DESIGN REVIEW BOARD
Monday, October 19, 2020
7:30 p.m.

Virtual Meeting using Zoom

Meeting ID: 845-1987-6965
(Instructions for accessing below)

To view and participate in this virtual meeting on your phone, download the "Zoom Cloud Meetings" app in any app store or at www.zoom.us. At the above date and time, click on "Join a Meeting" and enter the following Meeting ID: 845-1987-6965
Link: https://us02web.zoom.us/j/84519876965

To view and participate in this virtual meeting on your computer, at the above date and time, go to www.zoom.us click "Join a Meeting" and enter the following ID: 845-1987-6965

HEARINGS begin at 7:30pm.

Public notice is hereby given that 540 Hillside Avenue LLC C/O SSG Hillside Needham LLC, located at 540 Hillside Ave, has made application to the Design Review Board for a Special Permit pursuant to the Sign By-Law Section 5.5.3.2, (Wall sign exceeding 32 Sq. Ft.) and Section 5.5.3.2(b) (Allowing additional wall sign) any other applicable sections of the By-law.

This hearing will be continued to Monday, November 2, 2020 at 7:30pm.

APPLICANTS:
(Items for which a specific time has not been assigned may be taken out of order.)

1. Boston Properties applying for site plan review of the property located at 140 Kendrick Street.

REVIEW Minutes of 10/5/2020 meeting.

***Next Public Meeting** – November 2, 2020 at 7:30pm via Zoom Webinar*

TOWN OF NEEDHAM

DESIGN REVIEW BOARD

Public Service Administration Building
500 Dedham Avenue
Needham, MA 02492
Application and Report

Property Location: 140 Kendrick Street *Date:* 10/13/2020

Owner: BP 140 Kendrick Street LLC c/o Boston Properties Limited Partnership

Address: 800 Boylston Street, Suite 1900 Boston MA 02199
Street *City* *State* *Zip*

Telephone: 617-236-3392

Applicant: BP 140 Kendrick Street LLC c/o Boston Properties Limited Partnership

Address: 800 Boylston Street, Suite 1900 Boston MA 02199
Street *City* *State* *Zip*

Telephone: 617-236-3392

Designer/Installer: VHB & Copley Wolff Design Group

Address: VHB 101 Walnut Street, Watertown MA 02472
Copley Wolff Design Group 10 Post Office Square, Suite 1315, Boston, MA 02109
Street *City* *State* *Zip*

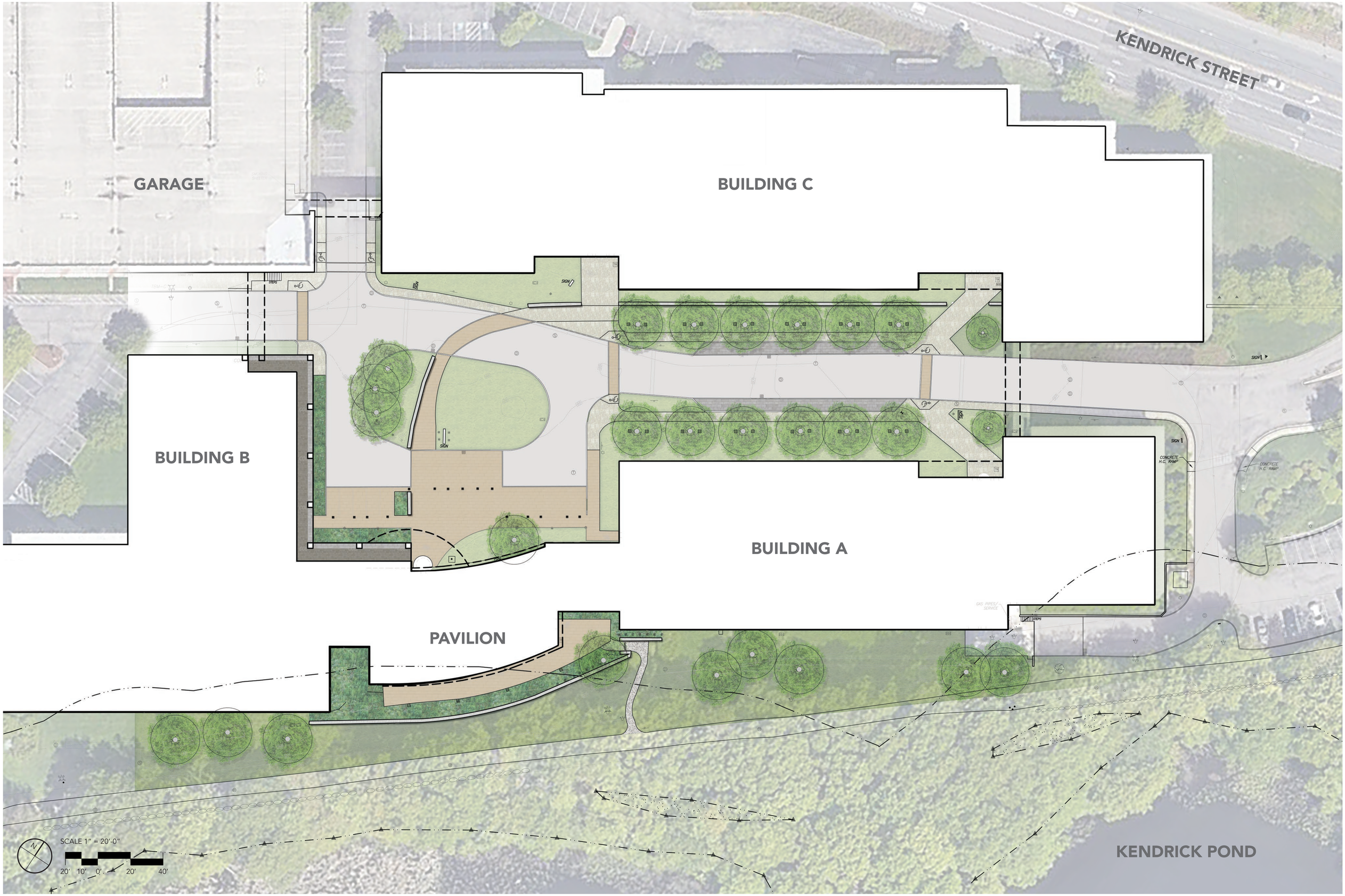
Telephone: VHB - 617-607-2769
Copley Wolff Design Group - 617-654-9000

Type of Application
☐ **Sign**
☐ **Minor Project**
☐ **Exterior Alterations**
Major Project (Site Plan Review) ☐ **- preliminary** ☒ **- final**
☐ **Flexible Subdivision**
☐ **Planned Residential Development**
☐ **Residential Compound**

Brief description of sign or project:

The 140 Kendrick Street Project was originally approved and constructed pursuant to Special permit/Site Plan Review issued by the Planning Board on June 15th, 1999. The current project consists of renovating the existing single tenant office space to allow multiple tenants to lease the buildings. Exterior improvements are limited to adding entrance locations to the buildings, patio improvements, and accessible parking & landscape improvements at the new entrance locations.

Please email completed application to elitchman@needhamma.gov



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Landscape Architects & Planners

140 KENDRICK STREET

Boston Properties

Needham, MA

EXISTING CONDITIONS PLAN RENDERING

OCTOBER 8, 2020

KENDRICK STREET

GARAGE

BUILDING C

EXISTING CURB LOCATION

BUILDING B

BUILDING A

EXISTING CURB LOCATION

PAVILION

PROPOSED TREES

PROPOSED TREES

SCALE 1" = 20'-0"

20' 10' 0' 20' 40'

KENDRICK POND

Copley Wolff Design Group
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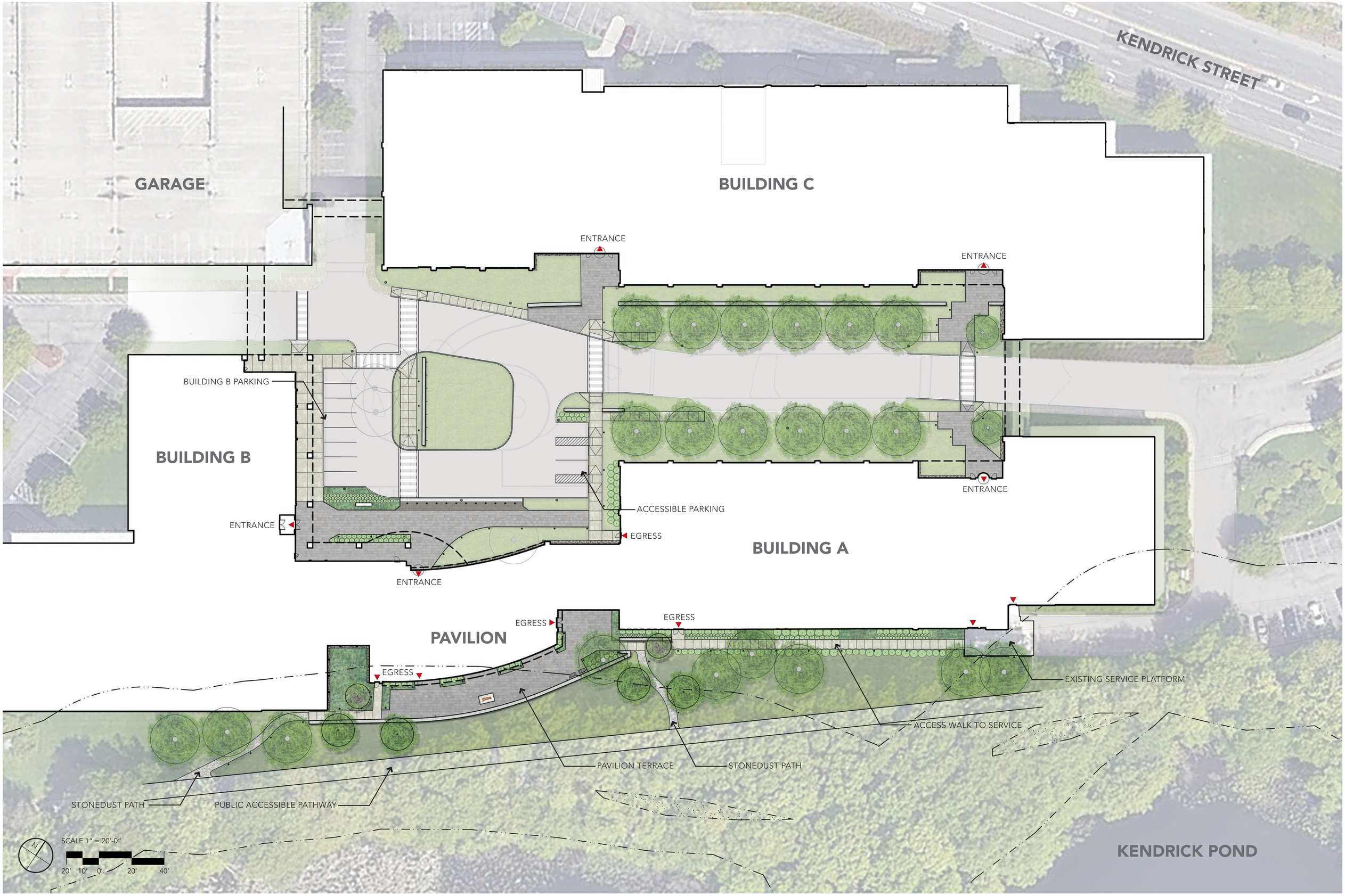
140 KENDRICK STREET

Boston Properties

Needham, MA

PROPOSED PLAN RENDERING - EXISTING CURB

OCTOBER 8, 2020



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Needham, MA

PROPOSED PLAN RENDERING

OCTOBER 8, 2020

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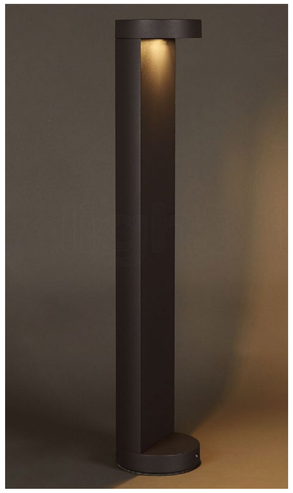
Needham, MA

EXISTING SITE PHOTOS

OCTOBER 8, 2020



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Boston Properties

Needham, MA

AMENITY PRECEDENT PHOTOS

OCTOBER 8, 2020

BUILDING C

BUILDING B

BUILDING A

12" HDPE

OCS WEIR
ELEV. = 96.9

STORMTECH SC-740
54 CHAMBERS
CHAMBER INV = 92.50'
STONE INV = 92.00'

MAINTAIN EXISTING
DRAIN CONNECTION

CONNECT TO EXISTING MANHOLE
INV=94.0±

CONNECT TO UNDERDRAIN
(REFER TO LANDSCAPE PLAN)

FILTER TUBES AND
SILT FENCING (TYP)

TOWN OF NEEDHAM
MAINTENANCE EASEMENT
(4 FEET WIDE)
AREA = 2,008± S.F.
(SEE DOC. NO. 870498)

TOWN OF NEEDHAM
SEWER EASEMENT B
AREA = 14,593± S.F.
(SEE DOC. NO. 870498)

MDC EASEMENT
AREA = 10,321± S.F.
(SEE DOC. NO. 870499)

20' WIDE SEWER EASEMENT
(SEE CERT. OF TITLE #131038)

RAILROAD EASEMENT
(VARIABLE WIDTH)
(SEE DOC. #225520)
(SEE BK. 3786, PG. 430)

N.E.T. & T. D/B/A BELL ATLANTIC
& BOSTON EDISON COMPANY
EASEMENT (DOCUMENT NO. 850639)

ZONING SETBACK LINE

NEW ENGLAND BUSINESS CENTER ZONE
& WIRELESS COMMUNICATIONS FACILITIES OVERLAY DISTRICT

SINGLE RESIDENCE A ZONE

CUTLER LAKE

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140 KENDRICK STREET

Boston Properties

Needham, MA

CIVIL UTILITIES PLAN

OCTOBER 8, 2020

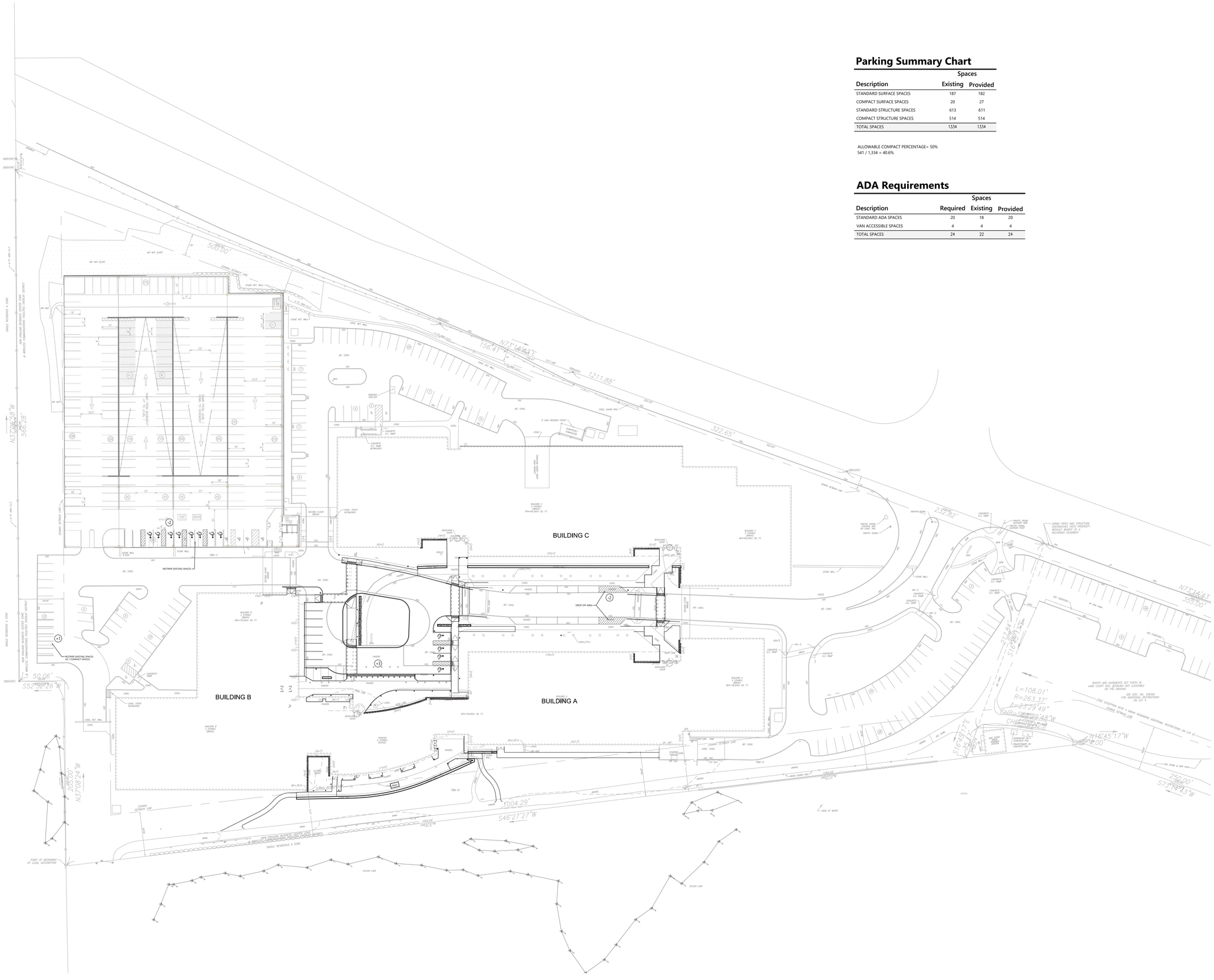
Parking Summary Chart

	Spaces	
Description	Existing	Provided
STANDARD SURFACE SPACES	187	182
COMPACT SURFACE SPACES	20	27
STANDARD STRUCTURE SPACES	613	611
COMPACT STRUCTURE SPACES	514	514
TOTAL SPACES	1334	1334

ALLOWABLE COMPACT PERCENTAGE= 50%
541 / 1,334 = 40.6%

ADA Requirements

		Spaces	
Description	Required	Existing	Provided
STANDARD ADA SPACES	20	18	20
VAN ACCESSIBLE SPACES	4	4	4
TOTAL SPACES	24	22	24



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140 KENDRICK STREET

Boston Properties

Needham, MA

CIVIL PARKING PLAN

OCTOBER 8, 2020

LANDSCAPE MATERIAL NOTES

1. THE CONTRACTOR SHALL REVIEW ALL DRAWINGS AND NOTES TO DETERMINE THE TOTAL SCOPE OF WORK AND ALL REQUIRED COORDINATION.
2. THE CONTRACTOR IS RESPONSIBLE FOR A THOROUGH SITE EXAMINATION TO SATISFY HIM OR HERSELF AS TO THE ACTUAL SITE CONDITIONS BEFORE SUBMISSION OF BIDS.
3. CONTRACTOR SHALL VERIFY ALL EXISTING UTILITY LOCATIONS PRIOR TO EXCAVATION.
4. CONTRACTOR SHALL ARRANGE PRE-INSTALLATION CONFERENCES AT PROJECT SITE FOR STONE WALLS AND PAVEMENT WORK. ATTENDEES SHALL INCLUDE OWNER'S REPRESENTATIVE, LANDSCAPE ARCHITECT, GENERAL CONTRACTOR AND ALL SUB-CONTRACTORS DIRECTLY CONCERNED WITH THE WORK.
5. CONTRACTOR SHALL PREPARE SUBMITTALS TO THE LANDSCAPE ARCHITECT FOR ALL COMPONENTS OF THE FINISHED WORK, INCLUDING SHOP DRAWINGS, PRODUCT DATA, MATERIAL CERTIFICATIONS, MIX DESIGNS AND SAMPLES.
6. CONTRACTOR SHALL FURNISH AND INSTALL CONSTRUCTED SAMPLES (MOCK-UPS) DEMONSTRATING ALL COMPONENTS OF THE DESIGN, INCLUDING FINISHED EXPOSED EDGES AND SURFACES, COLORS AND JOINTING FOR REVIEW AND APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTING FINAL WORK. MOCK-UPS MAY BE PART OF THE FINAL CONSTRUCTION. MOCK-UPS SHALL BE MAINTAINED AND PROTECTED THROUGHOUT THE DURATION OF THE PROJECT AND WILL SERVE AS PROJECT STANDARD. CONTRACTOR SHALL DEMOLISH AND RECONSTRUCT MOCK-UP UNTIL APPROVAL FROM LANDSCAPE ARCHITECT. MOCK-UPS SHALL INCLUDE: ONE FULL HEIGHT AND WIDTH BY 6' LONG STONE WALL SECTION AND ONE 6' X 6' PANEL OF CONCRETE PAVEMENT.
7. THE DIMENSIONS OF PAVEMENT JOINTS AS SHOWN ON THE DRAWINGS ARE TO THE CENTER LINE OF EACH TYPE OF JOINT EXCEPT WHERE PAVEMENT MEETS A VERTICAL FACE; AT THIS LOCATION DIMENSIONS ARE TO THE VERTICAL FACE. THE DIMENSIONS SHOWN ON DRAWINGS SHOW DESIGN INTENT AND MUST BE FIELD VERIFIED PRIOR TO PREPARATION OF SHOP DRAWINGS. ALL ALIGNMENTS SHALL BE INSTALLED AS SHOWN.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DOCUMENTING THE LOCATIONS OF ALL EXISTING SITE ELEMENTS TO BE RESET IN THEIR SAME HORIZONTAL LOCATION.
9. THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE INSIDE OR OUTSIDE OF LIMIT OF WORK LINE DUE TO HIS/HER CONSTRUCTION OPERATIONS.
10. STORAGE AREAS FOR THE GENERAL CONTRACTOR'S EQUIPMENT AND MATERIALS SHALL BE LOCATED WITHIN THE LIMITS OF WORK AS APPROVED BY THE LANDSCAPE ARCHITECT.
11. WHERE NEW PAVING MEETS EXISTING PAVING, MEET LINE AND GRADE OF EXISTING WITH NEW CONSTRUCTION.
12. AT ALL LOCATIONS WHERE EXISTING BITUMINOUS CONCRETE PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING PAVEMENT SHALL BE SAW CUT TO A CLEAN SMOOTH EDGE.
13. ALL EXISTING LIGHT POLES AND LIGHT BOLLARDS SHALL BE SAVED FOR OWNER FOR RELOCATION
14. EXISTING LIGHTS AND FLAG POLES SHALL BE SAVED FOR OWNER

