

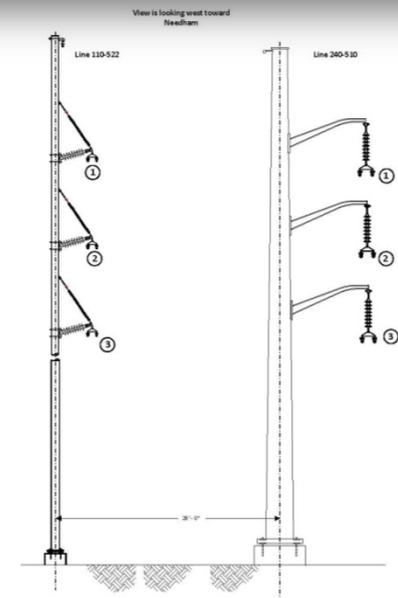
# **West Roxbury to Needham Reliability Project**

Needham Board of Selectmen  
Public Meeting

January 23, 2017

- Introductions
- Overview
- Project Need
- Project Alternatives
- Route Selection Process
- Construction & Traffic Management Plans
- EMF Analysis
- Next Steps

- Currently, Eversource has two overhead lines on one set of structures, called Double Circuit Towers (DCT) between the West Roxbury Substation and Needham Substation.
- The West Roxbury to Needham Reliability Project proposes to separate those existing lines thereby improving system reliability.
- The line separation work will occur by:
  - Relocating one set of existing lines to a new set of poles installed within the existing right-of-way.
  - In Needham, the separated line will exit the right-of-way and transition from an overhead design to an underground design located primarily in town streets into the Needham Substation on Chestnut Street.
  - Once the line is separated, the existing structures will remain with one less overhead line and set of arms.



# West Roxbury to Needham Reliability Project

## Locations of Other UG Transmission Lines in Vicinity of Project



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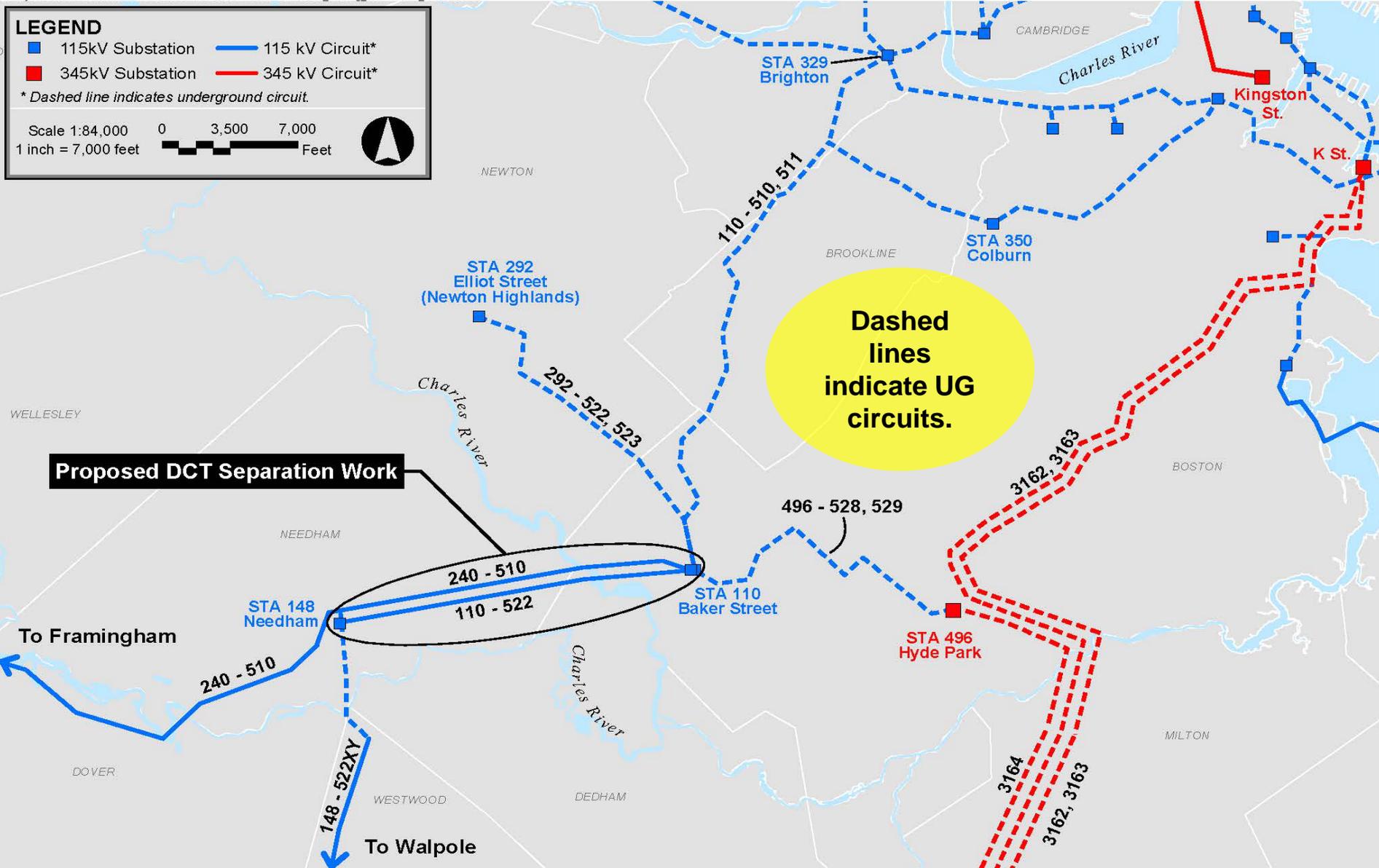
**LEGEND**

- 115kV Substation
- 345kV Substation
- 115 kV Circuit\*
- 345 kV Circuit\*

\* Dashed line indicates underground circuit.

Scale 1:84,000  
1 inch = 7,000 feet

0 3,500 7,000 Feet



***Federal and regional electric system planning criteria require that electric transmission systems are able to reliably deliver power to the region under a number of different operating conditions, including emergency conditions.***

- The Federal Energy Regulatory Commission (FERC) is the independent agency that regulates the interstate transmission of electricity and protects the reliability of the interstate transmission system through mandatory reliability standards.
- FERC established the North American Electric Reliability Corporation (NERC) to develop mandatory North American Reliability Standards that all electric utilities must follow.
- Northeast Power Coordinating Council (NPCC) has been delegated by NERC to establish a set of rules and criteria that are particular to the northeast, and encompass more general NERC standards.
- ISO-NE (Independent System Operator – New England) is the independent entity authorized by FERC to:
  - Maintain a reliable flow of power over the transmissions system across all 6 New England states
  - Design, run, and oversee the billion-dollar markets where wholesale electricity is bought and sold
  - Conduct studies, analyses, and system planning to ensure that New England’s electricity needs will be met now and into the future.
- The standards established by NERC, NPCC and ISO-NE have been developed to ensure that the electric power transmission system serving New England is designed, constructed and maintained to provide adequate and reliable electric power delivery to meet customer demand.