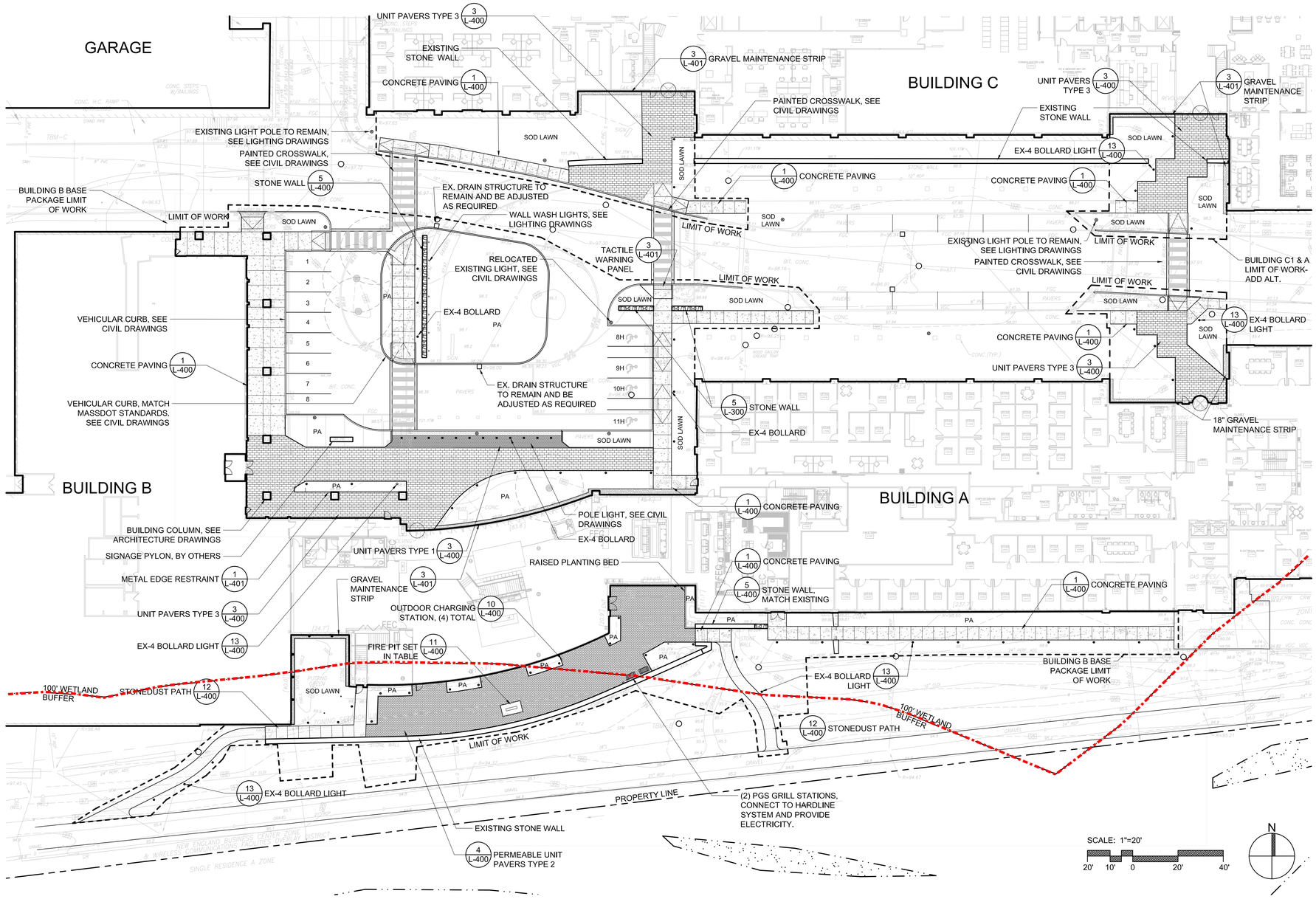
PAVER SCHEDULE - HANOVER

TYPE	PRODUCT	PERMEABILITY	SIZE (LXWXD)	COLOR	TOTAL SF
1	PREST PAVERS	NON-PERMEABLE	3.25" X 18" X 4"	STANDARD/TUDOR FINISH	395
2	PERMEABLE 12" X 18"	PERMEABLE	12" X 18" X 4"	STANDARD/TUDOR FINISH	3,350
3	PREST PAVERS	NON-PERMEABLE	12" X 36" X 4"	STANDARD/TUDOR FINISH	7,035

1. ALL CONCRETE PAVERS WILL BE SELECTED FROM THE RANGE OF STANDARD MANUFACTURER COLORS
2. ALL PAVERS SHALL BE GAUGED

MATERIALS LEGEND

- CONCRETE PAVING
- UNIT PAVERS TYPE 1
- PERMEABLE UNIT PAVERS TYPE 2
- UNIT PAVERS TYPE 3
- STONE DUST PATH
- STONE WALL
- FIRE PIT IN TABLE
- EX-1 WALL WASH LIGHT - MP LIGHTING L01
- EX-3 TREE UPLIGHT - BK LIGHTING DELTA STAR
- EX-4 BOLLARD LIGHT - BEGA 99058
- EX-5 TAPE LIGHT BELOW FIRE PIT - OPTIC ARTS FLEX AC 4
- EX-6 POLE LIGHT, MATCH EXISTING, SEE CIVIL DRAWINGS
- PA PLANTING



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Notes

2	DESIGN PACKAGE	2020.09.25
1	SCHEMATIC DESIGN	2020.08.06
	Issued/Revision	YYYY.MM.DD

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

Scale 1"=20'-0"
Project No. 2012

LANDSCAPE MATERIALS PLAN

L-100

PLANTING AND SOIL NOTES

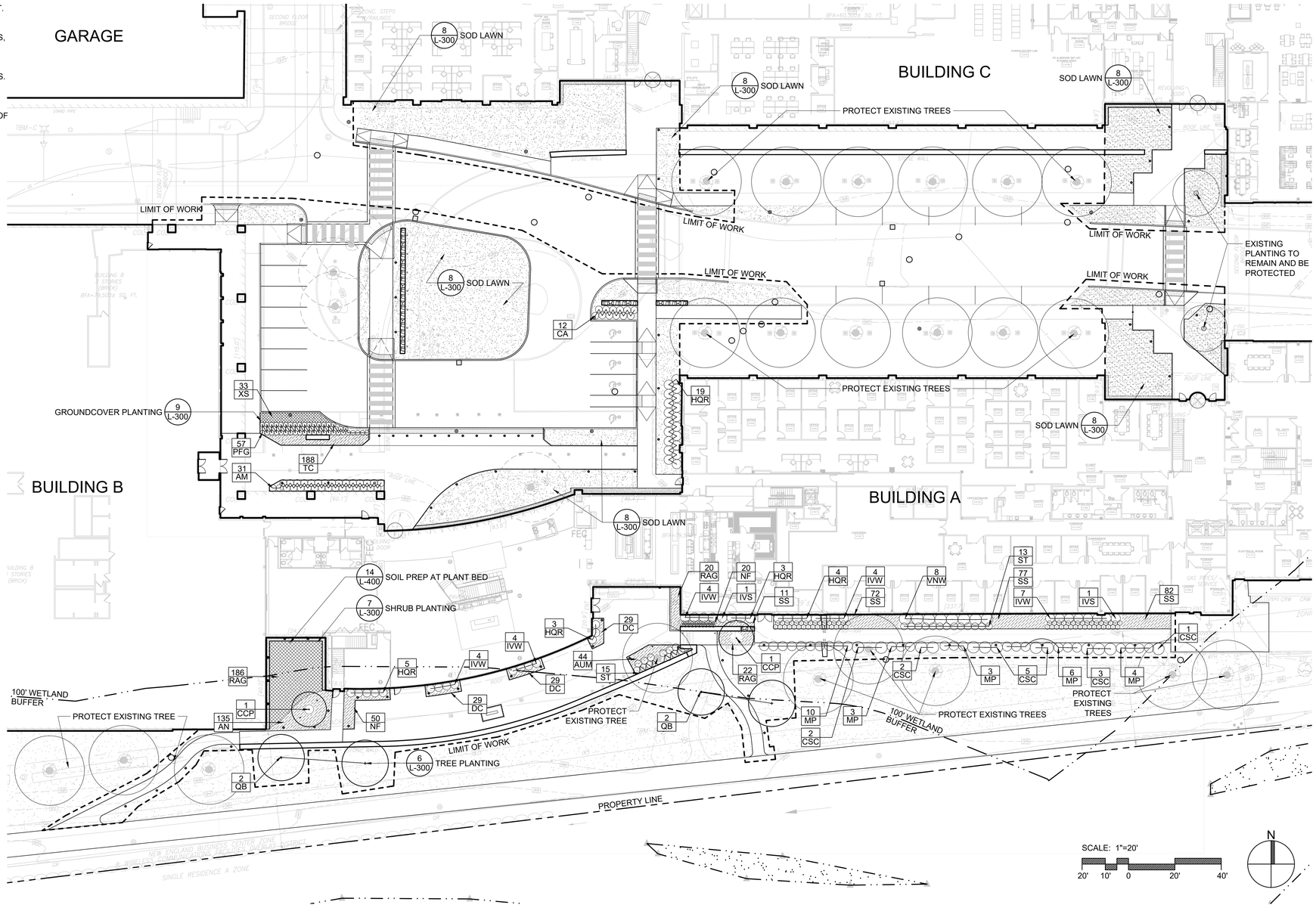
1. IF DISCREPANCIES EXIST BETWEEN THE NUMBER OF PLANTS DRAWN ON THE PLANTING PLAN AND THE NUMBER OF PLANTS IN THE PLANT LIST, THE PLANTING PLAN SHALL GOVERN.
2. ALL NEW PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC. IN ADDITION, ALL NEW PLANT MATERIAL FOR THE PROJECT SHALL BE OF SPECIMEN QUALITY.
3. THE LANDSCAPE ARCHITECT SHALL ONLY REVIEW TREES THAT ARE IN THE GROUND AT THE NURSERY. NO PRE-DUG TREES WILL BE ACCEPTED. THEREFORE TIMING OF IN-GROUND REVIEWS MUST BE COORDINATED WITH EXPECTED INSTALLATION DATES.
4. ALL NEW PLANTS TO BE BALLED & BURLAPPED OR CONTAINER GROWN, UNLESS OTHERWISE NOTED ON THE PLANT LIST.
5. THE CONTRACTOR SHALL SUPPLY ALL NEW PLANT MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING SHOWN ON THE DRAWINGS.
6. ANY PROPOSED SUBSTITUTIONS OF PLANT SPECIES SHALL BE MADE WITH PLANTS OF EQUIVALENT OVERALL FORM, HEIGHT, BRANCHING HABIT, FLOWER, LEAF, COLOR, FRUIT AND CULTURE, AND ONLY AFTER WRITTEN APPROVAL OF THE LANDSCAPE ARCHITECT.
7. ALL NEW PLANTS SHALL BE TAGGED AND APPROVED BY THE LANDSCAPE ARCHITECT AT THE NURSERY PRIOR TO DIGGING OR DELIVERY TO THE SITE.
8. CONTRACTOR SHALL LOCATE AND VERIFY ALL EXISTING UTILITY LINES PRIOR TO PLANTING AND SHALL REPORT ANY CONFLICTS TO THE LANDSCAPE ARCHITECT.
9. STAKE LOCATION OF ALL PROPOSED PLANTING FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO THE COMMENCEMENT OF PLANTING.
10. NEW SHRUBS AND GROUNDCOVER SHALL BEAR THE SAME RELATIONSHIP TO GRADE AS IT BORE TO PREVIOUS GRADE. TREES SHALL BE SET 3" HIGHER THAN PREVIOUS GRADE. NO TREES SHALL BE PLANTED BEFORE ACCEPTANCE OF ROUGH GRADING.
11. ALL PLANT BEDS TO RECEIVE UN-DYED, AGED AND SHREDDED BARK MULCH AS PER SPECIFICATIONS.
12. ALL EXISTING TREES TO REMAIN SHALL BE PROPERLY PROTECTED DURING CONSTRUCTION. PROTECTION TECHNIQUES SHALL BE REVIEWED AND APPROVED BY THE LANDSCAPE ARCHITECT.
13. PRUNE TREES IN ACCORDANCE WITH THE SPECIFICATIONS.
14. ALL PLANT MATERIAL SHALL BE MAINTAINED BY CONTRACTOR FOR ONE-FULL CALENDAR YEAR AND GUARANTEED FOR ONE-FULL CALENDAR YEAR.
15. CONFIRM ALL QUANTITIES AGAINST PLANTING PLANS, GRADING PLANS, AND SPECIFICATIONS, INCLUDING SITE DISTURBANCE OUTSIDE OF THE LIMIT OF GRADING NECESSITATED TO FACILITATE CONSTRUCTION.
16. WHERE SAND AND GRAVEL ARE SPECIFIED FOR A DRAINAGE LAYER, EXTEND DRAINAGE LAYER TO ASSOCIATED DRAIN LINES, DRAINAGE AREAS, OR DAYLIGHT.
17. WHERE ONE SOIL TYPE MEETS ANOTHER SOIL TYPE, FORM A 1:1 SLOPED BOUNDARY TRANSITION.
18. WHERE A SOIL PROFILE ENCROACHES WITHIN THE DRIP LINE OF EXISTING TREES, CONSULT WITH LANDSCAPE ARCHITECT PRIOR TO COMMENCING EXCAVATION.
19. ALL EXCAVATION AND PLACEMENT OF SOILS WITHIN THE DRIP LINE OF EXISTING TREES TO BE PERFORMED BY HAND.
20. SCARIFY SUBGRADE AS SPECIFIED BEFORE PLACEMENT OF ANY PLANTING SOILS.
21. DO NOT PLACE OR HANDLE SOILS THAT ARE WET.
22. PROTECT ALL EXISTING SOILS AGAINST COMPACTION, CONTAMINATION WITH CONSTRUCTION MATERIALS, AND ALL DISTURBANCE.
23. CONTRACTOR IS RESPONSIBLE FOR ACTUAL SITE CONDITIONS, COORDINATION OF SOILS PLACEMENT, AND PLANTING SUBDRAINAGE.
24. DO NOT PLACE ANY PLANTING SOIL PRIOR TO INSPECTION BY LANDSCAPE ARCHITECT.
25. SAND BASED STRUCTURAL SOIL (SBSS) WHERE IDENTIFIED SHALL CONSIST OF A MINIMUM OF 1,000 C.F. OF SBSS FOR EACH TREE.
26. ALL EXISTING TREES ON SITE SHALL BE PRESERVED AND PROTECTED UNLESS OTHERWISE NOTED.

PLANTING SCHEDULE

Symbol	Qty.	Scientific Name	Common Name	Size	Comments
Deciduous Trees					
QB	4	*Quercus bicolor*	Swamp White Oak	3 1/2"- 4" cal.	B&B, single straight central leader
Ornamental Trees					
CCP	2	*Cercis canadensis* 'Forest Pansy'	Forest Pansy Eastern Redbud	12'-15' ht.	B&B, multi-stem, , 3-4 main trunks, SPECIMEN QUALITY
Shrubs & Groundcovers					
AM	31	*Aronia melanocarpa*	Black Chokeberry	30"-36" ht.	36" O.C. spacing
AN	135	*Aster novae-angliae*	New England Aster	36"-42" ht.	18" O.C. spacing
AUM	44	*Arctostaphylos uva-ursi* 'Massachusetts'	Bearberry	6"-12" ht.	18" O.C. spacing
CA	12	*Clethra alniolia*	Sweet Pepperbush	36"-42" ht.	36" O.C. spacing
CSC	12	*Cornus sericea* 'Cardinal'	Cardinal Red-Osier Dogwood	4'-5' ht.	B&B, 5' O.C. spacing
DC	87	*Deschampsia cespitosa*	Tufted Hair Grass	24"-30" ht.	12" O.C. spacing
HQR	34	*Hydrangea quercifolia* 'Ruby Slippers'	Oakleaf Hydrangea	30"-36" ht.	48" O.C. spacing
IVW	23	*Ilex verticillata* 'Winter Red'	Winter Red Winterberry	3'-4' ht.	48" O.C. spacing
IVS	2	*Ilex verticillata* 'Southern Gentleman'	Southern Gentleman Winterberry	3'-4' ht.	48" O.C. spacing
MP	26	*Myrica pennsylvanica*	Bayberry	3'-4' ht.	48" O.C. spacing
NF	70	*Nepeta faasenii*	Catmint	12"-18" ht.	18" O.C. spacing
PFG	71	*Potentilla fruticosa* 'Goldfinger'	Shrubby Cinquefoil	24"-30" ht.	24" O.C. spacing
RAG	235	*Rhus aromatica* 'Gro-low'	Gro-low Sumac	24"-30" ht.	24" O.C. spacing
SS	242	*Schizachyrium scoparium*	Little Bluestem	18"-24" ht.	18" O.C. spacing
ST	28	*Spiraea tomentosa*	Steeplebush	30"-36" ht.	36" O.C. spacing
TC	188	*Tiarella cordifolia*	Foamflower	10"-12" ht.	12" O.C. spacing
VNW	8	*Viburnum nudum* 'Winterthur'	Smooth Witherod	3'-4' ht.	B&B, 6' O.C. spacing
XS	191	*Xanthorhiza simplicissima*	Yellowroot	18"-24" ht.	18" O.C. spacing

PLANTING LEGEND

- EXISTING TREE TO REMAIN
- PROPOSED DECIDUOUS TREE
- PROPOSED ORNAMENTAL TREE
- PROPOSED DECIDUOUS & EVERGREEN SHRUBS
- PROPOSED PERENNIAL & GROUNDCOVER BEDS
- PROPOSED SOD LAWN
- EXISTING LAWN TO REMAIN
- EXISTING TREE TO BE REMOVED



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Project No.	2012

LANDSCAPE PLANTING PLAN

L-200

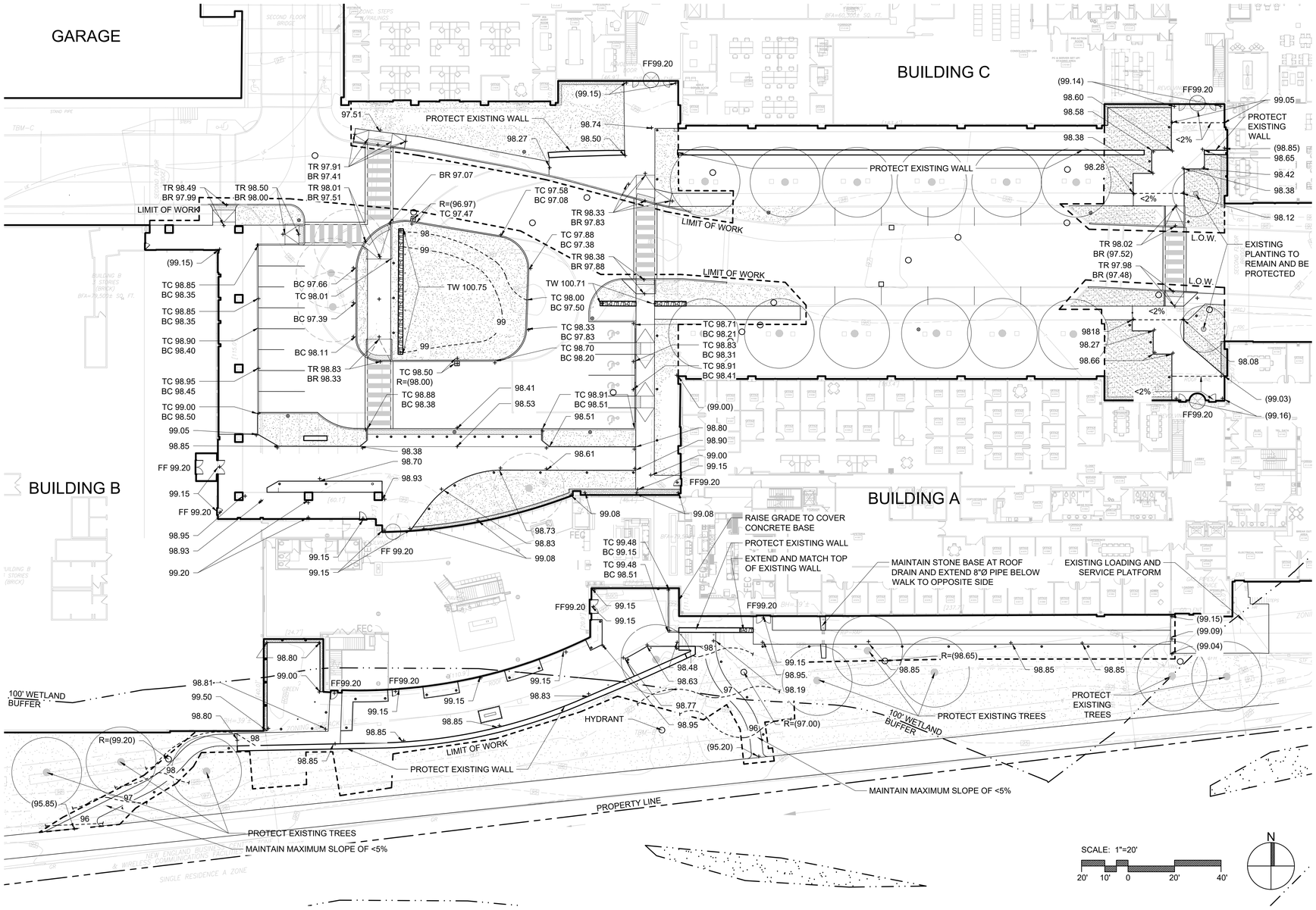
ORIGINAL SHEET - ARCH D

LANDSCAPE GRADING NOTES

1. SEE CIVIL ENGINEERING PLANS FOR FINAL GRADING.
2. PITCH EVENLY BETWEEN SPOT GRADES. ALL PAVING AREAS MUST PITCH TO DRAIN AT MIN. PITCH OF ¼" PER FOOT UNLESS OTHERWISE SHOWN. REPORT ANY DISCREPANCIES BETWEEN EXISTING AND PROPOSED SPOT GRADES THAT DO NOT PITCH ACCORDINGLY TO THE LANDSCAPE ARCHITECT BEFORE COMMENCING WORK.
3. WHERE NEW PAVING MEETS EXISTING PAVING, MEET LINE AND GRADE OF EXISTING SMOOTHLY WITH NEW CONSTRUCTION.
4. EXCAVATION ADJACENT TO EXISTING AND PROPOSED UTILITY LINES AND EXISTING TREES SHALL BE DONE BY HAND. CONTRACTOR SHALL PROTECT ALL EXPOSED UTILITIES.
5. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES, EXISTING STRUCTURES, IMPROVEMENTS, APPURTENANCES AND VEGETATION TO REMAIN. THE CONTRACTOR SHALL REPAIR ANY DAMAGE INCURRED AT NO COST TO OWNER.
6. THE CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF PERMITS AND LICENSEES ISSUED BY THE FEDERAL, STATE AND LOCAL AGENCIES (SEE SPECS).
7. THE CONTRACTOR SHALL COORDINATE ALL SITE UTILITY IMPROVEMENTS WITH THE PROPER AUTHORITIES.
8. MAINTAIN A MAXIMUM OF 1.8% CROSS SLOPE ON ALL PAVED SURFACES, UNLESS OTHERWISE NOTED.
9. ALL MANHOLES, DRAINAGE STRUCTURES, STEAM MANHOLES, ELECTRIC MANHOLE FRAMES AND COVERS WITHIN THE PROJECT WORK AREA SHALL BE ADJUSTED TO FINISH GRADES UNLESS OTHERWISE NOTED.
10. SEE CIVIL ENGINEER'S DRAWINGS FOR GRADING IN VEHICULAR AREAS, SIDEWALKS, AND ACCESSIBLE CURB RAMPS.

GRADING LEGEND

+ (XX.XX)	EXISTING SPOT GRADE (SEE CIVIL/SURVEY DRAWINGS)
+ 15.92	PROPOSED SPOT GRADE
FFE	FINISH FLOOR ELEVATION
TC / BC	TOP/BOTTOM OF CURB
FC	FLUSH CURB
TW / BW	TOP/BOTTOM OF WALL
+ HP	HIGH POINT
+ LP	LOW POINT



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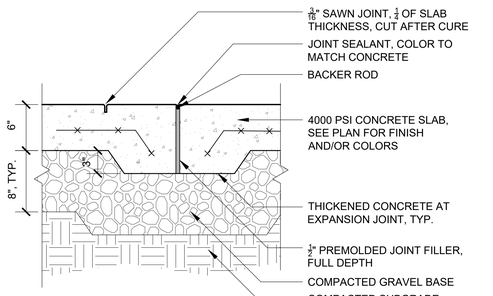
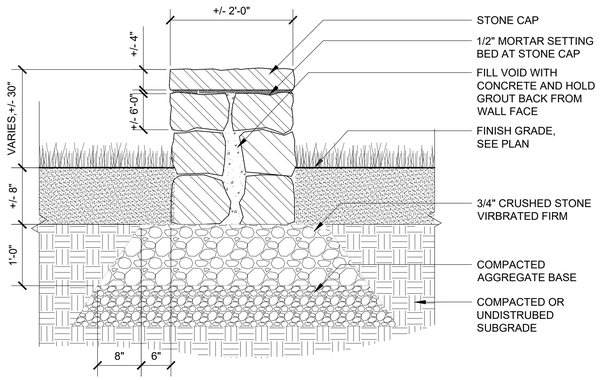
LANDSCAPE GRADING PLAN

L-300

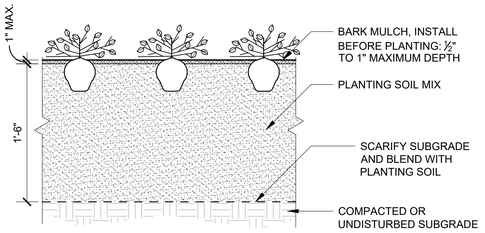
NOTE:
1. CONTROL JOINTS EVERY 5' UNLESS OTHERWISE SHOWN ON PLAN.
2. EXPANSION JOINTS EVERY 20' UNLESS OTHERWISE SHOWN ON PLAN.
3. PROVIDE 10" DEEP THICKENED EDGE AT PLANTING BEDS, 6" WIDTH.



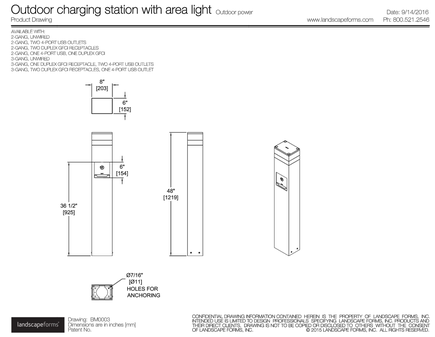
1 CONCRETE PAVING
SCALE: 1-1/2" = 1'-0"



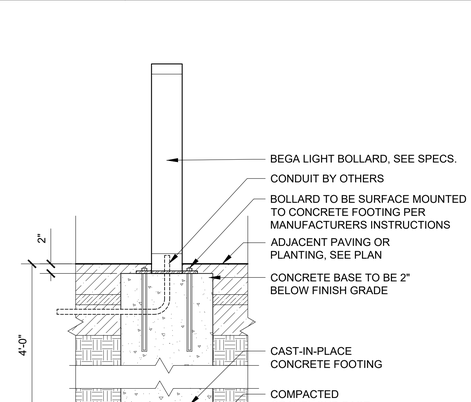
5 STONE WALL
SCALE: 1" = 1'-0"



9 PERENNIAL / GROUNDCOVER PLANTING
SCALE: 1-1/2" = 1'-0"

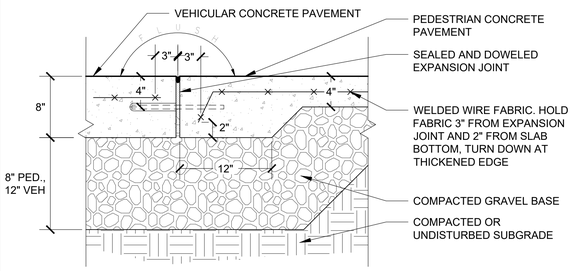


10 OUTDOOR CHARGING STATION
SCALE: NTS

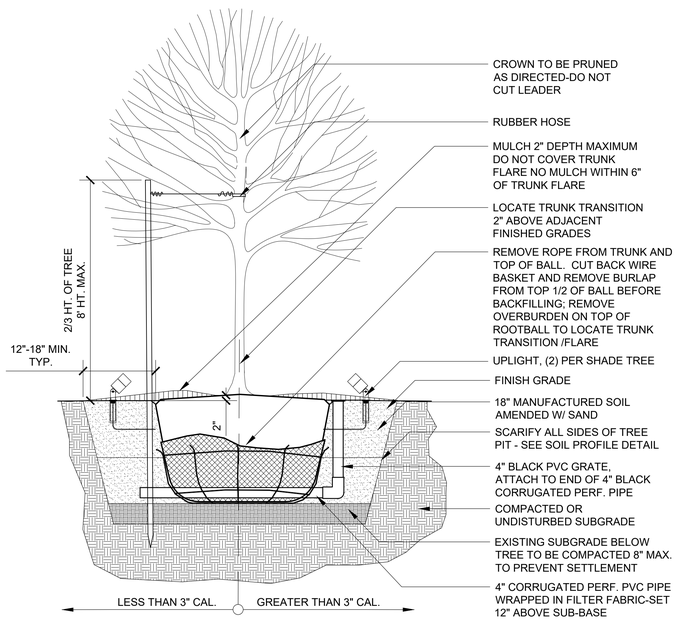


13 BEGA LIGHT BOLLARD
SCALE: 1" = 1'-0"

NOTE:
1. PROVIDE EXPANSION JOINTS EVERY 20'-0" UNLESS OTHERWISE NOTED ON THE PLANS.
2. SEE CIVIL DWGS AND SPECS FOR VEHICULAR-RATED CONCRETE PAVEMENT.



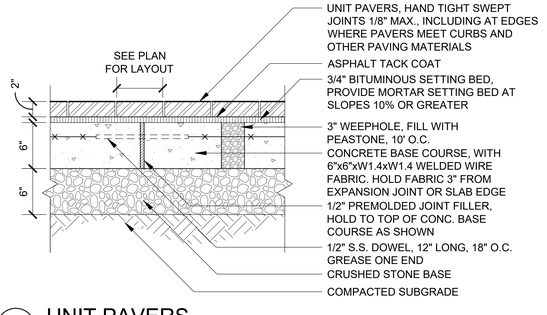
2 JOINT AT CONCRETE PAVEMENT
SCALE: 1-1/2" = 1'-0"



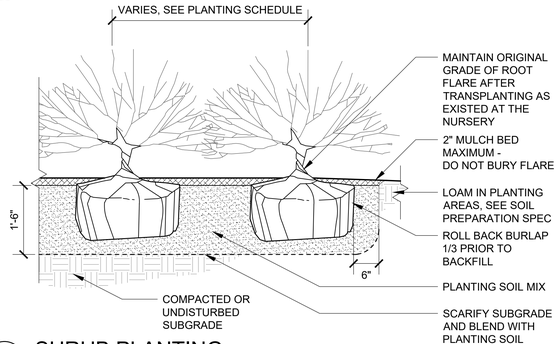
6 TREE PLANTING
SCALE: 1/2" = 1'-0"

11 FIRE PIT SET IN GRANITE TABLE ON STEEL BASE
SCALE: 3/4" = 1'-0"

NOTE:
FOR UNIT PAVERS IN VEHICULAR AREAS, COORDINATE BASE COURSE DEPTH WITH PAVEMENT SECTIONS BY CIVIL ENGINEER

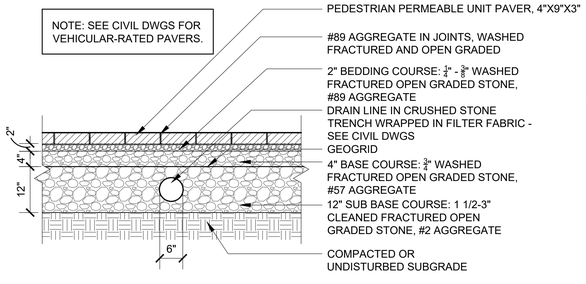


3 UNIT PAVERS
SCALE: 1-1/2" = 1'-0"

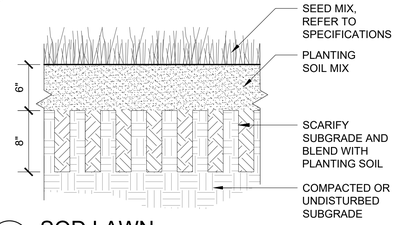


7 SHRUB PLANTING
SCALE: 3/4" = 1'-0"

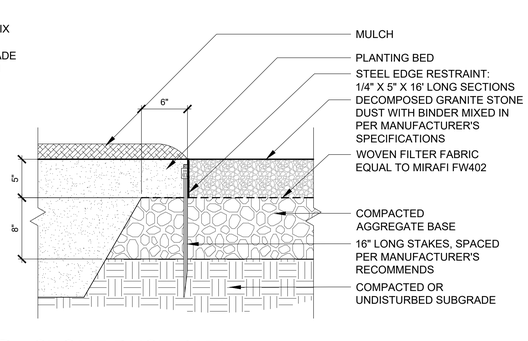
NOTE: SEE CIVIL DWGS FOR VEHICULAR-RATED PAVERS.



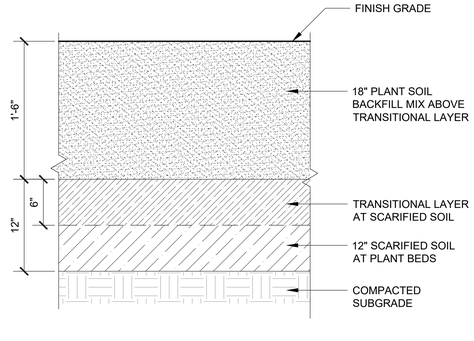
4 PERMEABLE UNIT PAVERS
SCALE: 3/4" = 1'-0"



8 SOD LAWN
SCALE: 1-1/2" = 1'-0"



12 STONE DUST PATH
SCALE: 1-1/2" = 1'-0"



14 SOIL PREPARATION AT WOODY PLANTS
SCALE: 1-1/2" = 1'-0"

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Boston, 02210-1723
Tel: (617) 234-3100
www.stantec.com

Consultant

CWDG Copley Wolff Design Group
Landscape Architects & Planners

Copley Wolff Landscape Architects
10 Post Office Square
Boston, 02109
Tel: (617) 454-9000
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Notes

2	DESIGN PACKAGE	2020.09.25
1	SCHEMATIC DESIGN	2020.08.06
Issued/Revision		YYYY.MM.DD

Permit/Seal

PRELIMINARY NOT FOR CONSTRUCTION

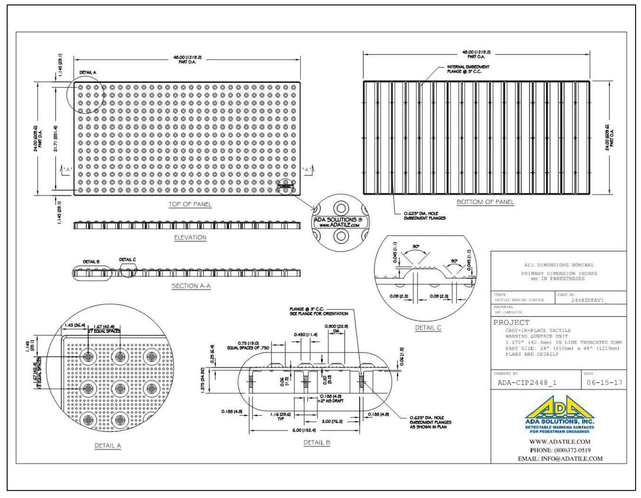
Scale	NTS
Project No.	2012

LANDSCAPE DETAILS

L-400

1 METAL EDGE RESTRAINT - SEE SPECIFICATION

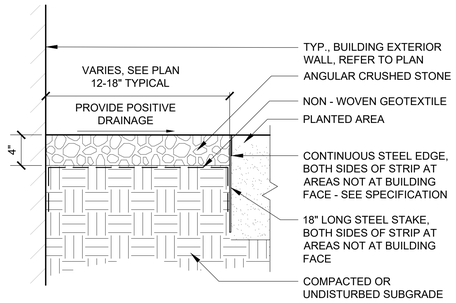
SCALE: NTS



2 C.I.P. TACTILE WARNING PANEL

SCALE: NTS

NOTE: SHOP DRAWINGS REQUIRED PRIOR TO INSTALLATION.



3 GRAVEL MAINTENANCE STRIP

SCALE: 1-1/2" = 1'-0"

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Notes

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1	SCHEMATIC DESIGN	2020.08.06

Issued/Revision YYYY.MM.DD

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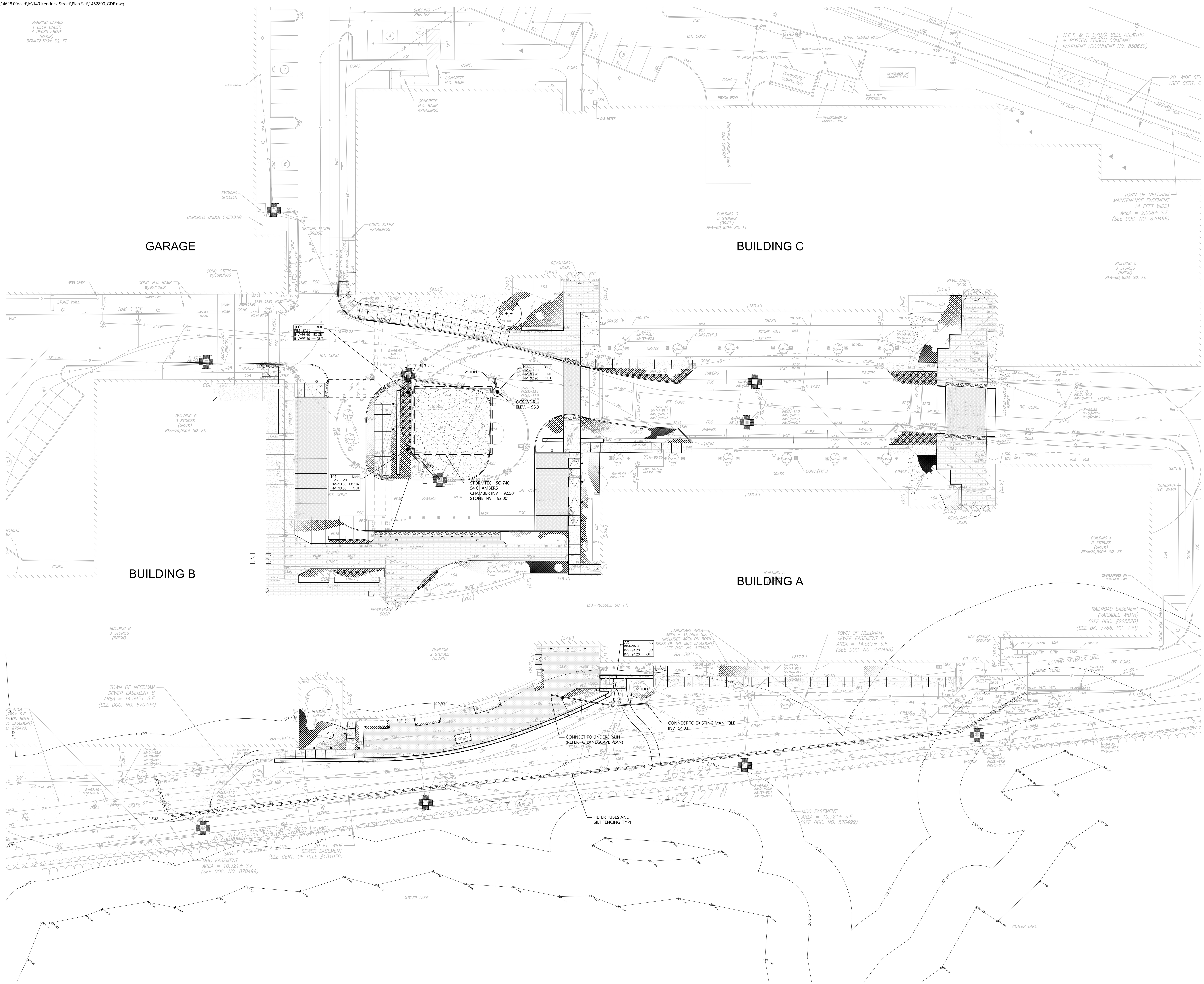
Scale	NTS
Project No.	2012

LANDSCAPE DETAILS

L-401

\\vhb\gbl\proj\Wat-LD\14628.00\cad\ld\140 Kendrick Street\Plan Set\1462800_GDE.dwg



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0 10 20 40 Feet

140 Kendrick Street

Needham, Massachusetts

No.	Revision	Date	Appvd.