- The ISO-NE has a robust stakeholder process for analyzing and planning the bulk power system. Some of those stakeholders include:
  - consumer advocates and Attorney General(s)
  - market participants (generators, transmission providers, etc.)
  - Public Utility Commissions
  - environmental regulators
  - and other interested parties
- For major transmission upgrades, the regional transmission planning process includes:
  1. System needs are identified;
  2. The market is given the opportunity to propose solutions to meet the identified system need;
  3. If market responses are not forthcoming or adequate to meet the identified need, the host transmission utility(ies) is obligated to propose transmission solutions to meet the need;
  4. ISO-NE then selects the preferred solution to address the identified system reliability need essential for maintaining power system reliability

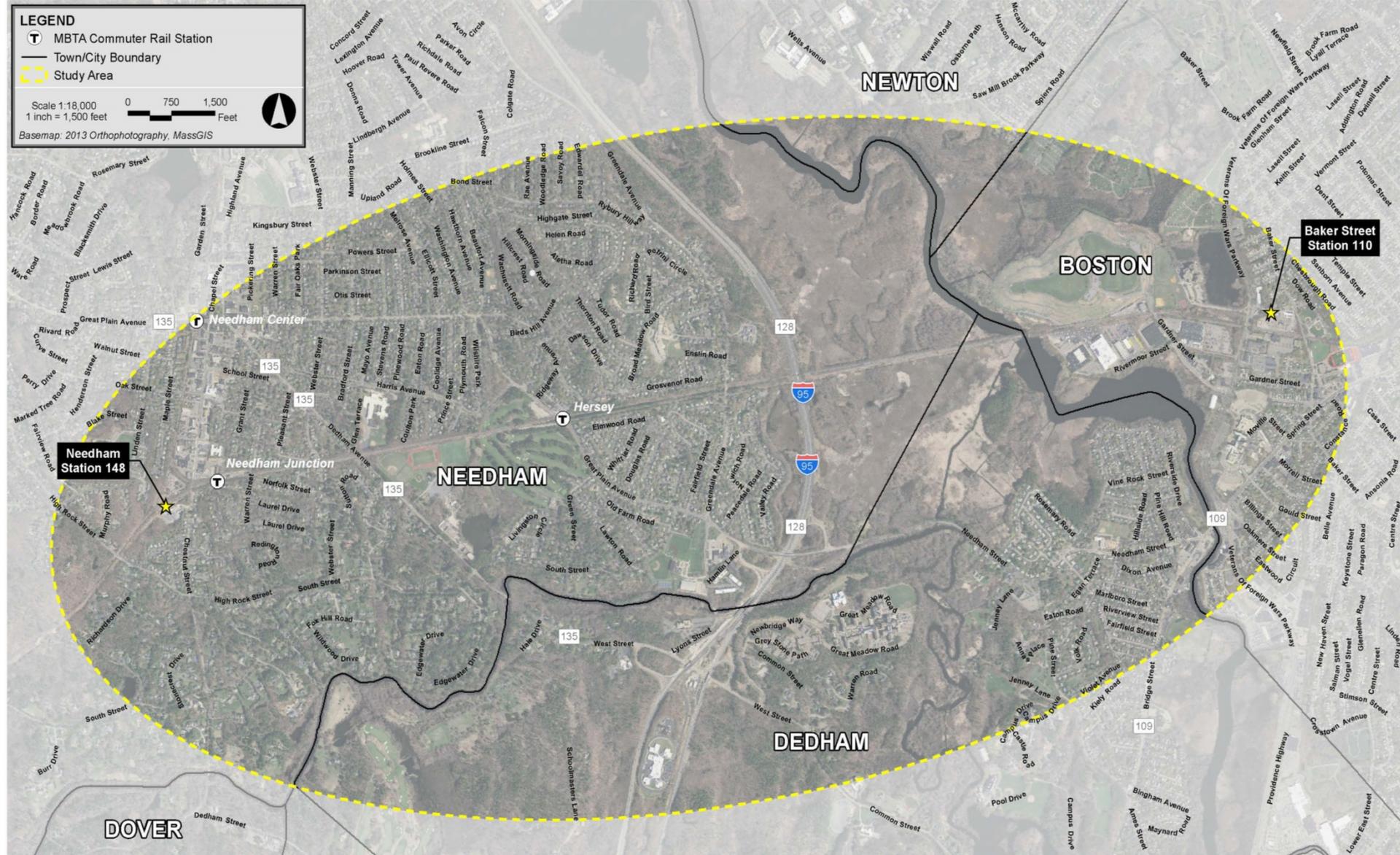
- A strong electrical transmission grid is vital to the safety, security and economic prosperity of the region. The transmission system serves a critical role to ensure that electricity flows with a high degree of reliability from wherever the power is generated to where power is needed.
- In a recent study, ISO-New England, the independent system operator for New England, concluded that there are inadequate transmission resources to reliably serve the electricity needs in the Greater Boston and surrounding area.
- To proactively address these deficiencies and the growing customer demands on the electric system, Eversource is implementing a series of transmission projects called the “Greater Boston and Southern New Hampshire Solution.”
- One of the selected projects to solve the identified system reliability problems, over other transmission solutions, and non-transmission solutions, is the *West Roxbury to Needham Reliability Project*.

- ISO-NE has determined that certain contingency events, e.g., loss of line, piece of equipment, etc., would result in equipment overload and loss of power to as many as 24,000 customers in the immediate Project area and potentially up to 65,000 in the western Boston suburbs.
- The proposed line separation between West Roxbury and Needham will mitigate risk to the existing transmission system by correcting identified thermal overload problems in the area.
- Non-transmission alternatives, such as solar, wind, fuel cells, energy efficiency and demand response programs cannot adequately address the identified system need, either alone or in combination.
- This Project was selected as the preferred solution over other potential transmission solutions.
- The Project will improve the reliable delivery of power to Needham and the surrounding area.