Designed by | Checked by

Issued for | Date

Notice of Intent | 9/23/2020

Not Approved for Construction

Drawing Title

Grading and Drainage Plan

Drawing Number

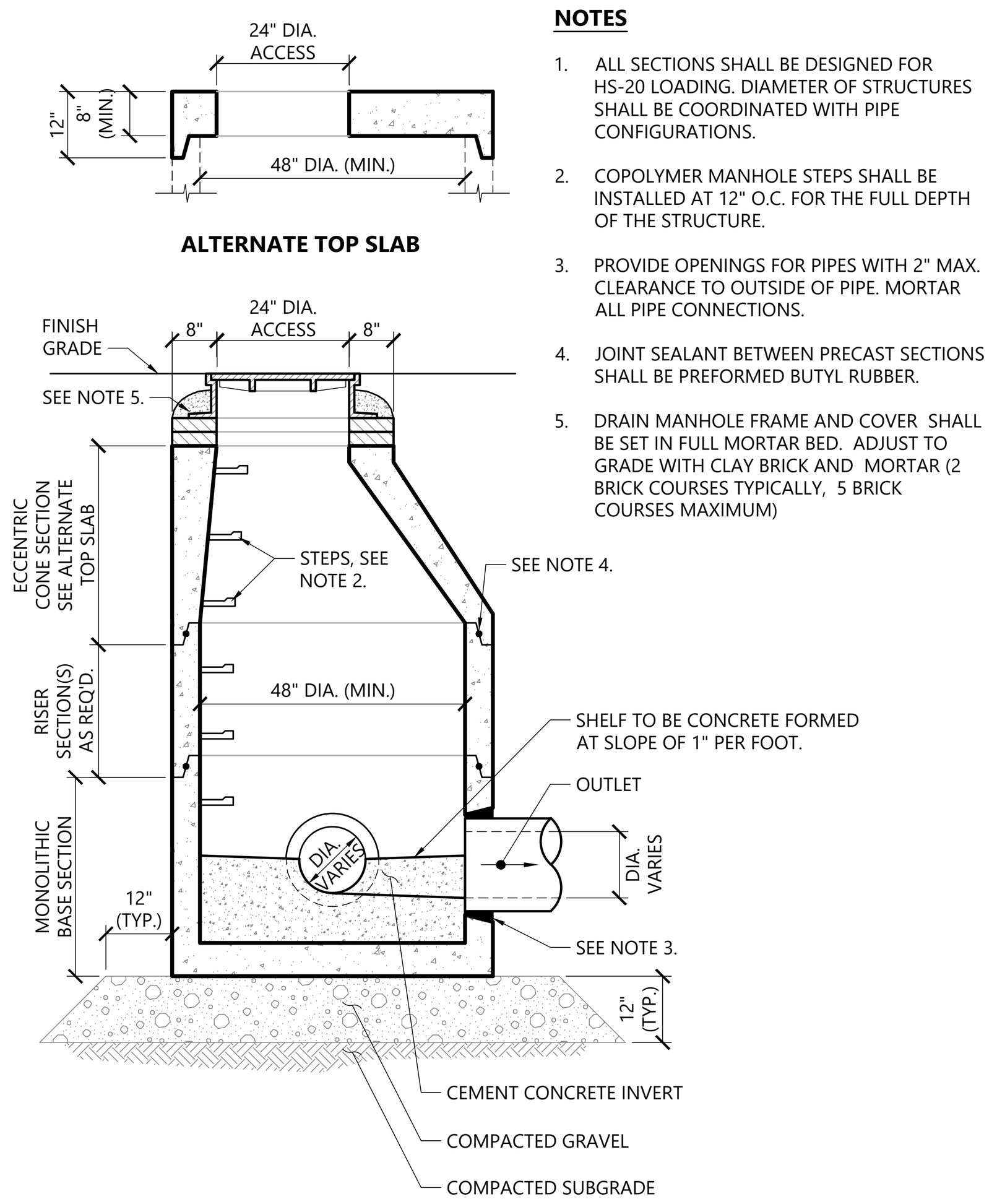
C-1

Commonwealth of Massachusetts
Nicholas J. Skoly
Civil
No. 52677
Registered Professional Engineer

Sheet 1 of 2

Project Number
15060.00

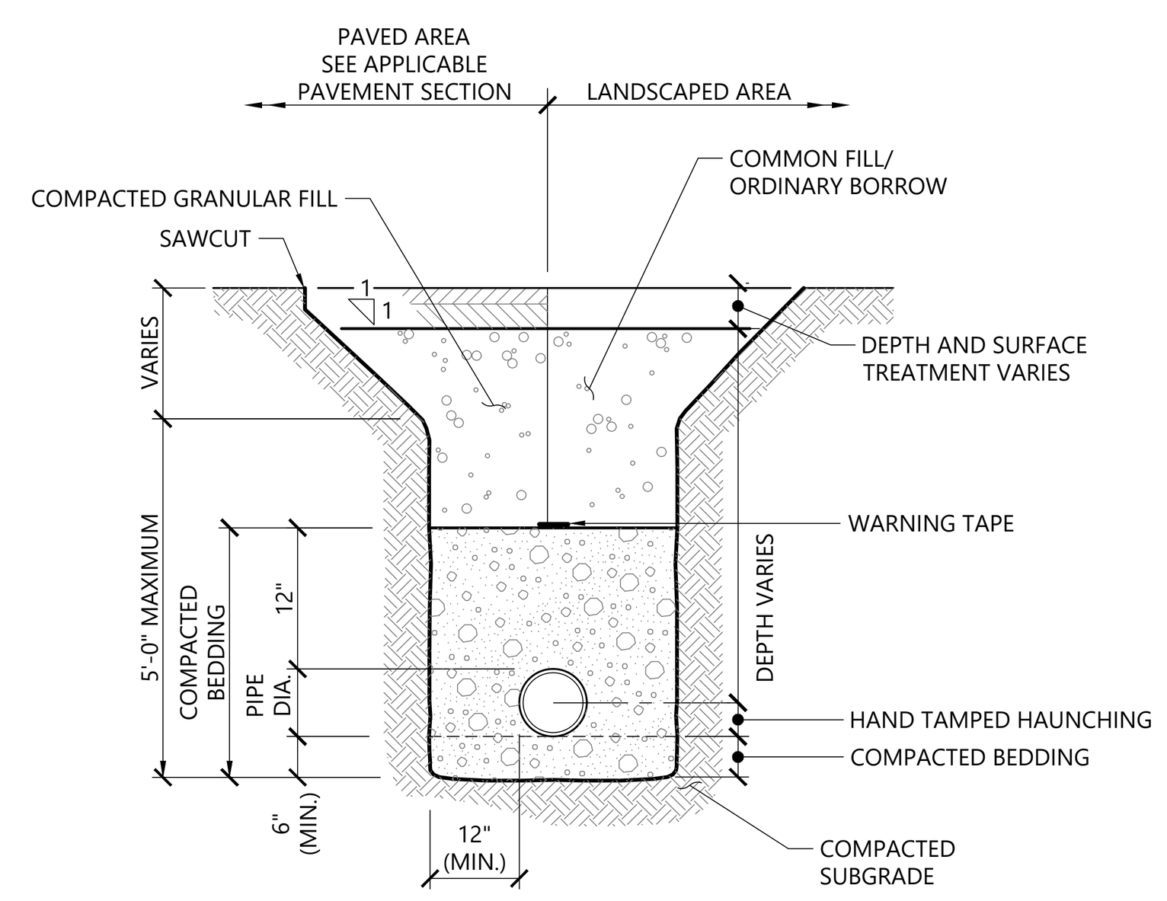
Saved Wednesday, September 23, 2020 10:08:59 AM NSKOLY Plotted Wednesday, September 23, 2020 10:39:18 AM Skoly, Nicholas



NOTES

1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING. DIAMETER OF STRUCTURES SHALL BE COORDINATED WITH PIPE CONFIGURATIONS.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. PROVIDE OPENINGS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)

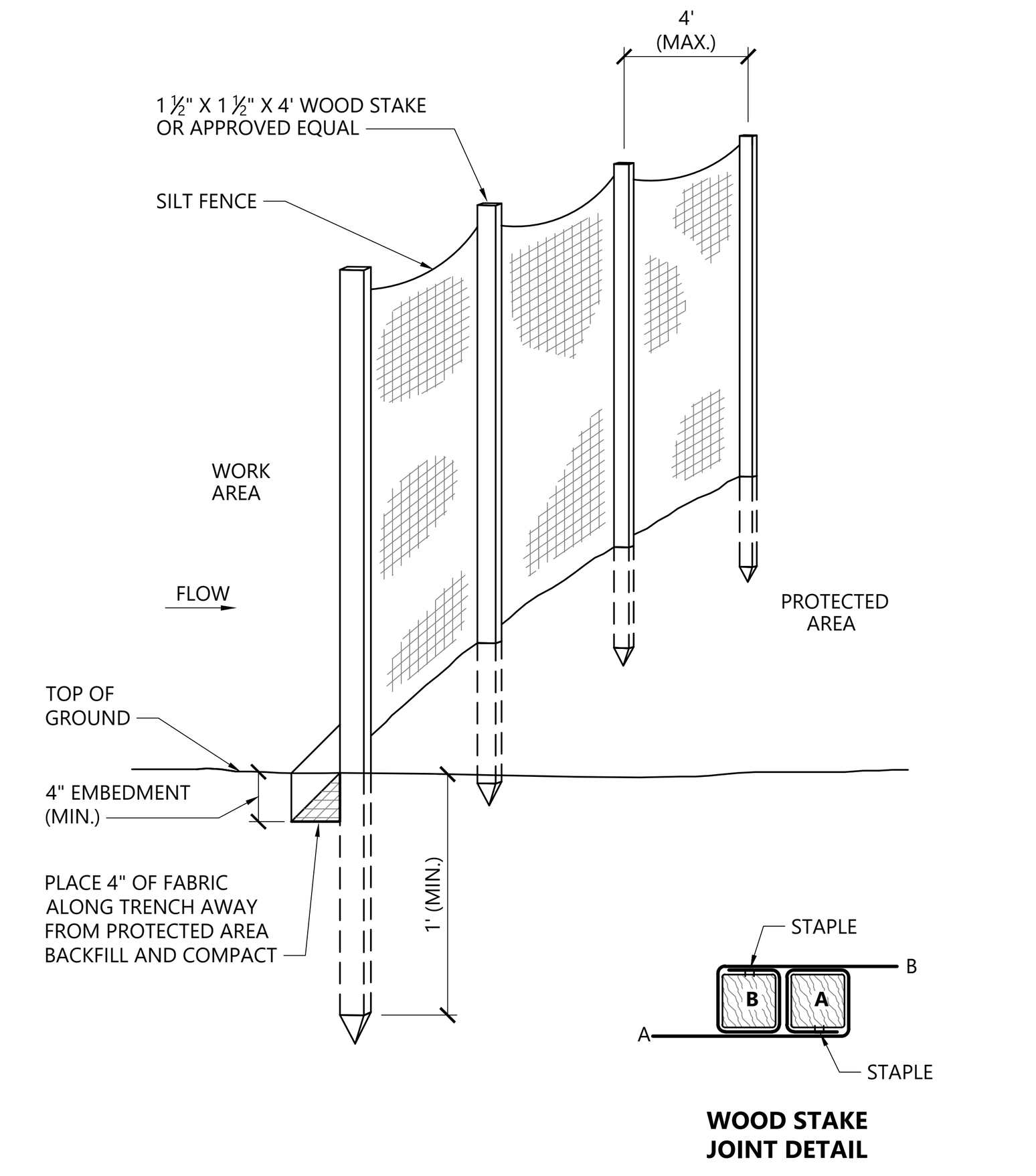
Drain Manhole (DMH)
1/16
N.T.S. Source: VHB LD_115



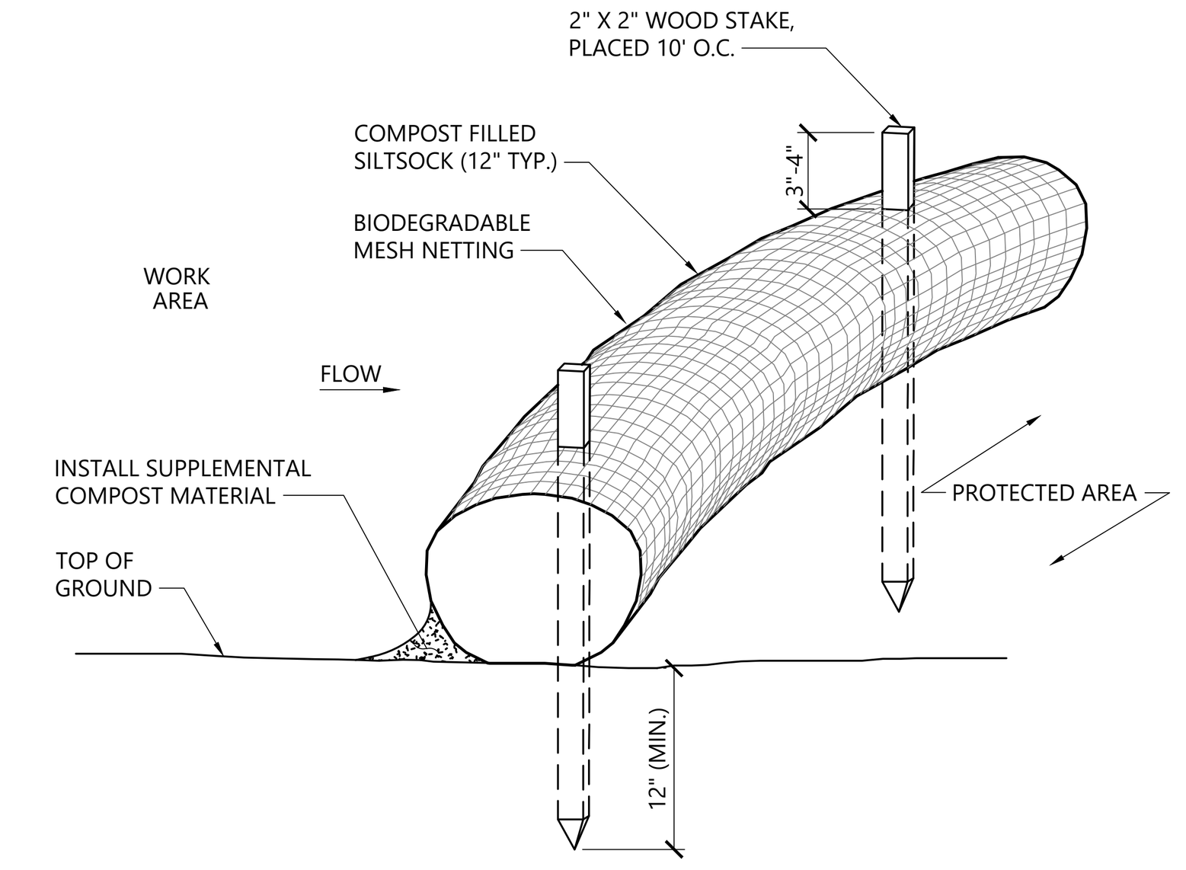
NOTES

1. WHERE UTILITY TRENCHES ARE CONSTRUCTED THROUGH DETENTION BASIN BERMS OR OTHER SUCH SPECIAL SECTIONS, PLACE TRENCH BACKFILL WITH MATERIALS SIMILAR TO THE SPECIAL SECTION REQUIREMENTS.
2. USE METALLIC TRACING/WARNING TAPE OVER ALL PIPES.

Utility Trench
1/16
N.T.S. Source: VHB LD_300



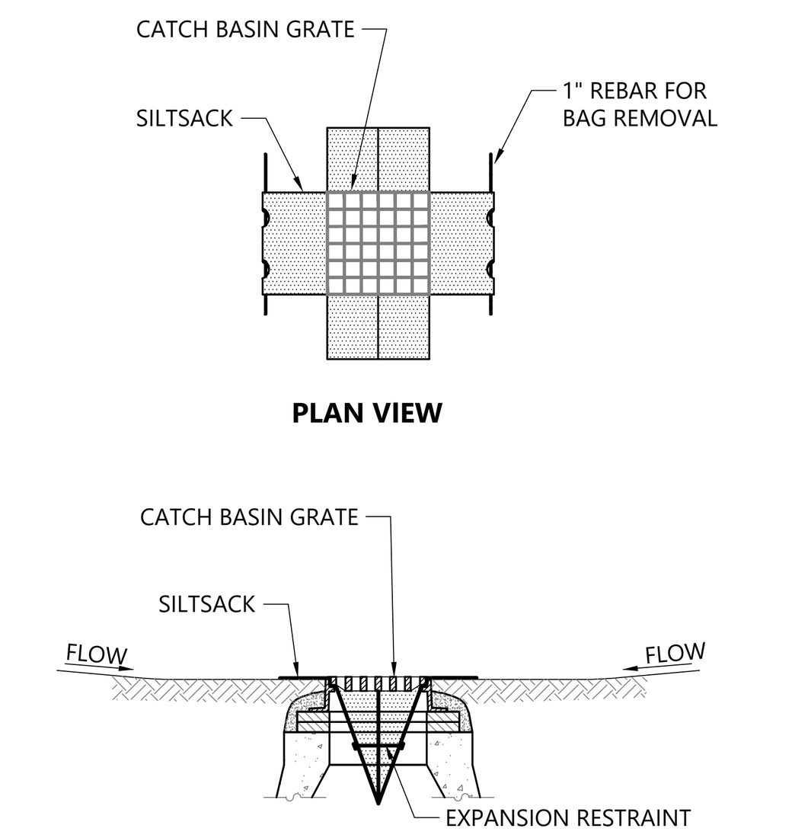
Silt Fence Barrier
1/16
N.T.S. Source: VHB LD_650



NOTES

1. SILTSOCK SHALL BE FILTREXX SILTSOXX, OR APPROVED EQUAL.
2. SILTSOCKS SHALL OVERLAP A MINIMUM OF 12 INCHES.
3. SILTSOCK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS, AND REPAIR OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.
4. COMPOST MATERIAL SHALL BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.
5. IF NON BIODEGRADABLE NETTING IS USED THE NETTING SHALL BE COLLECTED AND DISPOSED OF OFFSITE.

Siltsock - Erosion Control Barrier
1/16
N.T.S. Source: VHB LD_658



NOTES

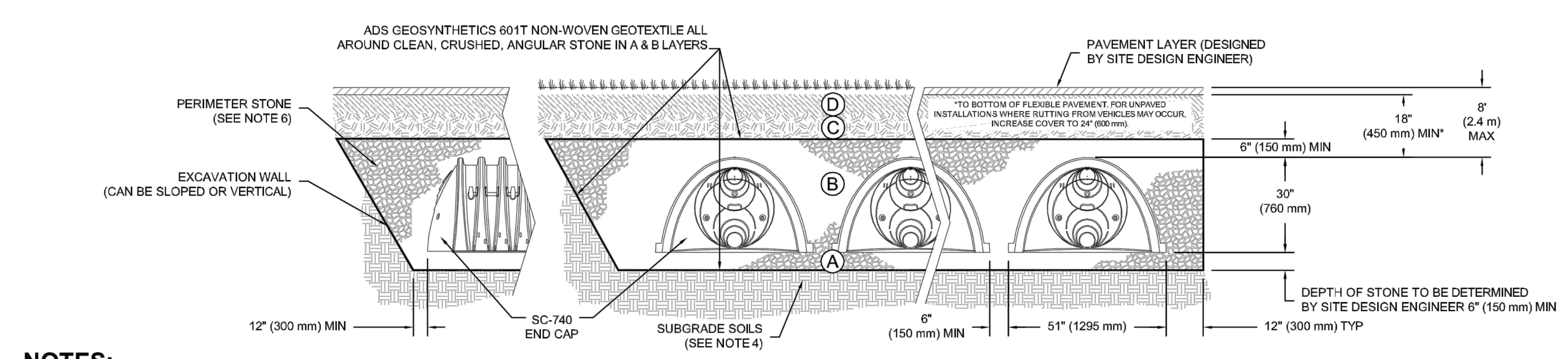
1. INSTALL SILTSACK IN ALL CATCH BASINS WHERE INDICATED ON THE PLAN BEFORE COMMENCING WORK OR IN PAVED AREAS AFTER BINDER COURSE IS PLACED AND HAY BALES HAVE BEEN REMOVED.
2. GRATE TO BE PLACED OVER SILTSACK.
3. SILTSACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED. MAINTAIN UNTIL UPSTREAM AREAS HAVE BEEN PERMANENTLY STABILIZED

Siltsack Sediment Trap
1/16
N.T.S. Source: VHB LD_674

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. [2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



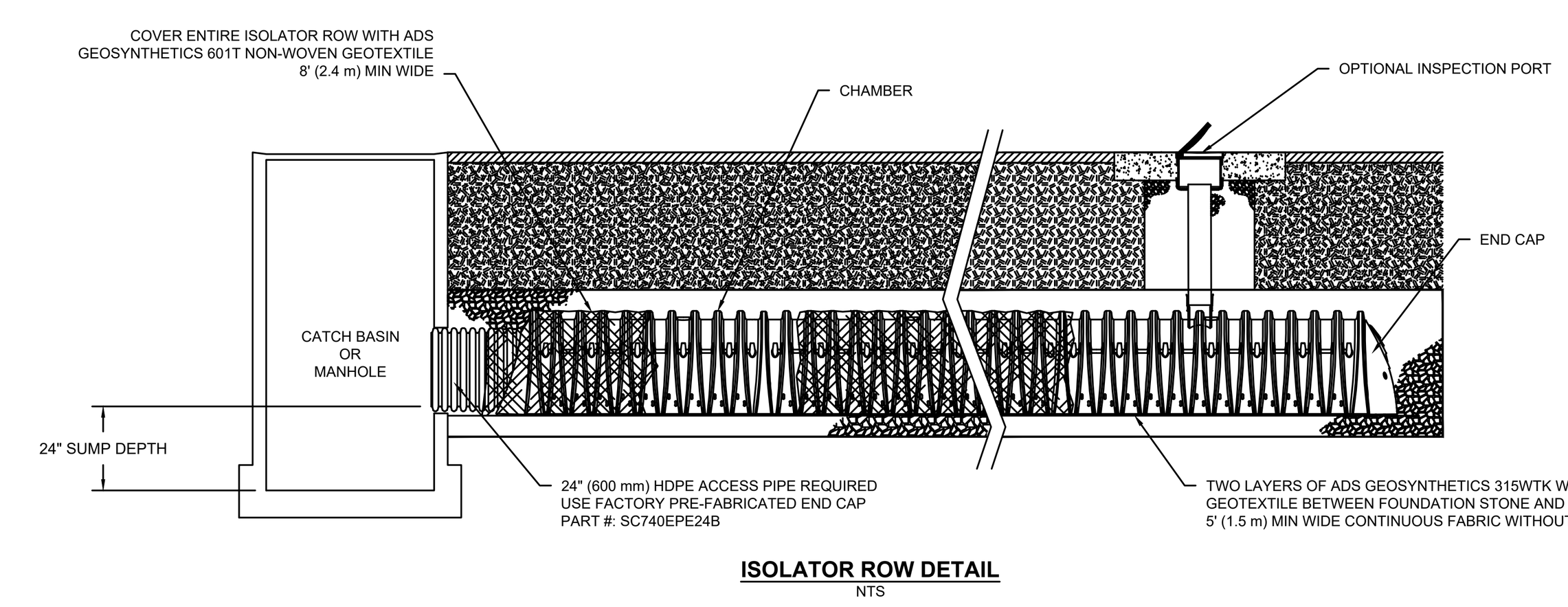
NOTES:

1. SC-740 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS", OR ASTM F2922 "STANDARD SPECIFICATION FOR POLYETHYLENE (PE) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
4. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
5. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
6. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.

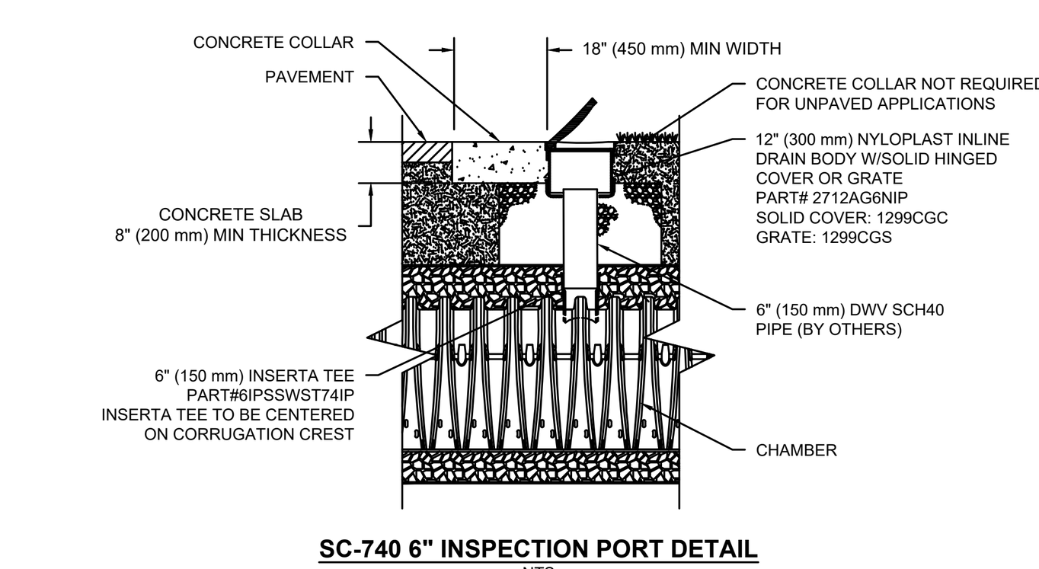
SC-740 STANDARD CROSS SECTION

StormTech
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SHEET 1 OF 1

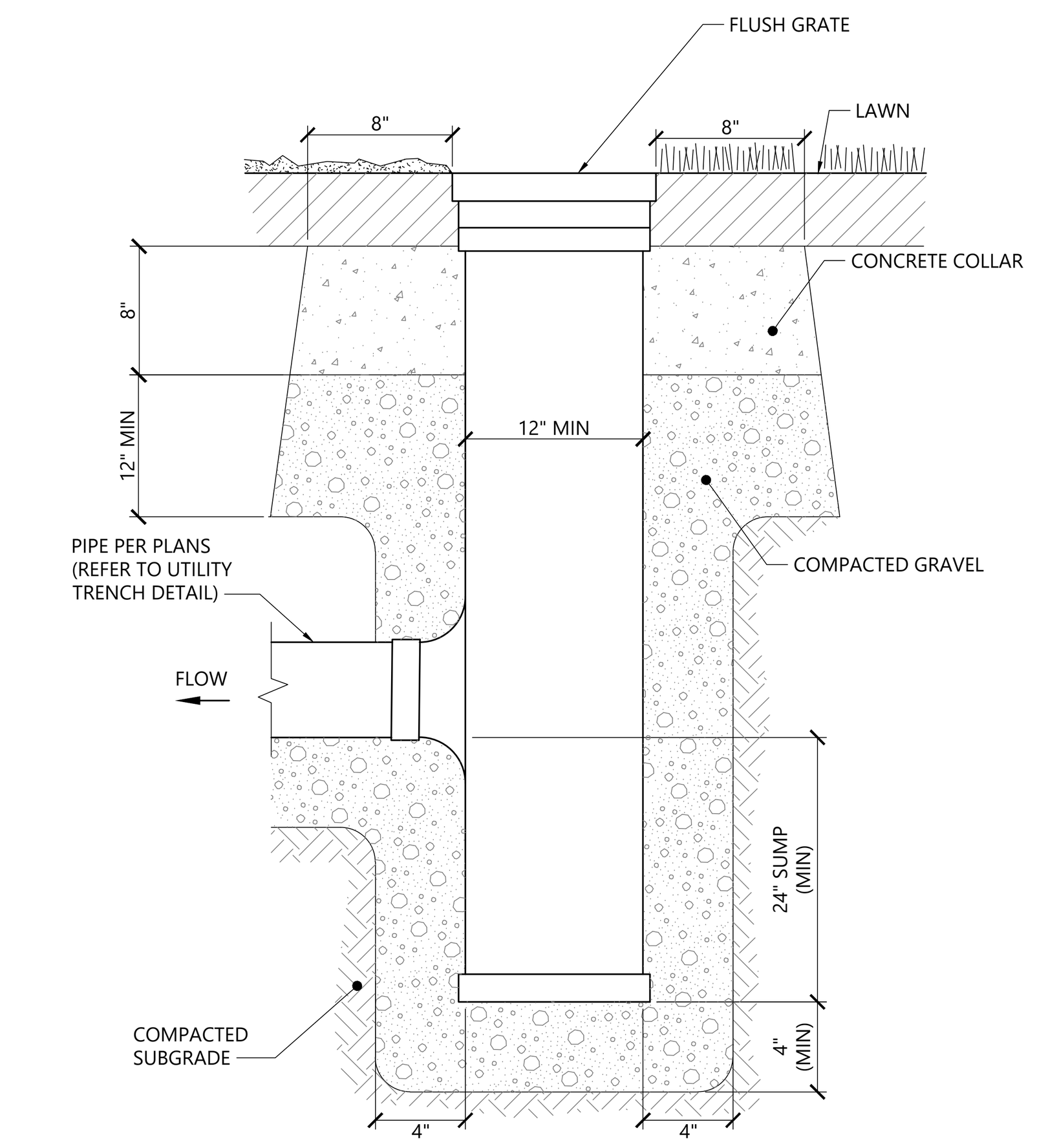


ISOLATOR ROW DETAIL
NTS



SC-740 6" INSPECTION PORT DETAIL
NTS

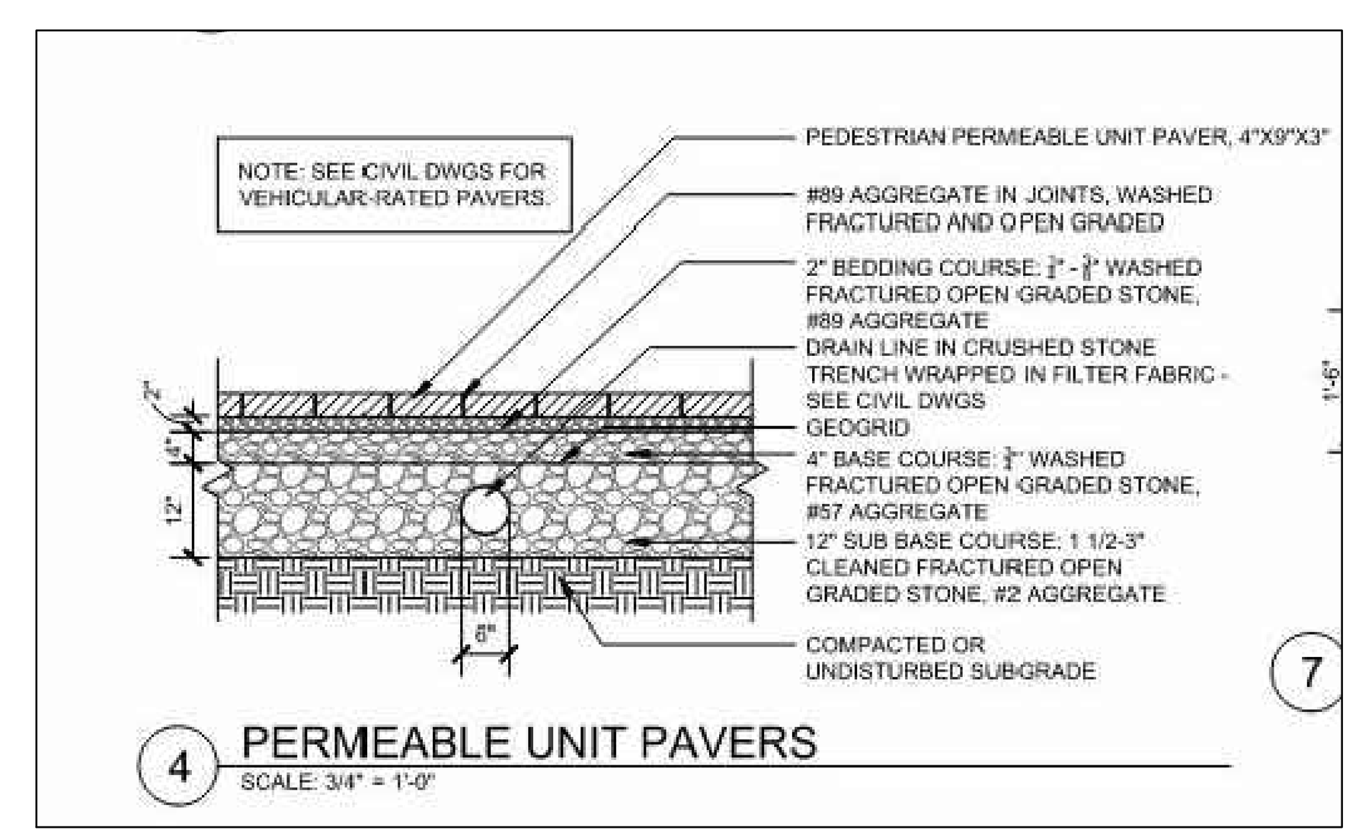
Isolator Row Profile
N.T.S. Source: StormTech



NOTES:

1. LANDSCAPE DRAINS SHALL BE NYLOPLAST 12" DRAIN BASIN, OR APPROVED EQUAL.
2. GRATES SHALL BE NYLOPLAST, 12"FLUSH GRATE OR APPROVED EQUAL AS SHOWN ON PLANS.

Area Drain (AD)
9/17
N.T.S. Source: VHB LD_197



4 PERMEABLE UNIT PAVERS
SCALE: 3/4" = 1'-0"

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140 Kendrick Street

Needham, Massachusetts

No.	Revision	Date	Appvd.

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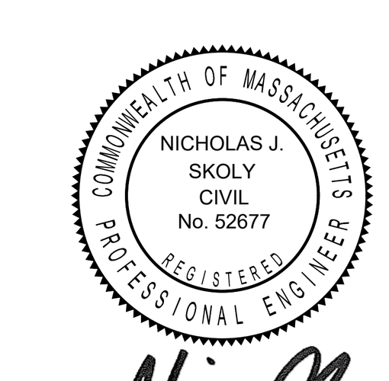
Issued for: Notice of Intent
Date: 9/23/2020

Not Approved for Construction

Drawing Title
Site Details

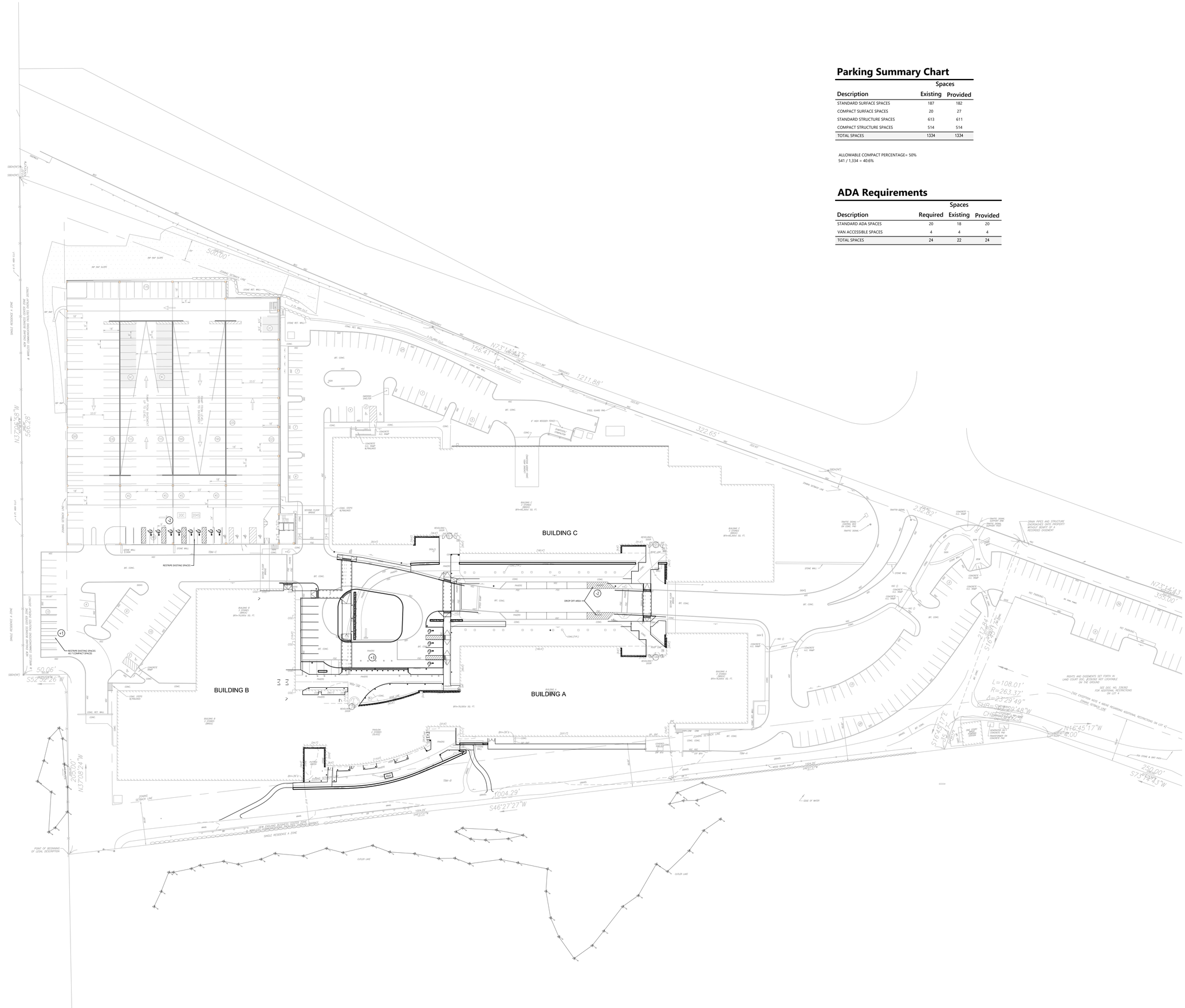
Drawing Number
C-2

Sheet 2 of 2



Project Number
15060.00

\\vhb\gbl\proj\Wat-LD\14628.00\cad\ld\140 Kendrick Street\Plan Set\Parking Plan.dwg



Parking Summary Chart

Description	Spaces Existing	Spaces Provided
STANDARD SURFACE SPACES	187	182
COMPACT SURFACE SPACES	20	27
STANDARD STRUCTURE SPACES	613	611
COMPACT STRUCTURE SPACES	514	514
TOTAL SPACES	1334	1334

ALLOWABLE COMPACT PERCENTAGE= 50%
541 / 1,334 = 40.6%

ADA Requirements

Description	Required	Spaces Existing	Spaces Provided
STANDARD ADA SPACES	20	18	20
VAN ACCESSIBLE SPACES	4	4	4
TOTAL SPACES	24	22	24

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0 20 40 80 Feet

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Drawing Title: Parking Plan

Drawing Number: C-3

Sheet 3 of 2

Project Number: 15060.00

Saved Thursday, October 8, 2020 11:14:6 PM NSKOLY Plotted Thursday, October 8, 2020 1:25:02 PM Skoly, Nicholas

Memorandum

To: Anthony L. Del Gaizo
Town Engineer
Public Services Administration Building
500 Dedham Avenue
Needham, MA 02492

Date: September 23, 2020

Project #: 15060.00

From: Nicholas Skoly, PE

Re: 140 Kendrick Stormwater Analysis

On behalf of Boston Properties, Vanasse Hangen Brustlin, Inc. (VHB is pleased to submit the following memorandum to document the adherence to the Town of Needham Stormwater Regulations (Project). The proposed stormwater management infrastructure includes best management practices (BMP's) for maintaining stormwater runoff rates has been developed in compliance with the Massachusetts Stormwater Management Standards and the Town of Needham Requirements for On-Site Drainage (Stormwater management), as applicable.

A HydroCAD model, using TR-20 methodology, was developed to evaluate the site's existing and proposed stormwater runoff response for the 2-,10-, 25-, and 100-year storm events. As summarized in the following sections, the analysis for these storm events indicates that there will be no increase in peak discharge rates or runoff volumes resulting from the additional impervious area.

Project Description

Boston Properties is proposing to renovate a portion of their existing building at 140 Kendrick Street. As part of that renovation, they are proposing to improve the hardscape and landscape areas surrounding the building. The exterior improvements will be limited to reworking parking spaces near the main entry, improving the vehicular drop off area and pedestrian circulation, and improving an outdoor patio.

Stormwater Approach

The exterior improvements are limited to the front entrance portion of the site located on the North side of the existing building and the back patio on the South side of the building. The improved drop-off area at the front entrance will generally maintain the same drainage patterns but will be improved with a subsurface detention system. Within the subcatchment, (approximately 60,675 sf) there is an increase in impervious area of approximately 1,620 sf. The improved patio area will generally maintain the same drainage patterns but will be improved with permeable pavers. Within the subcatchment (approximately 26,050 sf) there is a decrease in impervious area of approximately 960 sf.

The stormwater runoff in the proposed condition will be collected via the existing deep sump and hooded catch basins and routed to a subsurface detention basin installed adjacent to the catch basins via a pipe installed below the existing outlet of the catch basin. Once the detention basin reaches its capacity the stormwater will drain through the existing closed piping system and maintain the existing drainage patterns. The subsurface detention basin and permeable pavers provide the required volume for 1" over the impervious area. Under this requirement the design is required to store 3,575cf of runoff and the design provides stores 3,977cf. This storage assumes an infiltration rate of 1.02 which is consistent with the original stormwater design for the site. The Hydrologic model analyzes the subcatchment to the existing catch basin which encompasses all of the exterior work proposed.

Hydrologic Analysis

The rainfall runoff response of the Site under existing and proposed conditions was evaluated for storm events with recurrence intervals of 2-, 5-, 10-, 25-, and 100-years (as shown in the Site Construction permit Regulations.). Runoff coefficients for the pre- and post-development conditions, were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. The HydroCAD model is based on NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology. Printouts of the HydroCAD analyses are attached. Tables 1 below presents a summary of the existing and proposed conditions peak flow rates.

Table 1
Peak Discharge Rates (cubic feet per second)

Design Point	2-year	10-year	25-year	100-year
Design Point 1: Closed Drainage System				
Existing	2.26	5.06	6.90	9.85
Proposed	0.73	1.84	4.88	9.63
Design Point 2 Closed Drainage System				
Existing	0.02	0.5	1.0	1.90
Proposed	0.02	0.44	0.9	1.66

Table 2
Runoff Volumes (cubic feet)

Design Point	2-year	10-year	25-year	100-year
Design Point 1: Closed Drainage System				
Existing	5,981	13,292	18,288	26,452
Proposed	1,987	8,158	13,001	20,981
Design Point 2: Closed Drainage System				
Existing	339	1,703	2,907	5,164
Proposed	293	1,474	2,545	4,681

Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards

Standard 1: No New Untreated Discharges or Erosion to Wetlands

The Project has been designed to comply with Standard 1.

The Best Management Practices (BMPs) included in the proposed stormwater management system have been designed in accordance with the Massachusetts Stormwater Handbook. Supporting information and computations demonstrating that no new untreated discharges will result from the Project are presented through compliance with Standards 4 through 6.

There are no new untreated discharges that will result from the project. The project is using existing infrastructure and supplementing it with additional stormwater BMPs.

Standard 2: Peak Rate Attenuation

The Project has been designed to fully comply with Standard 2.

This project has been designed to reduce the peak attenuation rate for the 2-yr, 10-yr, 25-yr and 100-yr storm, as shown in the tables above.

Standard 3: Stormwater Recharge

The Project has been designed to comply with Standard 3. All runoff from impervious areas from the site is discharging into an infiltration BMP. Recharge BMPs have been sized to infiltrate the required recharge volume and sized to drain within 72-hours. These calculations have been provided.

Standard 4: Water Quality

This project has been designed to comply with Standard 4. A water quality calculation has been provided to show that greater than 1" of volume will be treated on site.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

This project is not considered a LUHPPL.

Standard 6: Critical Area

This project will not discharge stormwater near or to a critical area.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

This project is a redevelopment project and has been designed to comply with all the Stormwater Management Standards.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls

The Project will disturb approximately 2 acres of land and is therefore required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As required under this permit, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and submitted before land disturbance begins. Recommended construction period pollution prevention and erosion and sedimentation controls to be finalized in the SWPPP are included attached.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan has been developed for the Project. The O&M Plan is included in Appendix D as part of the Long Term Pollution Prevention Plan.

Standard 10: Prohibition of Illicit Discharges

Sanitary sewer and storm drainage structures which were part of the previous development on this site are to be completely removed during the site redevelopment. The design plans submitted with this report have been designed in full compliance with current standards. The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges.