# Transmission Line Routing: Area Reviewed for Potential Routes

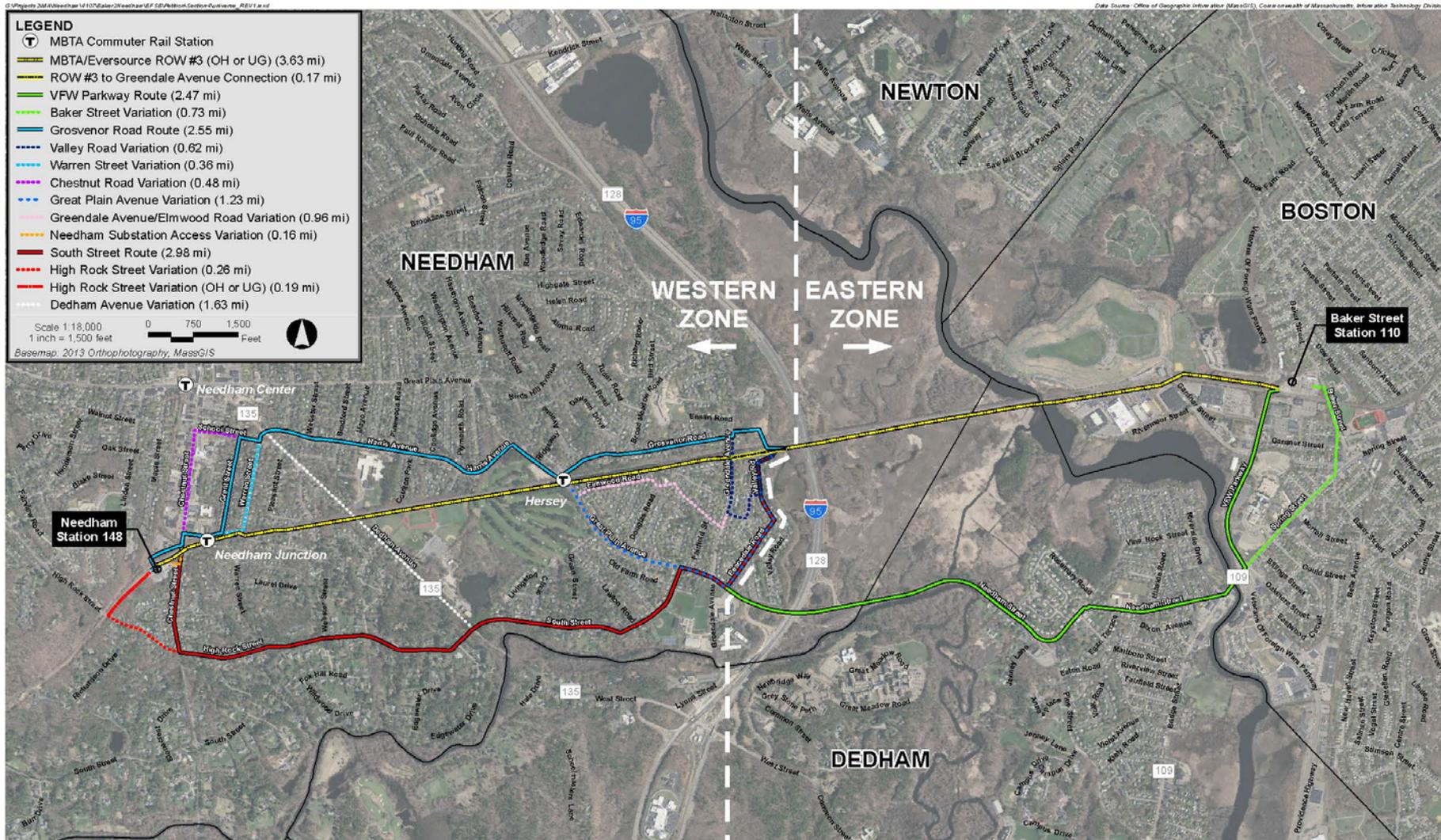
G:\Projects\2\AI\Needham\4107\Baker\2\Needham\ESR\PE\Section4\study\_area.mxd

Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division



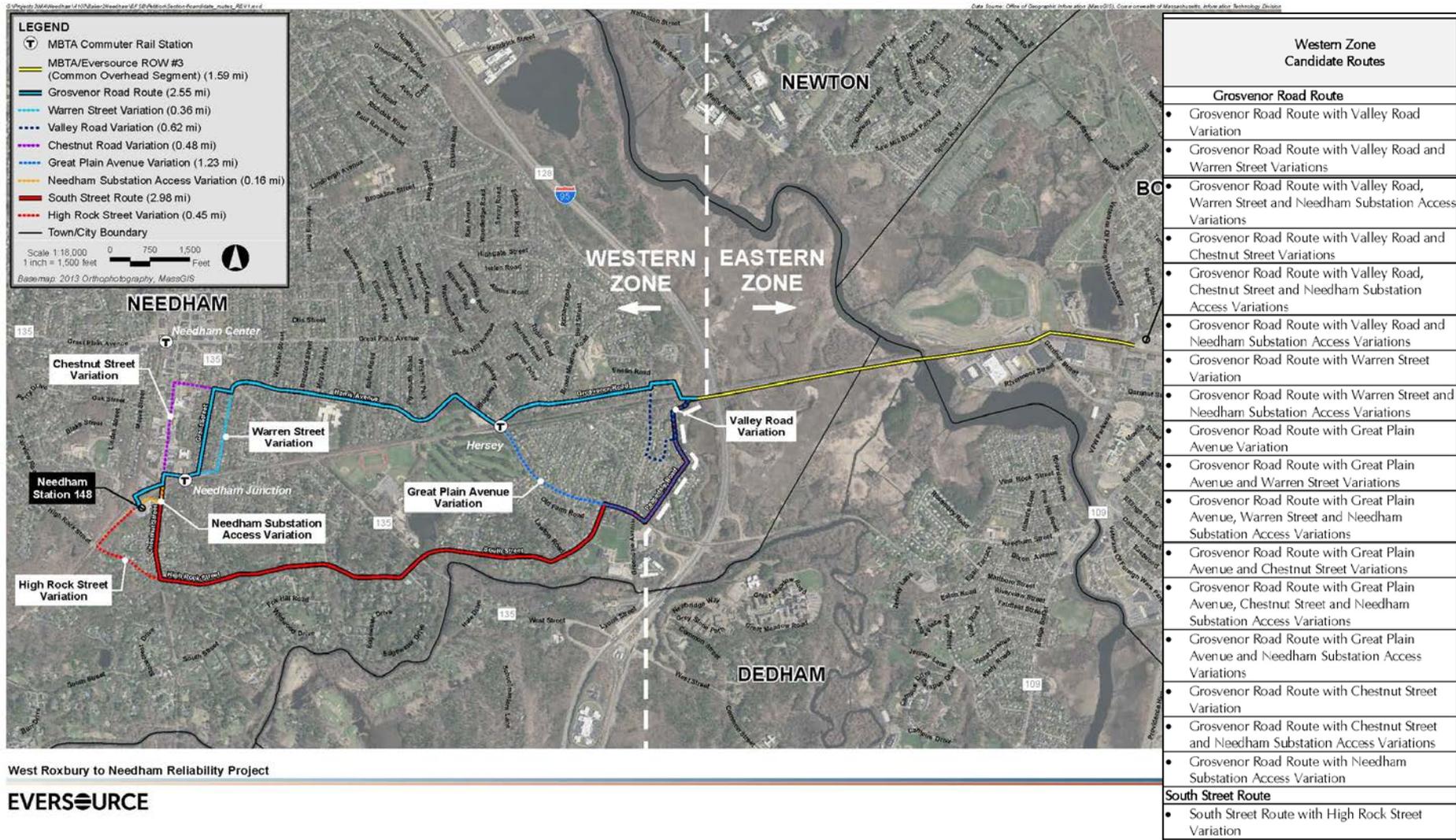
- The routing and design evaluations were performed using established guidelines to identify a comprehensive set of feasible routes between the West Roxbury and Needham substations.
- To date, the Company considered a total of 28 project options (including design options). All potential routes were screened and obviously flawed routes were eliminated from further consideration.
- The 20 remaining candidate routes were evaluated by applying detailed environmental, constructability, community impact, and conceptual cost estimate criteria. The criteria included, but was not limited to, the following:
  - Residential land use
  - Industrial and commercial land use
  - Public transit facilities
  - Historic resources
  - Potential for traffic congestion
  - High impact crossings
  - Wetlands
  - Environmental and water resources
  - Potential for subsurface contamination
  - Length
  - Street Width
  - Utility density
- Eversource used this evaluation process to select a “Preferred” Route and “Noticed Alternative” route.