Stormwater Management Summary

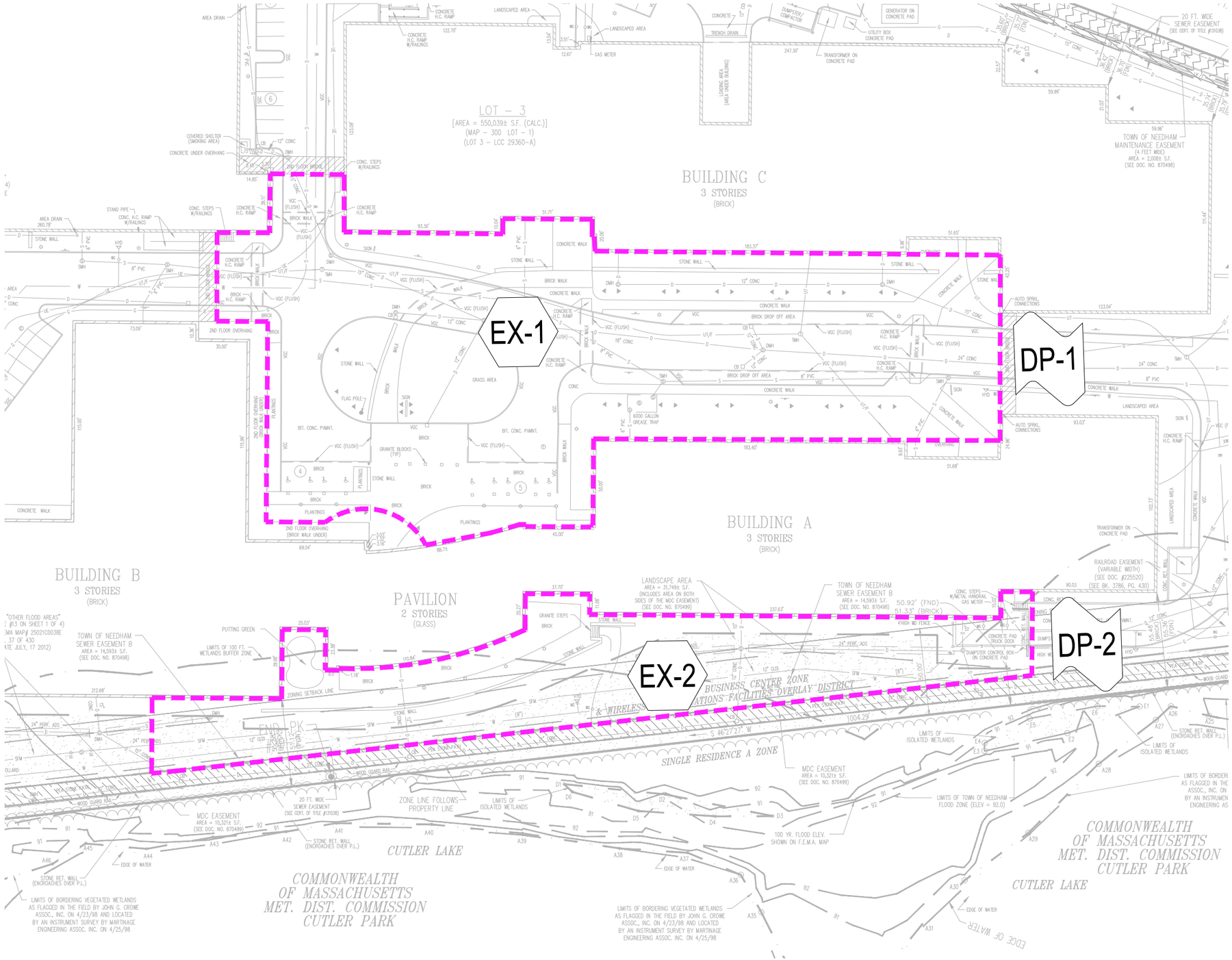
The stormwater management design includes BMPs for maintaining stormwater runoff rates and has been developed with guidance provided by the DEP and in accordance with the applicable Town and State requirements listed in previous sections of the memo. A hydrologic model was developed to evaluate the Site's existing and proposed stormwater runoff response and the results of the analysis indicate that the site has been designed such that there will be no increase in peak discharge rates or volumes between the pre- and post-development conditions for the storm events studied. In addition, the subsurface infiltration system and permeable pavers provide a significant improvement to water quality as compared to the existing condition.

ATTACHMENTS:

Supporting Calculations:

Figure 1 – Existing Drainage Conditions
Figure 2 – Proposed Drainage Conditions
Figure 3 – Impervious Buffer Area Comparison
Water Quality Volume Calculations
Hydrologic Analysis
Long Term Pollution Prevention Plan
Operations and Maintenance Plan
FIRM

\\vhb\gbl\proj\Wat-LD\14628.00\cad\ld\140 Kendrick Street\1462800_EX-Drainage-Conditions.dwg



Legend

SYMBOLS

X — **DESIGN POINT**

X — **DRAINAGE AREA DESIGNATION**

X — **POND**

LINETYPES

DRAINAGE AREA BOUNDARY

100' BUFFER ZONE

4–220 4–219 **WETLAND BOUNDARY**

0 30 60 120 Feet

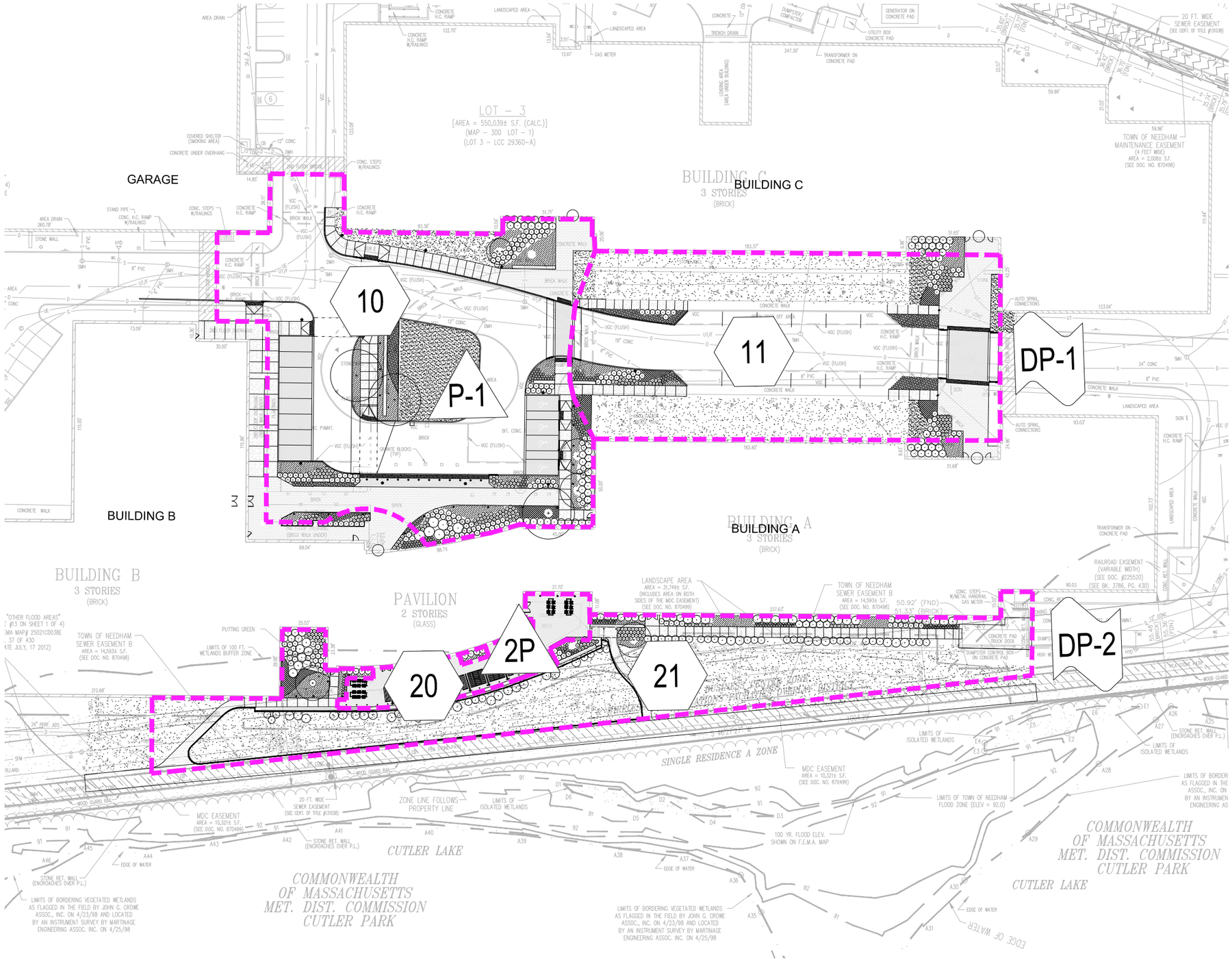
vhb

Existing Drainage Conditions

Figure 1

140 Kendrick Street
Needham, MA

9/10/2020



Legend

SYMBOLS

- DESIGN POINT
- DRAINAGE AREA DESIGNATION
- POND

LINETYPES

- DRAINAGE AREA BOUNDARY
- 100' BUFFER ZONE
- WETLAND BOUNDARY (4–220 / 4–219)

0 30 60 120 Feet

vhb

Proposed Drainage Conditions

Figure 2

140 Kendrick Street
Needham, MA

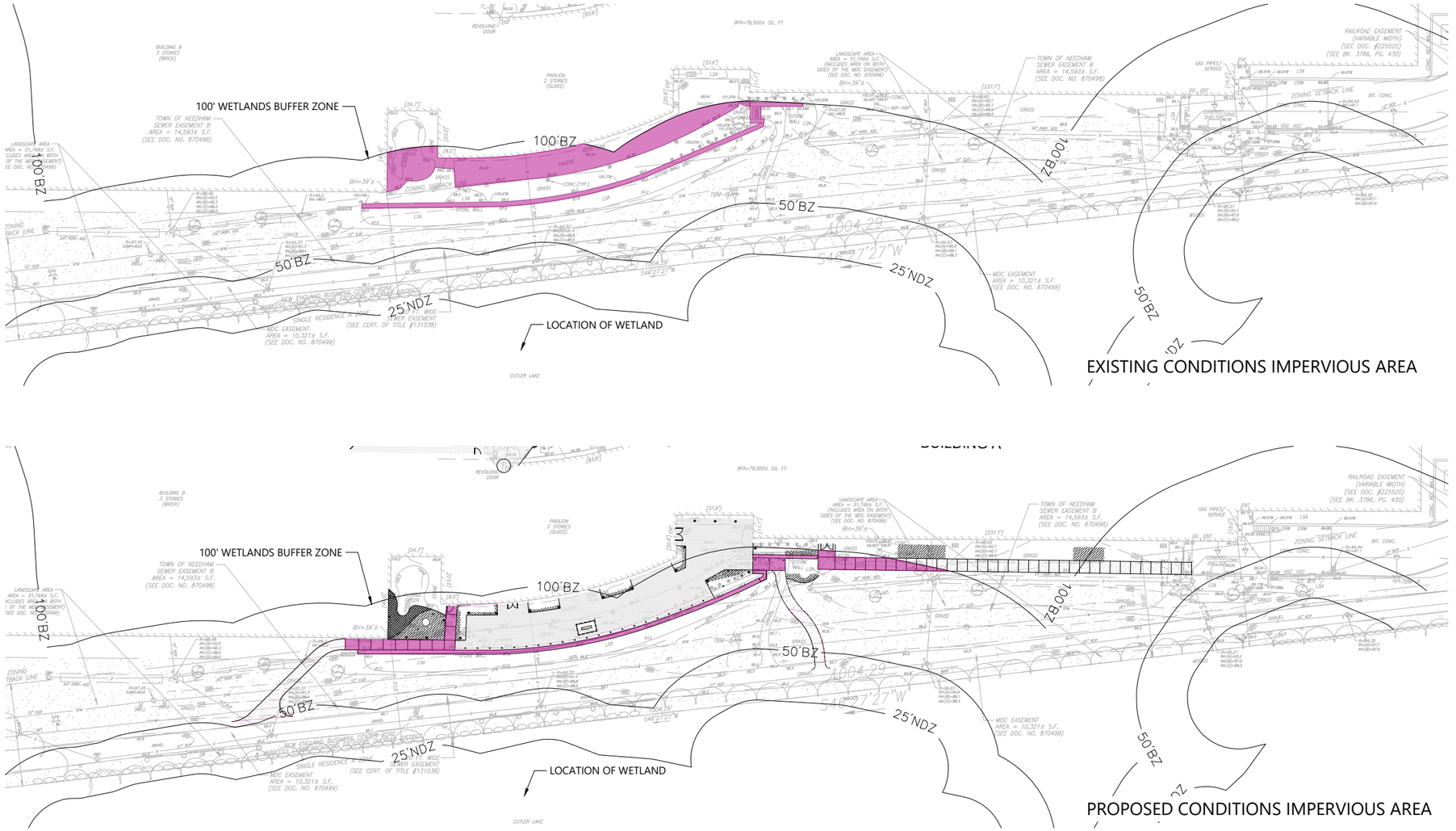
9/10/2020

Wetland Buffer Areas

Designation	Existing	Proposed	Delta
APPROXIMATE IMPERVIOUS AREA WITHIN 100' BUFFER	2,480 SF	1,264 SF	-1,216 SF

Legend

IMPERVIOUS AREA WITHIN 100' BUFFER ZONE



0 30 60 120 Feet

vhb

Impervious Area

140 Kendrick Street
Needham, MA

Figure 3

9/23/20

Water Quality Volume Calculations

Project Name: 140 Kendrick Street **Proj. No.:** -

Project Location: Needham, MA **Date:** September 2020

Calculated by: NJS

Checked by:

Limit of Development Area

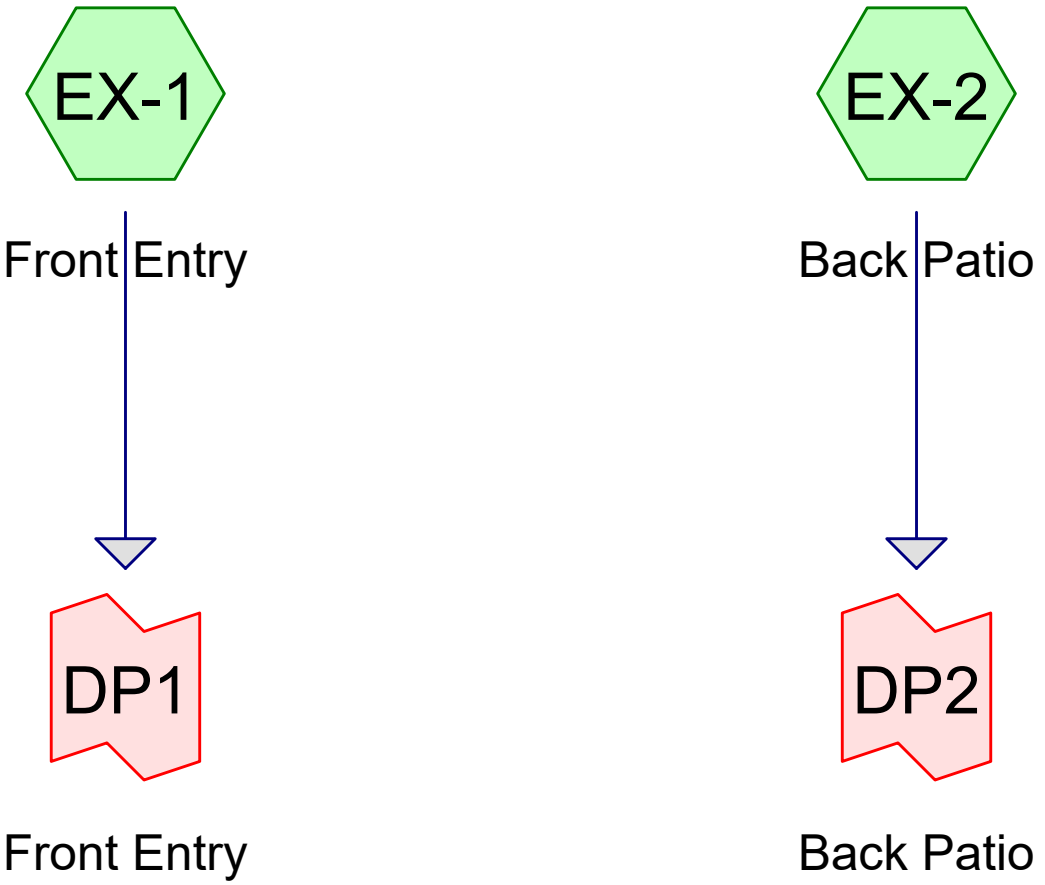
Total Impervious Area = 42,898 sf

Water Quality Requirement:

	Runoff Depth to be Treated (in.)	Required Volume (c.f.)
Water Quality Volume	1.0	3,575

Provided:

	Provided Volume (c.f.)	
Permeable Pavers (Rear of Building)	718	*For the 1-year design storm
Proposed Subsurface Infiltration System (Front Drop Off)	3,259	*For the 1-year design storm
Total Provided:	**3,977**	



Subcat Reach Pond Link

Routing Diagram for 1462800_EX
Prepared by VHB, Printed 9/17/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
44,485	39	>75% Grass cover, Good, HSG A (EX-1, EX-2)
42,240	98	Paved parking, HSG A (EX-1, EX-2)
86,725	**68**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front Entry Runoff Area=60,675 sf 61.34% Impervious Runoff Depth=1.18"
Tc=5.0 min CN=75 Runoff=2.26 cfs 5,981 cf

Subcatchment EX-2: Back Patio Runoff Area=26,050 sf 19.27% Impervious Runoff Depth=0.16"
Tc=5.0 min CN=50 Runoff=0.02 cfs 339 cf

Link DP1: Front Entry Inflow=2.26 cfs 5,981 cf
Primary=2.26 cfs 5,981 cf

Link DP2: Back Patio Inflow=0.02 cfs 339 cf
Primary=0.02 cfs 339 cf

Total Runoff Area = 86,725 sf Runoff Volume = 6,320 cf Average Runoff Depth = 0.87"
51.29% Pervious = 44,485 sf 48.71% Impervious = 42,240 sf

Summary for Subcatchment EX-1: Front Entry

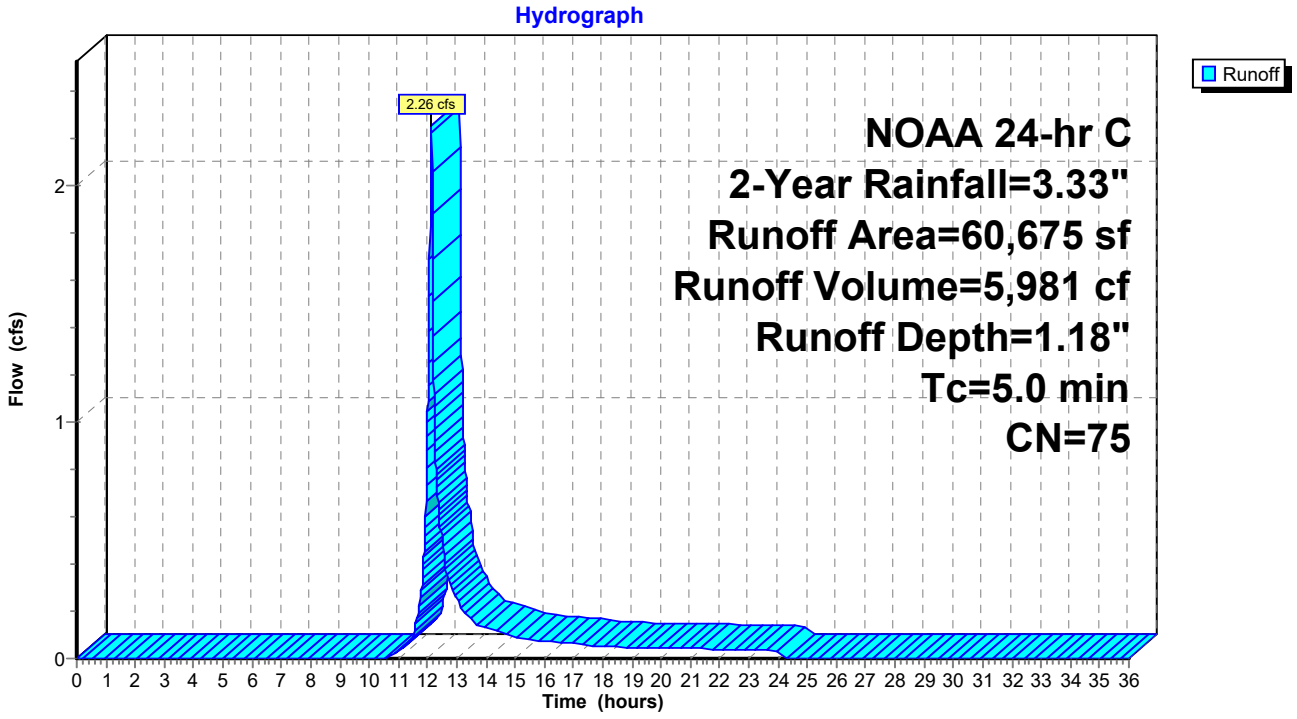
Runoff = 2.26 cfs @ 12.13 hrs, Volume= 5,981 cf, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.33"

Area (sf)	CN	Description
37,220	98	Paved parking, HSG A
23,455	39	>75% Grass cover, Good, HSG A
60,675	75	Weighted Average
23,455		38.66% Pervious Area
37,220		61.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front Entry