# West Roxbury to Needham Reliability Project Universe of Routes (28 potential combinations)



West Roxbury to Needham Reliability Project

# West Roxbury to Needham Reliability Project Candidate Routes (20 routes were scored)



West Roxbury to Needham Reliability Project

# West Roxbury to Needham Reliability Project Preferred and Noticed Alternative Route

## Preferred UG Route (~2.6 miles)

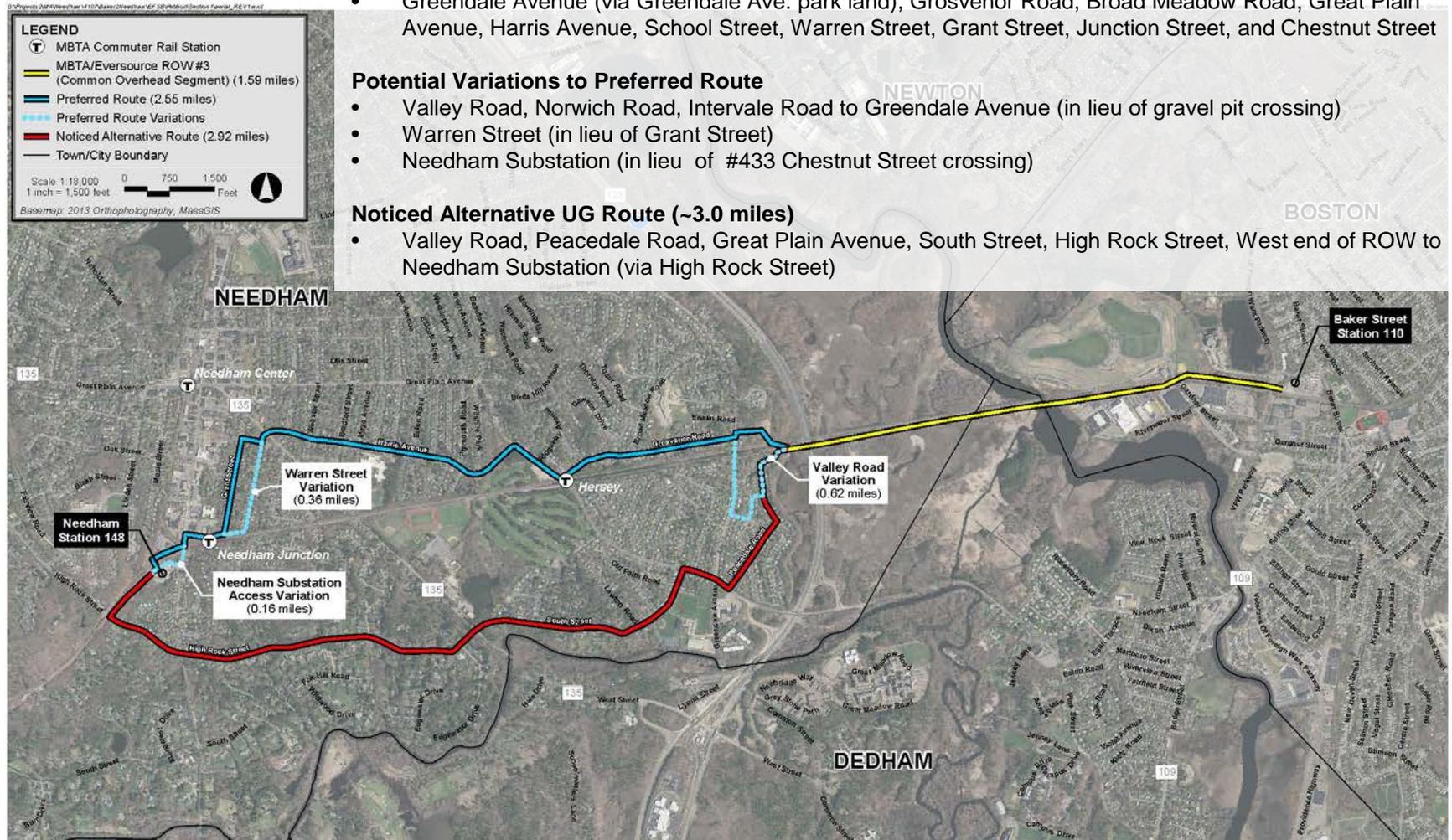
- Greendale Avenue (via Greendale Ave. park land), Grosvenor Road, Broad Meadow Road, Great Plain Avenue, Harris Avenue, School Street, Warren Street, Grant Street, Junction Street, and Chestnut Street