Summary for Subcatchment EX-2: Back Patio

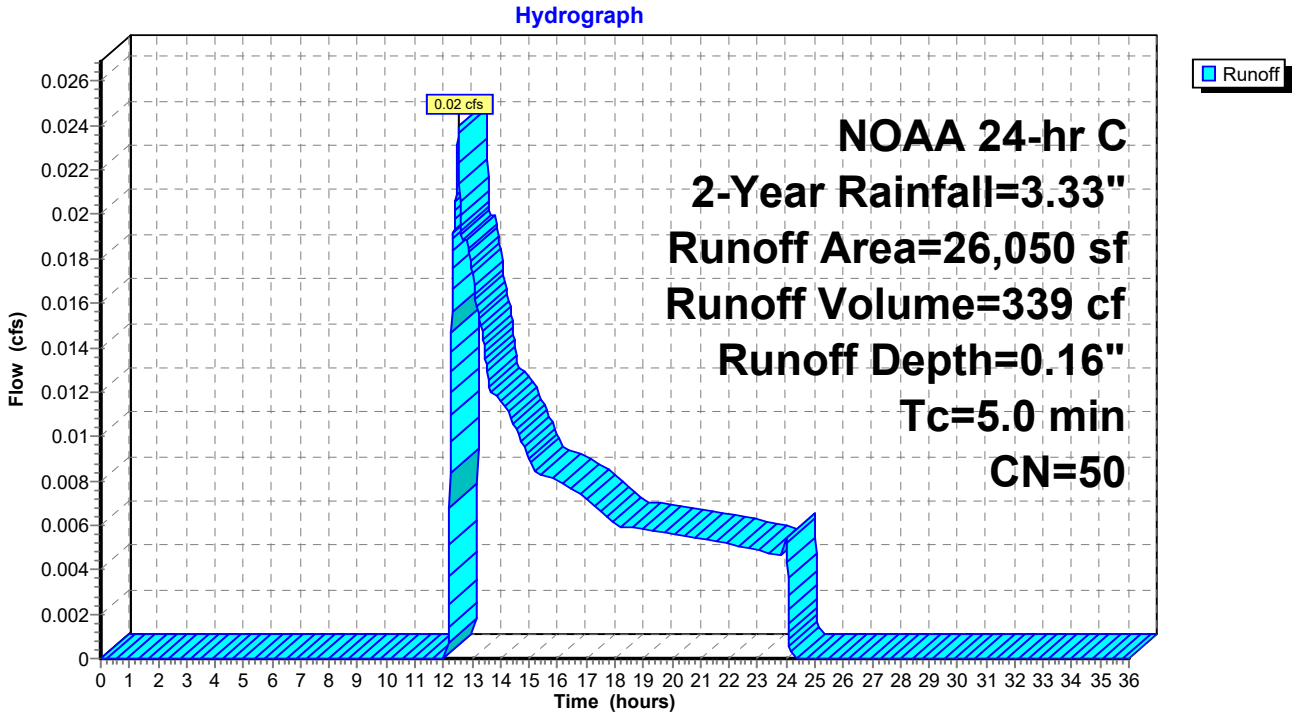
Runoff = 0.02 cfs @ 12.53 hrs, Volume= 339 cf, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.33"

Area (sf)	CN	Description
5,020	98	Paved parking, HSG A
21,030	39	>75% Grass cover, Good, HSG A
26,050	50	Weighted Average
21,030		80.73% Pervious Area
5,020		19.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back Patio

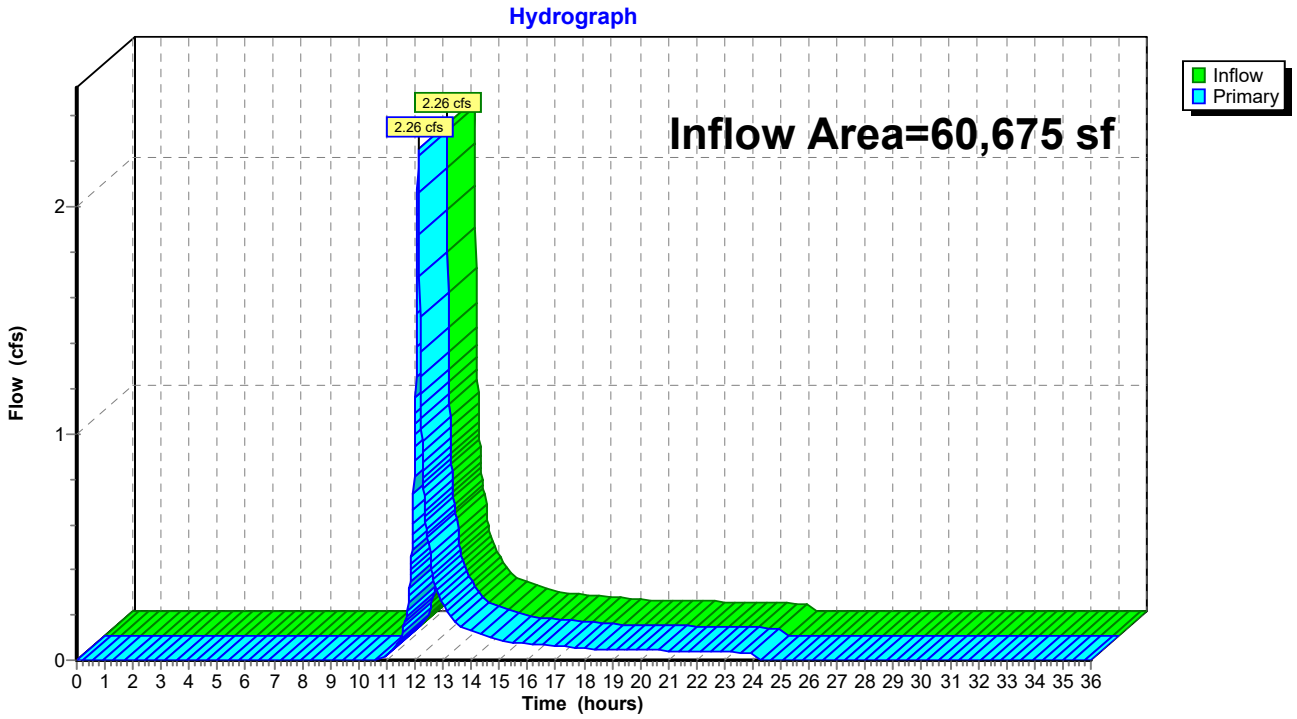


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 61.34% Impervious, Inflow Depth = 1.18" for 2-Year event
Inflow = 2.26 cfs @ 12.13 hrs, Volume= 5,981 cf
Primary = 2.26 cfs @ 12.13 hrs, Volume= 5,981 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

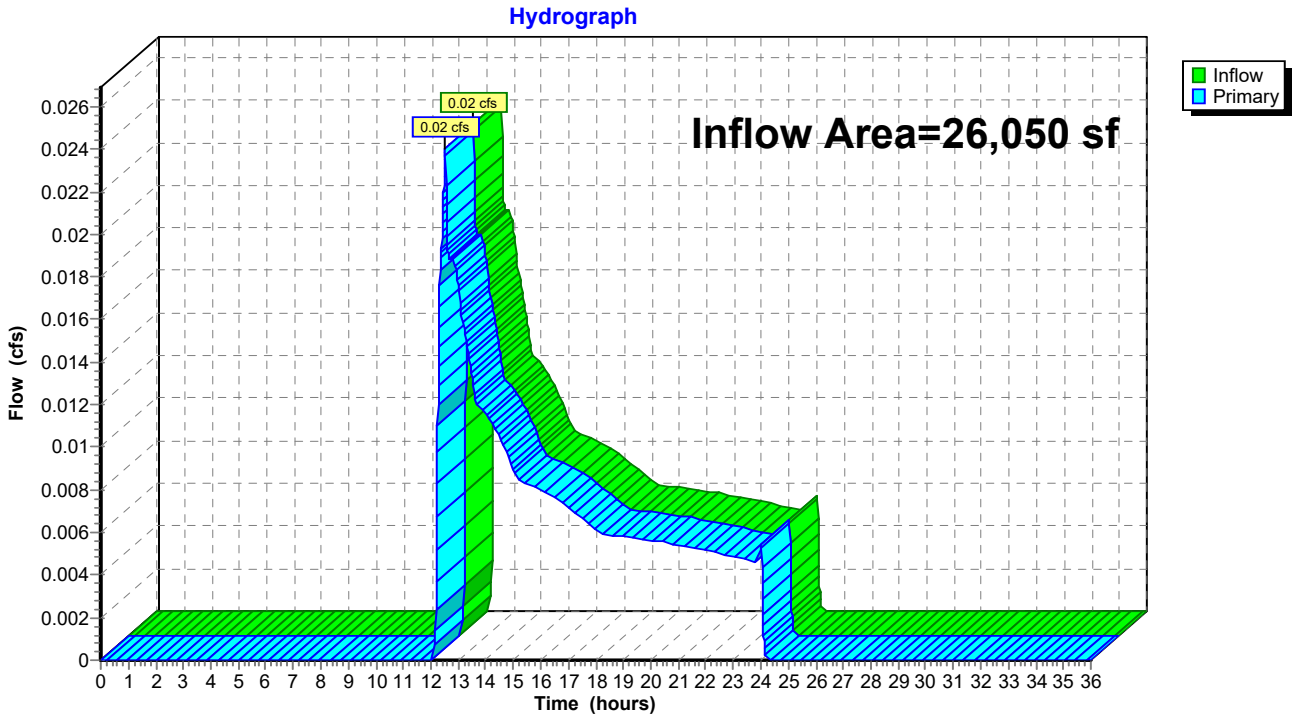


Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 19.27% Impervious, Inflow Depth = 0.16" for 2-Year event
Inflow = 0.02 cfs @ 12.53 hrs, Volume= 339 cf
Primary = 0.02 cfs @ 12.53 hrs, Volume= 339 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front Entry Runoff Area=60,675 sf 61.34% Impervious Runoff Depth=2.63"
Tc=5.0 min CN=75 Runoff=5.06 cfs 13,292 cf

Subcatchment EX-2: Back Patio Runoff Area=26,050 sf 19.27% Impervious Runoff Depth=0.78"
Tc=5.0 min CN=50 Runoff=0.50 cfs 1,703 cf

Link DP1: Front Entry Inflow=5.06 cfs 13,292 cf
Primary=5.06 cfs 13,292 cf

Link DP2: Back Patio Inflow=0.50 cfs 1,703 cf
Primary=0.50 cfs 1,703 cf

Total Runoff Area = 86,725 sf Runoff Volume = 14,995 cf Average Runoff Depth = 2.07"
51.29% Pervious = 44,485 sf 48.71% Impervious = 42,240 sf

Summary for Subcatchment EX-1: Front Entry

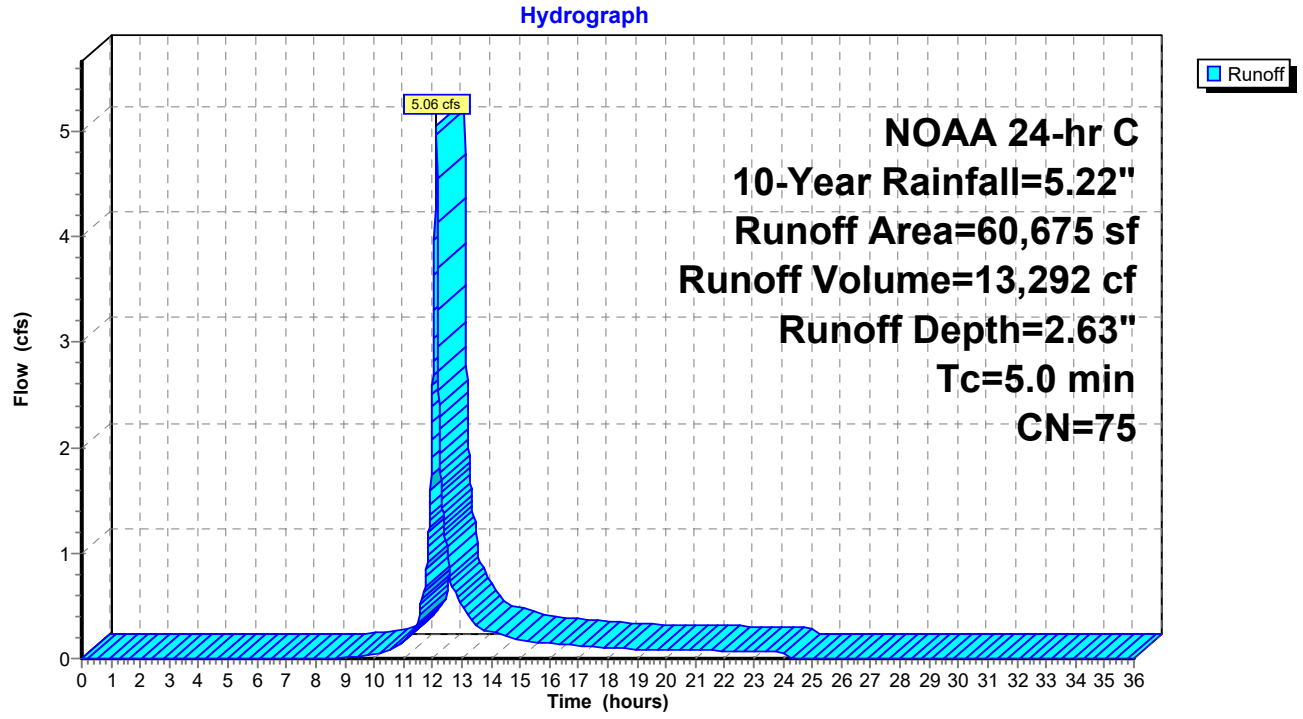
Runoff = 5.06 cfs @ 12.13 hrs, Volume= 13,292 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=5.22"

Area (sf)	CN	Description
37,220	98	Paved parking, HSG A
23,455	39	>75% Grass cover, Good, HSG A
60,675	75	Weighted Average
23,455		38.66% Pervious Area
37,220		61.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front Entry



Summary for Subcatchment EX-2: Back Patio

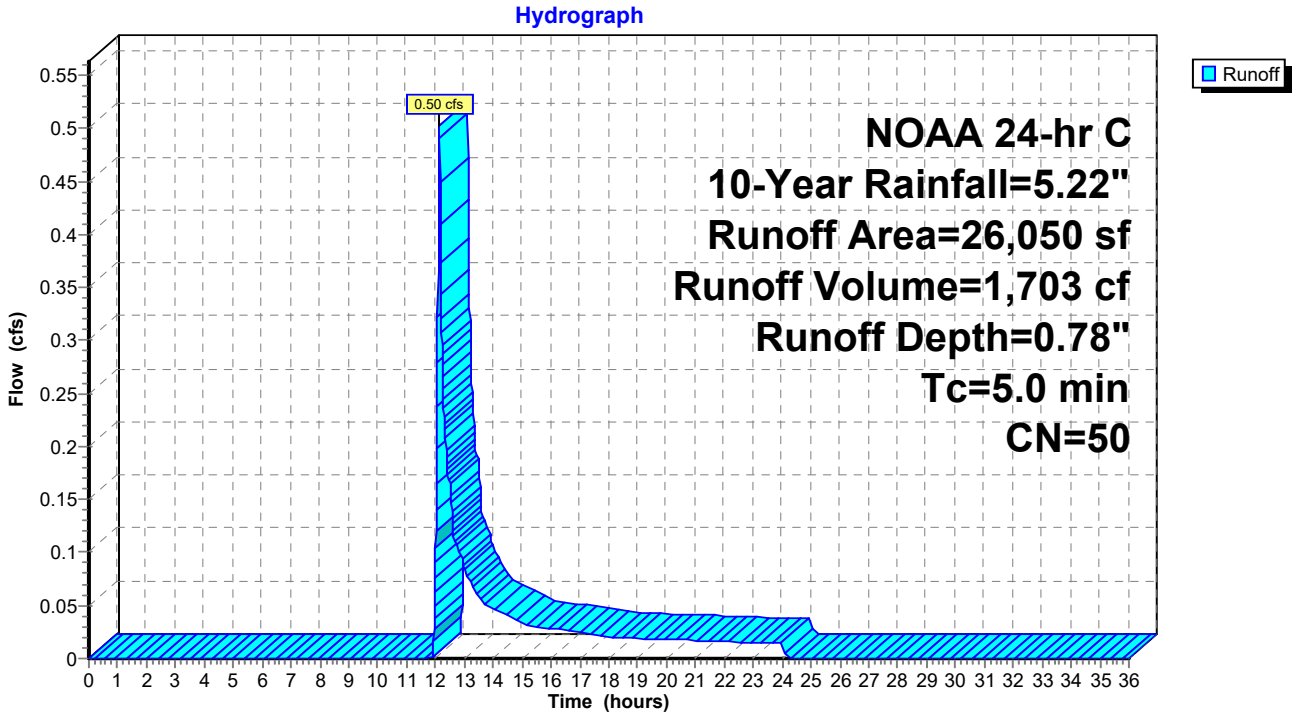
Runoff = 0.50 cfs @ 12.14 hrs, Volume= 1,703 cf, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=5.22"

Area (sf)	CN	Description
5,020	98	Paved parking, HSG A
21,030	39	>75% Grass cover, Good, HSG A
26,050	50	Weighted Average
21,030		80.73% Pervious Area
5,020		19.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back Patio

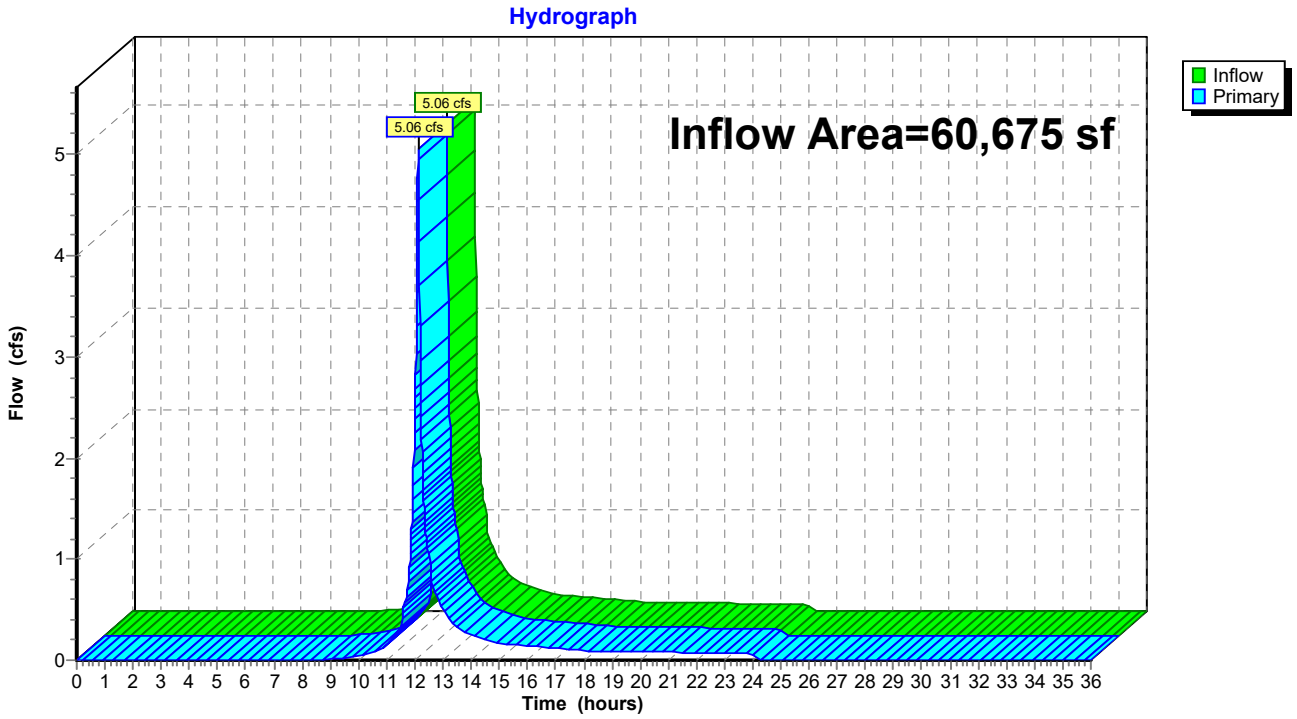


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 61.34% Impervious, Inflow Depth = 2.63" for 10-Year event
Inflow = 5.06 cfs @ 12.13 hrs, Volume= 13,292 cf
Primary = 5.06 cfs @ 12.13 hrs, Volume= 13,292 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

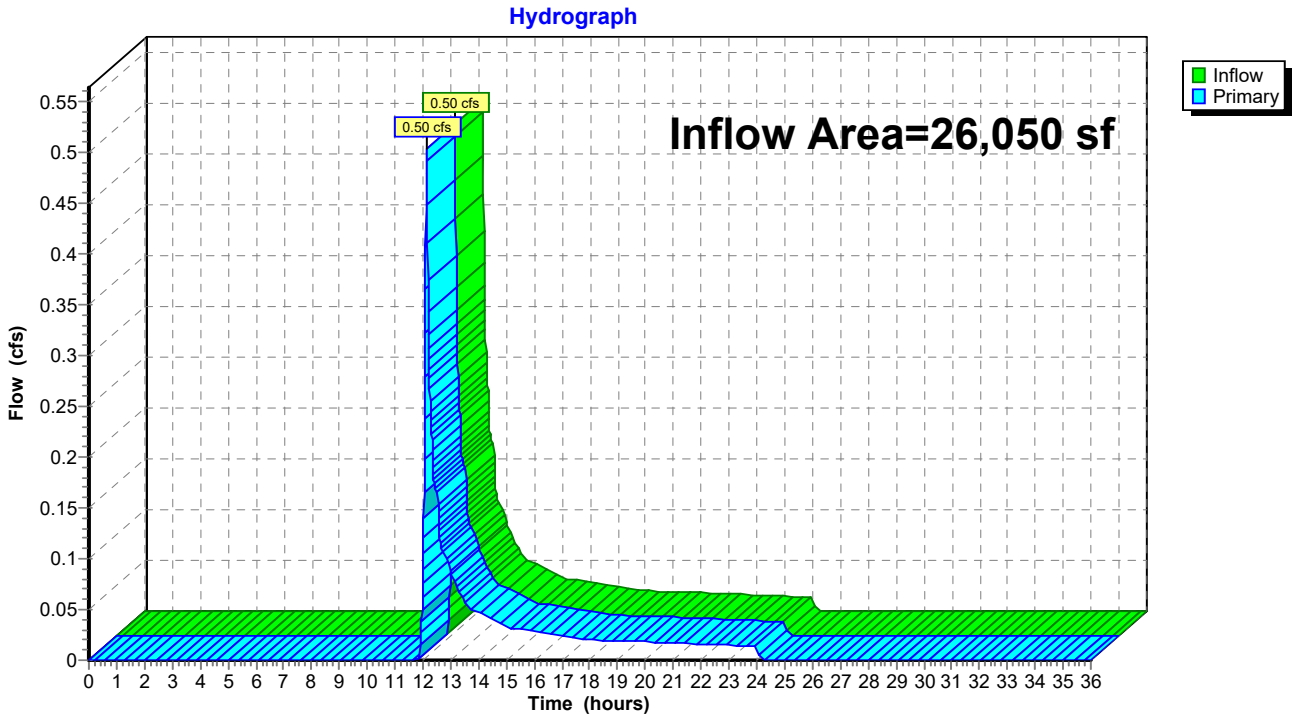


Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 19.27% Impervious, Inflow Depth = 0.78" for 10-Year event
Inflow = 0.50 cfs @ 12.14 hrs, Volume= 1,703 cf
Primary = 0.50 cfs @ 12.14 hrs, Volume= 1,703 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front Entry Runoff Area=60,675 sf 61.34% Impervious Runoff Depth=3.62"
Tc=5.0 min CN=75 Runoff=6.90 cfs 18,288 cf