## Potential Variations to Preferred Route

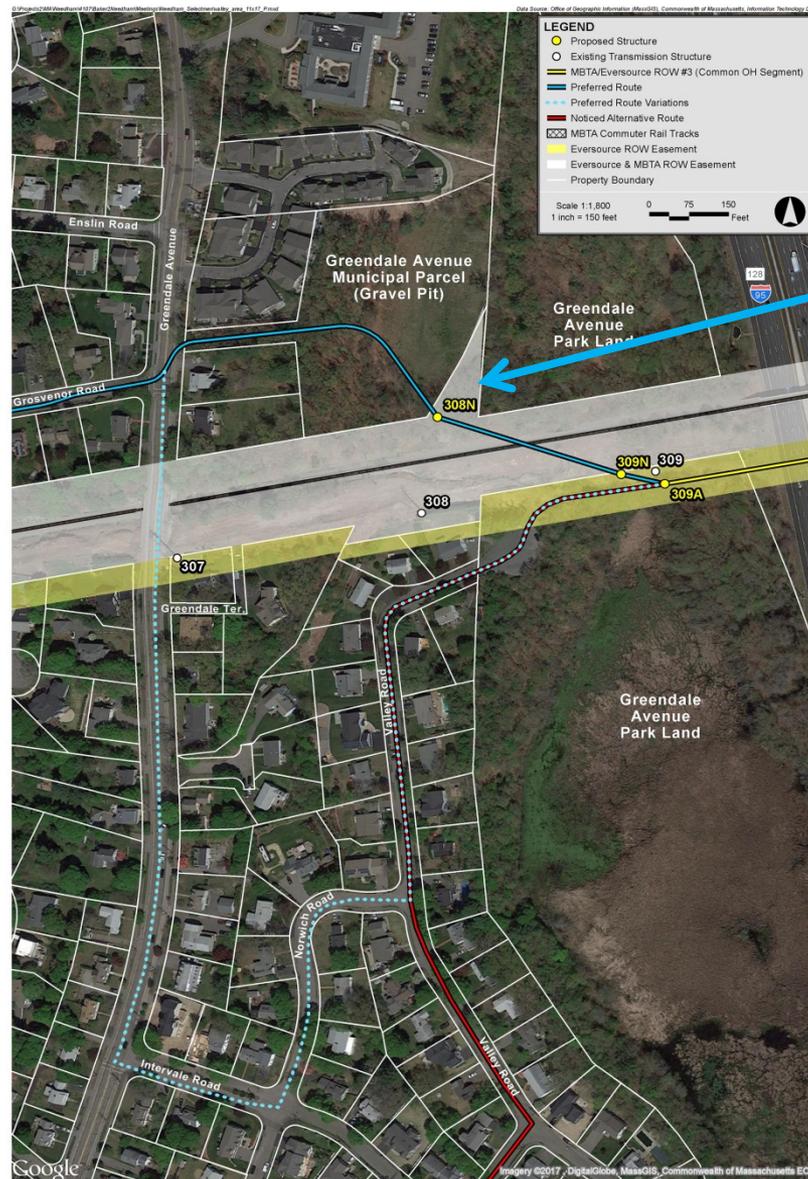
- Valley Road, Norwich Road, Intervale Road to Greendale Avenue (in lieu of gravel pit crossing)
- Warren Street (in lieu of Grant Street)
- Needham Substation (in lieu of #433 Chestnut Street crossing)

## Noticed Alternative UG Route (~3.0 miles)

- Valley Road, Peacedale Road, Great Plain Avenue, South Street, High Rock Street, West end of ROW to Needham Substation (via High Rock Street)

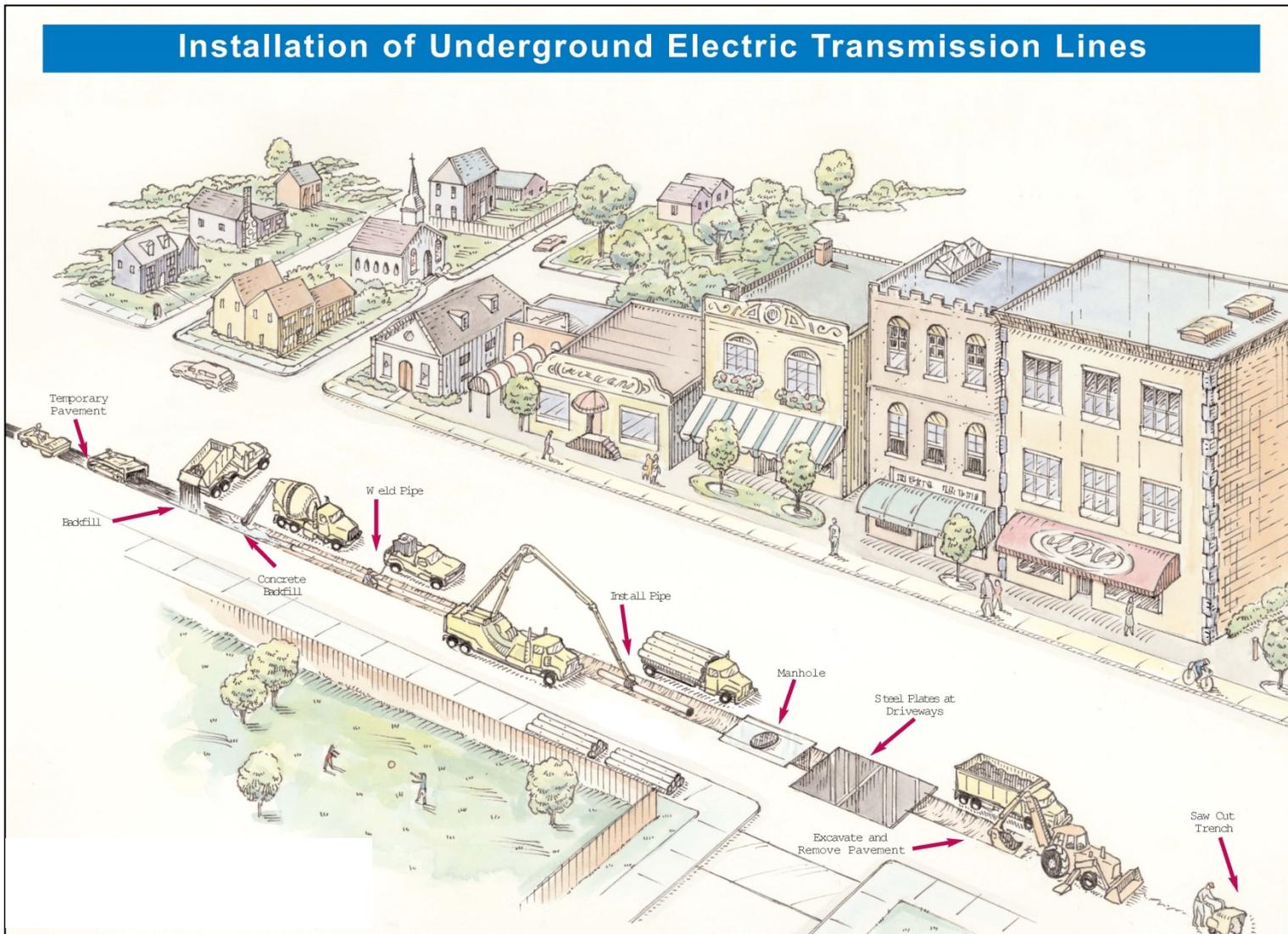


# West Roxbury to Needham Reliability Project Overhead to Underground Transition Point

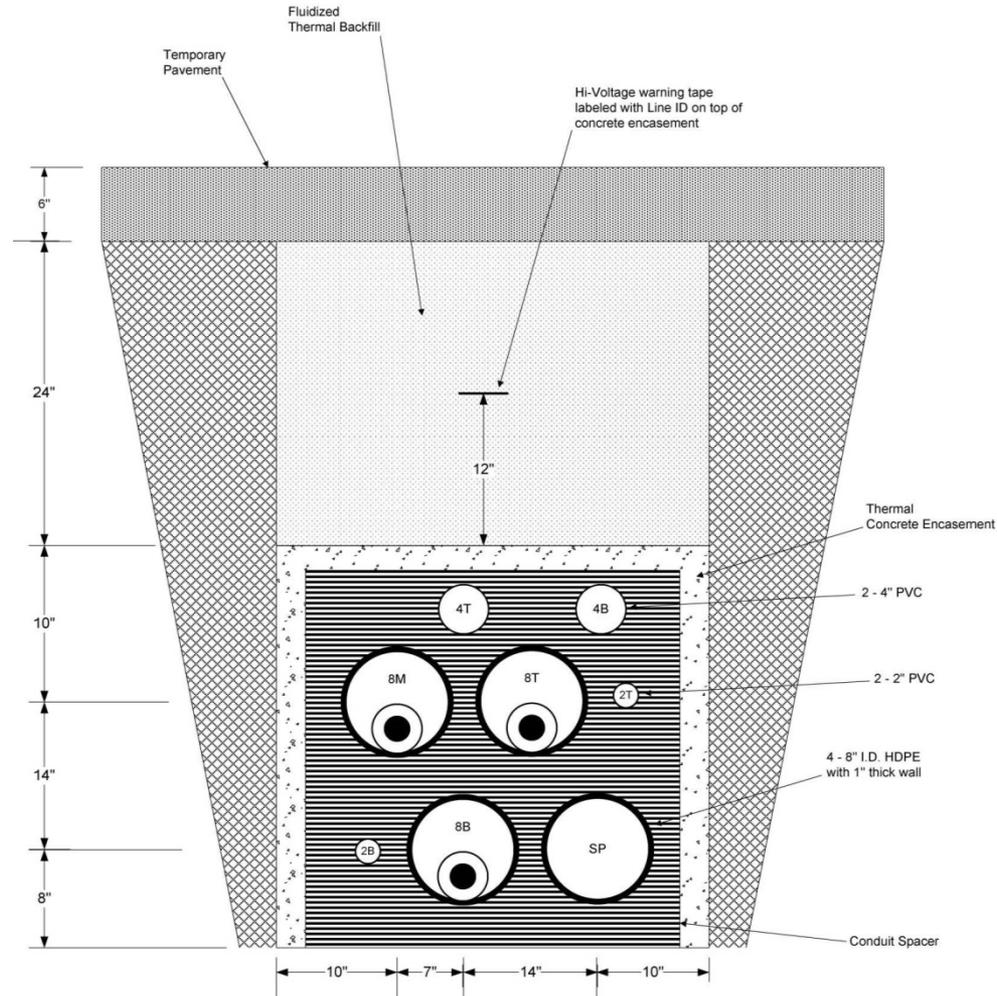


Proposed transition structure for preferred route

# Typical Construction Schedule & Duration for UG Transmission Line Work in Public Roads



# Construction Overview: Underground Duct Bank





- Splice Vault/Manhole installation
- Trench excavation, conduit installation, backfill and temporary paving.
- Install cables between each manhole.
- Cable splicing and testing in manholes.
- Final pavement and other Project restorations completed per municipal town agreements.

# Managing Traffic Impacts During Construction

- Traffic Management Plan
  - ✓ Developed jointly with Municipalities, MBTA, Schools and Public Safety Officials
  - ✓ Police details paid by Project
  - ✓ Maintain access to homes and businesses at all times
  - ✓ Hours of Construction as agreed upon with the Town
  - ✓ Maintain pedestrian safety
- Communicate and with neighbors and communities throughout the process by providing:
  - ✓ Door-to-door outreach
  - ✓ Informational mailings to abutting property owners, residents, and businesses
  - ✓ Project hotline and e-mail



MUTCD TEMPORARY TRAFFIC CONTROL ROAD SIGNS

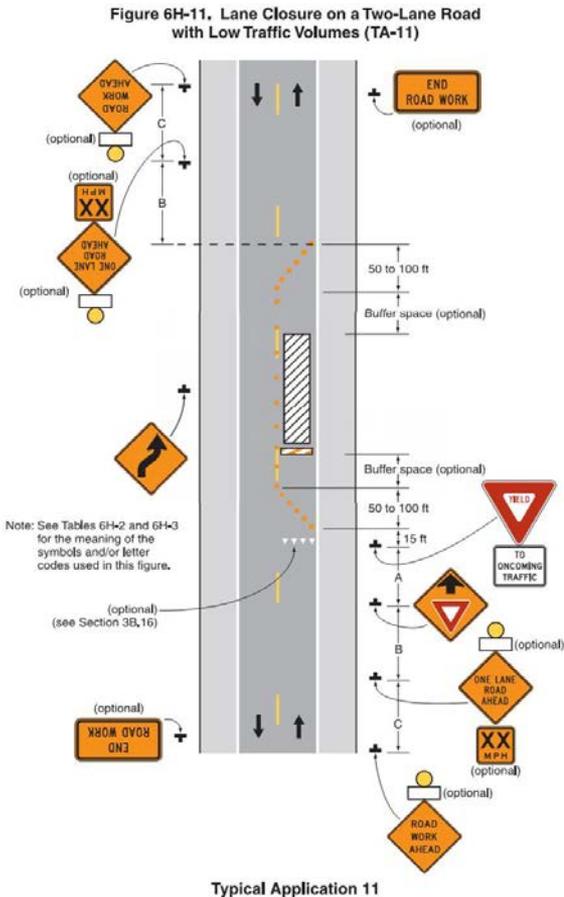
|                                      |                                  |  |                              |   |                                     |                                   |                                     |
|--------------------------------------|----------------------------------|--|------------------------------|---|-------------------------------------|-----------------------------------|-------------------------------------|
| ROAD WORK AHEAD<br>W20-1             | DETOUR AHEAD<br>W20-2            | ROAD CLOSED AHEAD<br>W20-3                 | ONE LANE ROAD AHEAD<br>W20-4 | END DETOUR<br>M4-8A                         | Culloden Rd<br>DETOUR<br>M4-9L (CR) | Custer St<br>DETOUR<br>M4-9L (CS) | Sheridan St<br>DETOUR<br>M4-9L (SS) |
| ROAD CLOSED<br>R11-2                 |                                  |  | DETOUR<br>M4-10L             | DETOUR<br>M4-10R                            | Culloden Rd<br>DETOUR<br>M4-9R (CR) | Custer St<br>DETOUR<br>M4-9R (CS) | Sheridan St<br>DETOUR<br>M4-9R (SS) |
| ROAD CLOSED TO THRU TRAFFIC<br>R11-4 | LEFT LANE MUST TURN LEFT<br>R3-7 | SIDEWALK CLOSED<br>USE OTHER SIDE<br>R9-10 |                              |   |                                     |                                   |                                     |
|                                      |                                  |  |                              | <b>PRELIMINARY<br/>NOT FOR CONSTRUCTION</b> |                                     |                                   |                                     |

**EVERSOURCE**  
ENERGY

## Eversource will work closely with the Town on detailed Traffic Management Plans (TMPs)

2009 Edition

Page 655



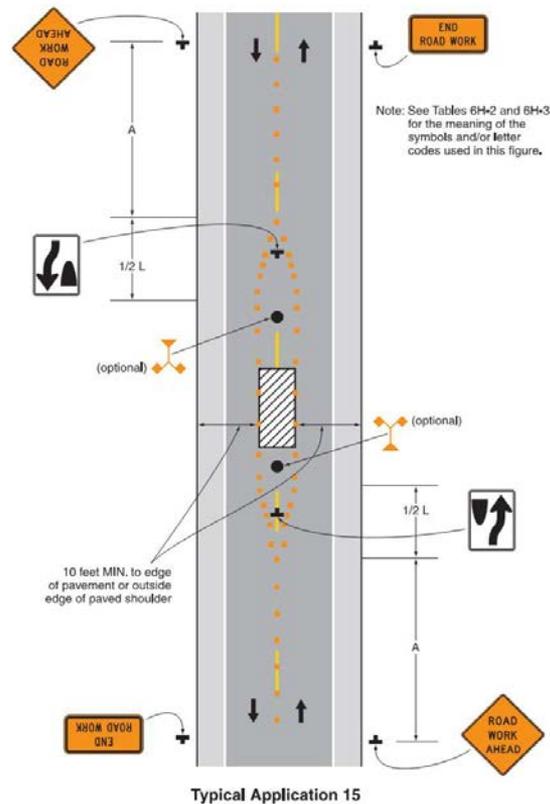
December 2009

Sect. 6H.01

2009 Edition

Page 663

**Figure 6H-15. Work in the Center of a Road with Low Traffic Volumes (TA-15)**



December 2009

Sect. 6H.01

- Gradient conducted an independent analysis of the EMF created by the transmission lines.
- EMFs were modeled for overhead and underground line cross-sections:
  - non-emergency summer peak; and
  - average transmission line loadings.
- Both current and projected magnetic field values in all locations are well below the International Commission on Non-Ionizing Radiation Protection (ICNIRP) health-based guidelines for the public exposure to EMF (2,000 mG).
- EMF results are typical and consistent with any similar technology in use or approved to be constructed elsewhere in Massachusetts or throughout the U.S.
- There will be a reduction in the existing EMF values near the overhead lines between Valley Road and Needham Substation (because 1 set of overhead lines are being removed (separated) and buried in the ground as part of the Project).

**Electric and Magnetic Field (EMF) Modeling Analysis  
for the West Roxbury to Needham Reliability Project**

Prepared for

Epsilon Associates, Inc.  
3 Clock Tower Place, Suite 250  
Maynard, MA 01754

Eversource  
1 NSTAR Way  
Westwood, MA 02090

March 18, 2016

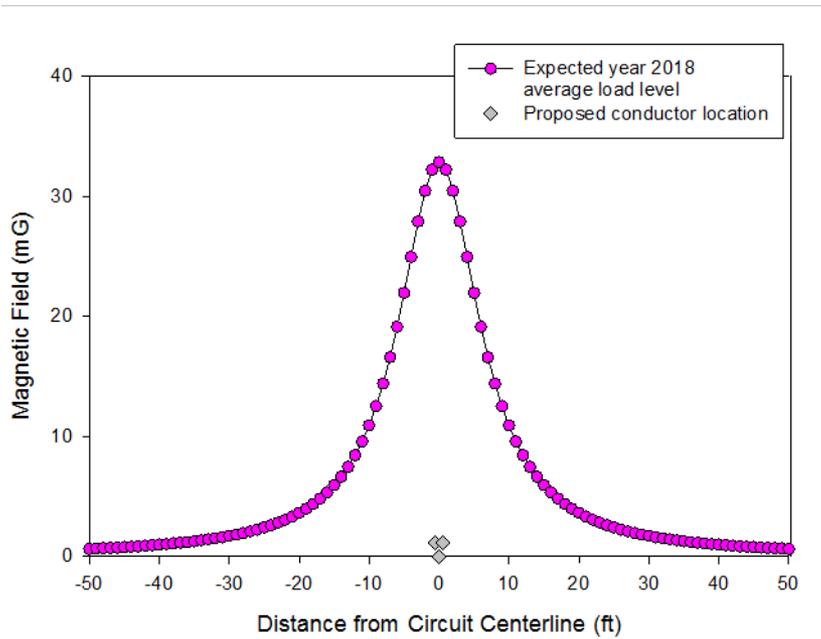


- EMF are present wherever electricity is used.
- EMF is common to all electric devices and power transmission, with motorized devices producing large magnetic fields.
- EMF from some of these sources can be much higher than what might be associated with a transmission line.
- EMF drops off rapidly with distance from any source.
- National and international public health organizations have periodically reviewed the data (now 40 years of scientific research) and have concluded that EMF from use of electric power is not an established health risk.

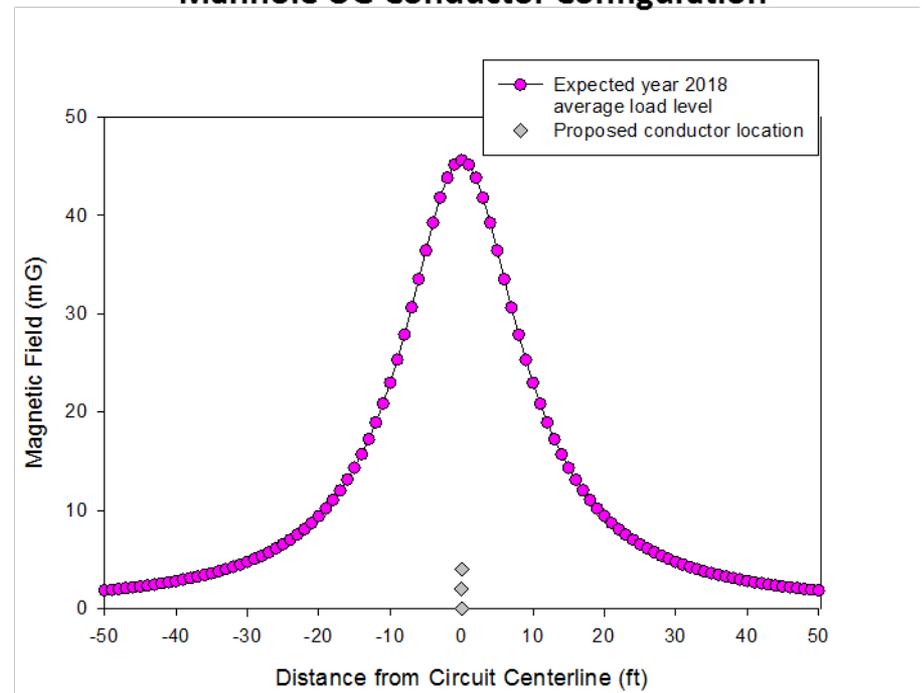
| Source                    | Distance from Source |             |
|---------------------------|----------------------|-------------|
|                           | 6 inches (mG)        | 1 foot (mG) |
| Can opener                | 600                  | 150         |
| Vacuum cleaner            | 300                  | 60          |
| Hair dryer                | 300                  | 1           |
| Electric pencil sharpener | 200                  | 70          |
| Power saw                 | 200                  | 40          |
| Microwave                 | 200                  | 4           |
| Electric shaver           | 100                  | 20          |
| Portable heater           | 100                  | 20          |
| Kitchen mixer             | 100                  | 10          |
| Blender                   | 70                   | 10          |
| Electric range            | 30                   | 8           |
| Dishwasher                | 20                   | 10          |

Source: NIEHS (2002)  
Numbers shown are median values.

### Typical UG Conductor Configuration

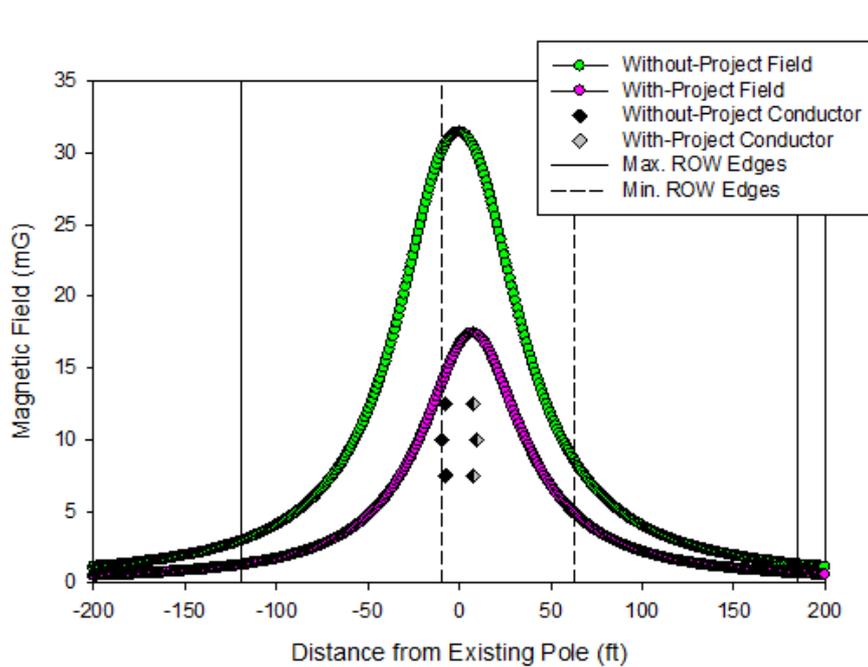


### Manhole UG Conductor Configuration

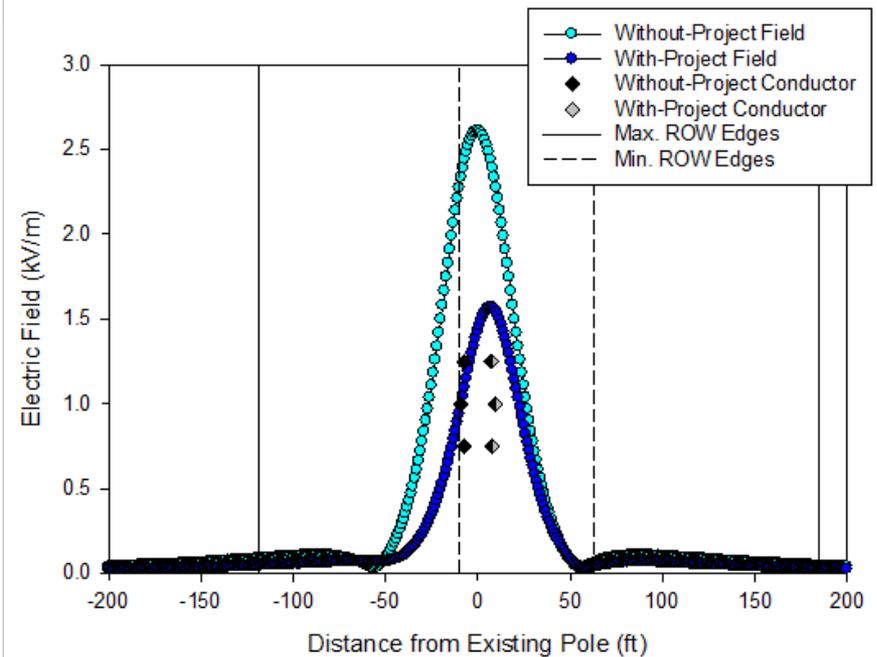


# Overhead Line Modeling Results for ROW Portion in Needham West of Valley Road

Predicted magnetic fields for  
expected year 2018 average  
load levels



Predicted electric fields for  
expected year 2018 average  
load levels



## **Stakeholders**

- Municipal officials
- State and federal elected officials and regulators
- Property owners & tenants
- Businesses

## **Project Communication for Municipalities**

- Briefings & Presentations
- E-mail updates

## **Project Communication for the Public**

- Releases/Media Advisories
- Door to door outreach, including door hangers
- Project Hotline: 1-800-793-2202
- E-Mail: [TransmissionInfo@Eversource.com](mailto:TransmissionInfo@Eversource.com)



**Project Hotline: 1-800-793-2202**

**E-Mail: [TransmissionInfo@Eversource.com](mailto:TransmissionInfo@Eversource.com)**