Subcatchment EX-2: Back Patio Runoff Area=26,050 sf 19.27% Impervious Runoff Depth=1.34"
Tc=5.0 min CN=50 Runoff=1.00 cfs 2,907 cf

Link DP1: Front Entry Inflow=6.90 cfs 18,288 cf
Primary=6.90 cfs 18,288 cf

Link DP2: Back Patio Inflow=1.00 cfs 2,907 cf
Primary=1.00 cfs 2,907 cf

Total Runoff Area = 86,725 sf Runoff Volume = 21,195 cf Average Runoff Depth = 2.93"
51.29% Pervious = 44,485 sf 48.71% Impervious = 42,240 sf

Summary for Subcatchment EX-1: Front Entry

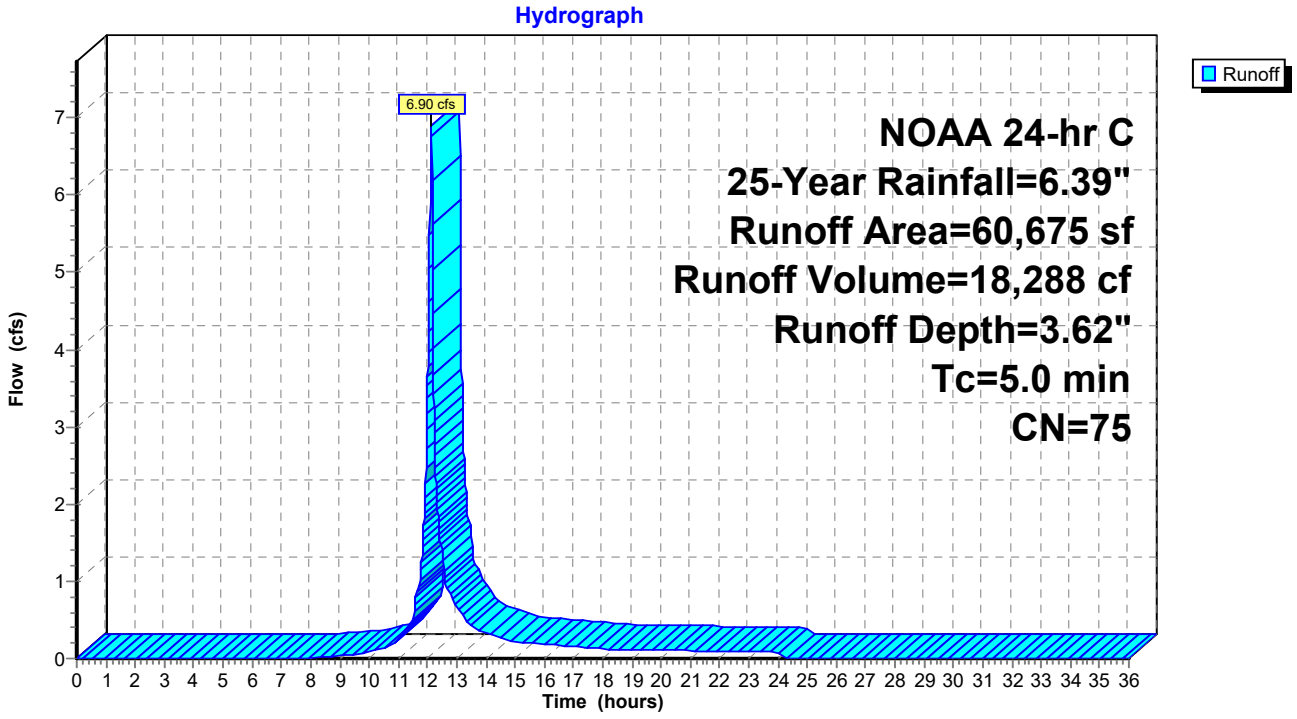
Runoff = 6.90 cfs @ 12.12 hrs, Volume= 18,288 cf, Depth= 3.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.39"

Area (sf)	CN	Description
37,220	98	Paved parking, HSG A
23,455	39	>75% Grass cover, Good, HSG A
60,675	75	Weighted Average
23,455		38.66% Pervious Area
37,220		61.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front Entry



Summary for Subcatchment EX-2: Back Patio

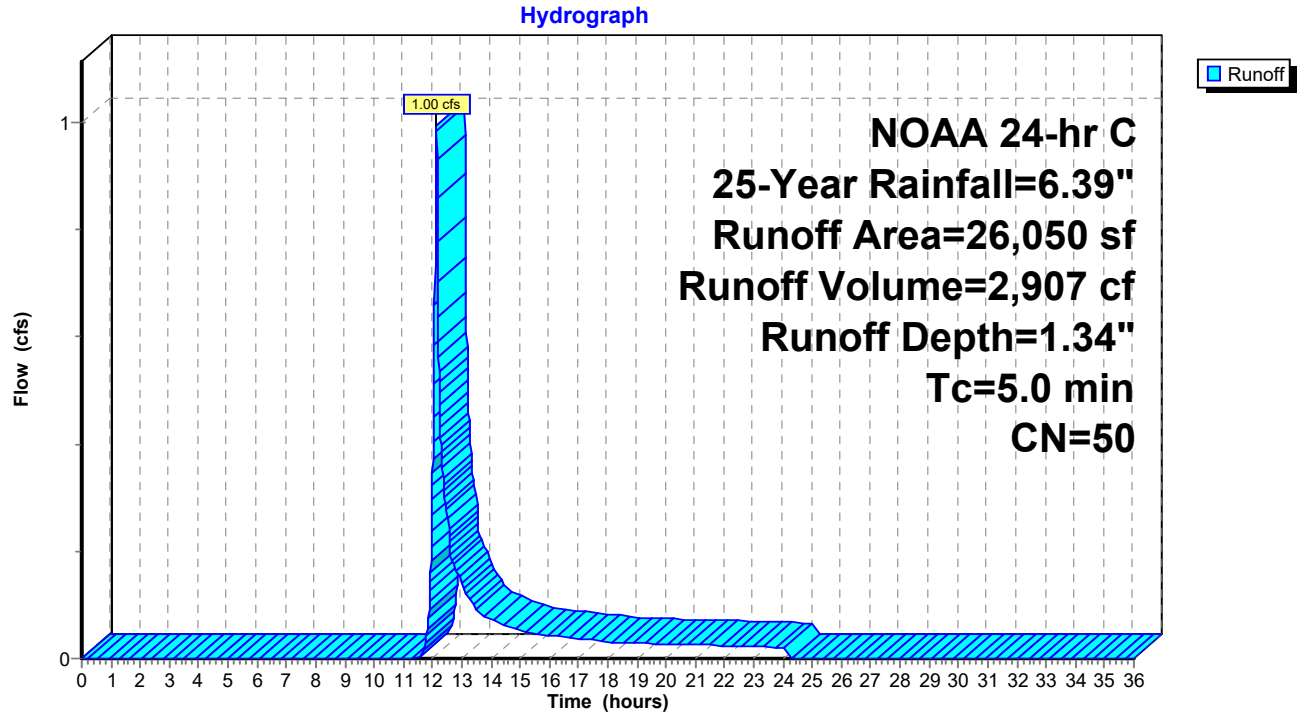
Runoff = 1.00 cfs @ 12.13 hrs, Volume= 2,907 cf, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.39"

Area (sf)	CN	Description
5,020	98	Paved parking, HSG A
21,030	39	>75% Grass cover, Good, HSG A
26,050	50	Weighted Average
21,030		80.73% Pervious Area
5,020		19.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back Patio

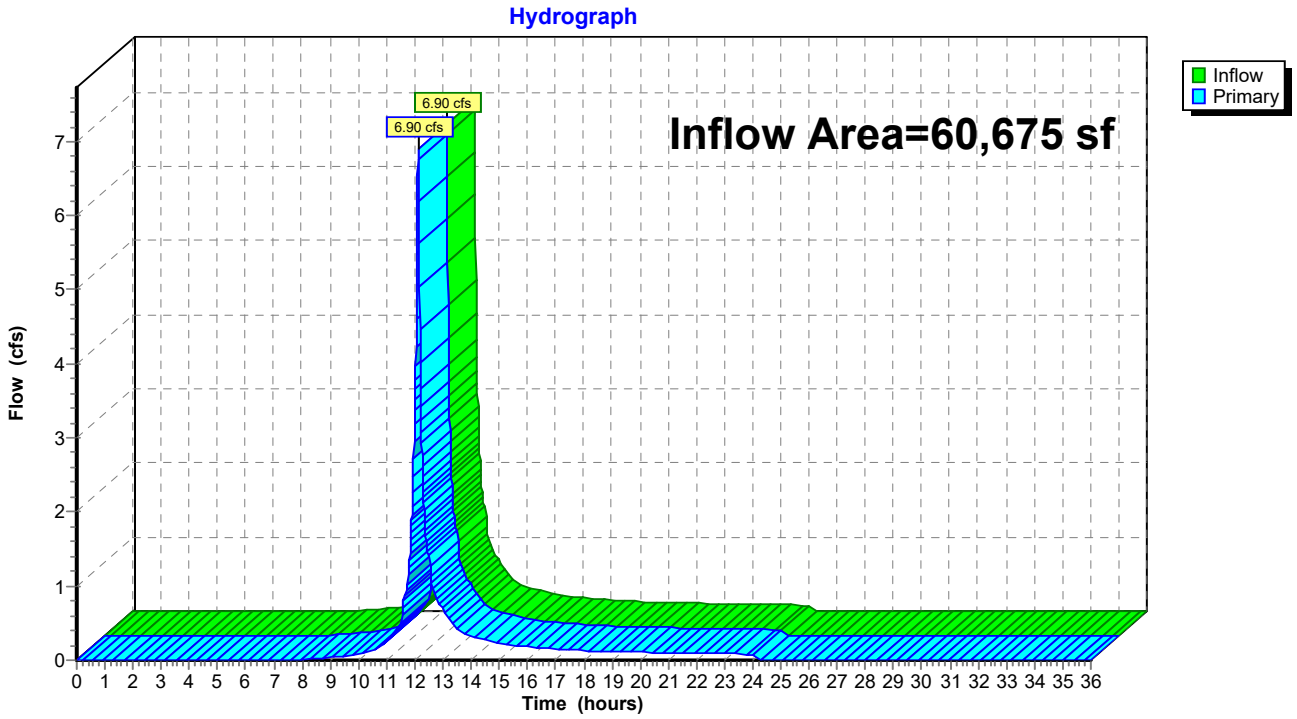


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 61.34% Impervious, Inflow Depth = 3.62" for 25-Year event
Inflow = 6.90 cfs @ 12.12 hrs, Volume= 18,288 cf
Primary = 6.90 cfs @ 12.12 hrs, Volume= 18,288 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

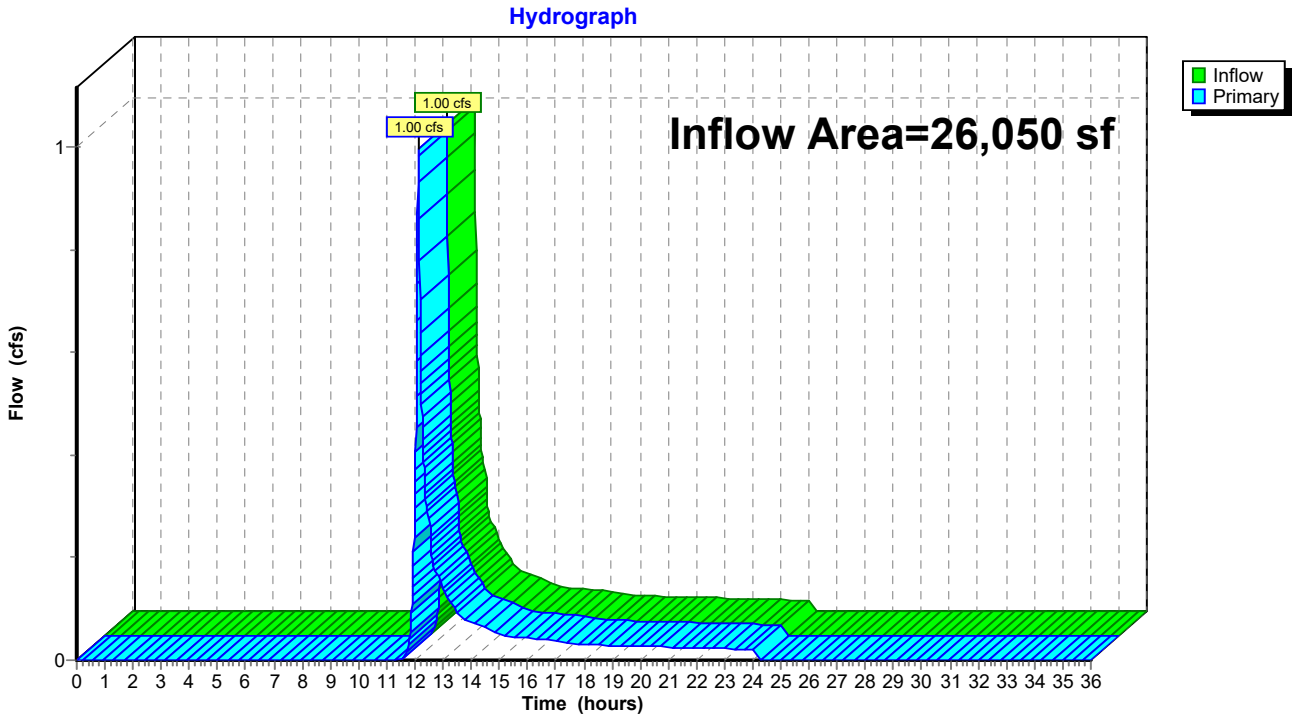


Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 19.27% Impervious, Inflow Depth = 1.34" for 25-Year event
Inflow = 1.00 cfs @ 12.13 hrs, Volume= 2,907 cf
Primary = 1.00 cfs @ 12.13 hrs, Volume= 2,907 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Front Entry Runoff Area=60,675 sf 61.34% Impervious Runoff Depth=5.23"
Tc=5.0 min CN=75 Runoff=9.85 cfs 26,452 cf

Subcatchment EX-2: Back Patio Runoff Area=26,050 sf 19.27% Impervious Runoff Depth=2.38"
Tc=5.0 min CN=50 Runoff=1.90 cfs 5,164 cf

Link DP1: Front Entry Inflow=9.85 cfs 26,452 cf
Primary=9.85 cfs 26,452 cf

Link DP2: Back Patio Inflow=1.90 cfs 5,164 cf
Primary=1.90 cfs 5,164 cf

Total Runoff Area = 86,725 sf Runoff Volume = 31,617 cf Average Runoff Depth = 4.37"
51.29% Pervious = 44,485 sf 48.71% Impervious = 42,240 sf

Summary for Subcatchment EX-1: Front Entry

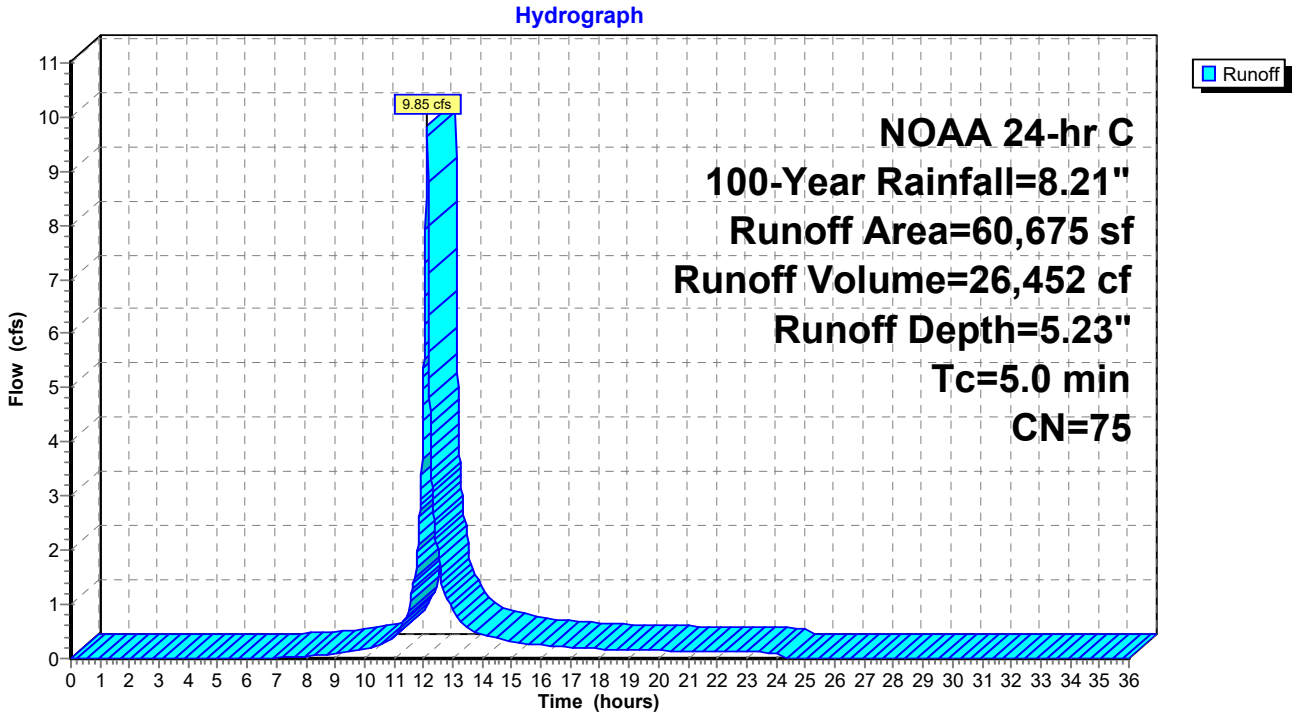
Runoff = 9.85 cfs @ 12.12 hrs, Volume= 26,452 cf, Depth= 5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (sf)	CN	Description
37,220	98	Paved parking, HSG A
23,455	39	>75% Grass cover, Good, HSG A
60,675	75	Weighted Average
23,455		38.66% Pervious Area
37,220		61.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-1: Front Entry



Summary for Subcatchment EX-2: Back Patio

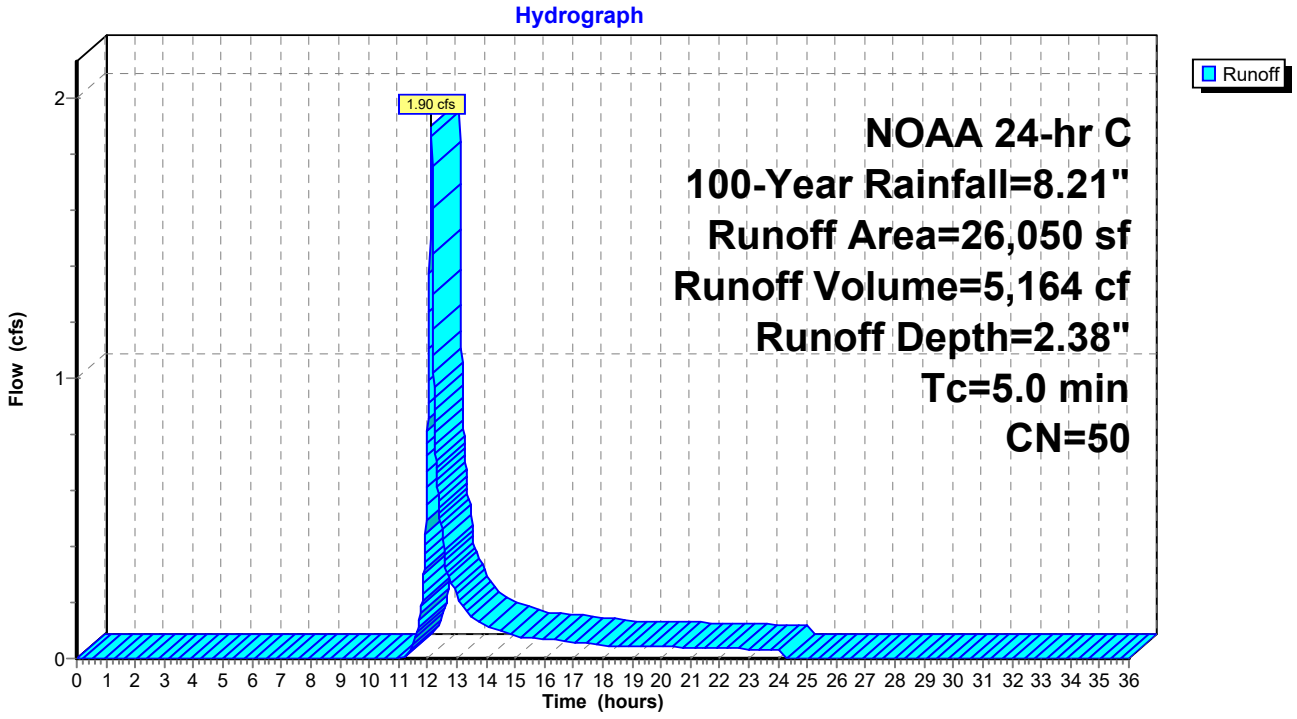
Runoff = 1.90 cfs @ 12.13 hrs, Volume= 5,164 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (sf)	CN	Description
5,020	98	Paved parking, HSG A
21,030	39	>75% Grass cover, Good, HSG A
26,050	50	Weighted Average
21,030		80.73% Pervious Area
5,020		19.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment EX-2: Back Patio

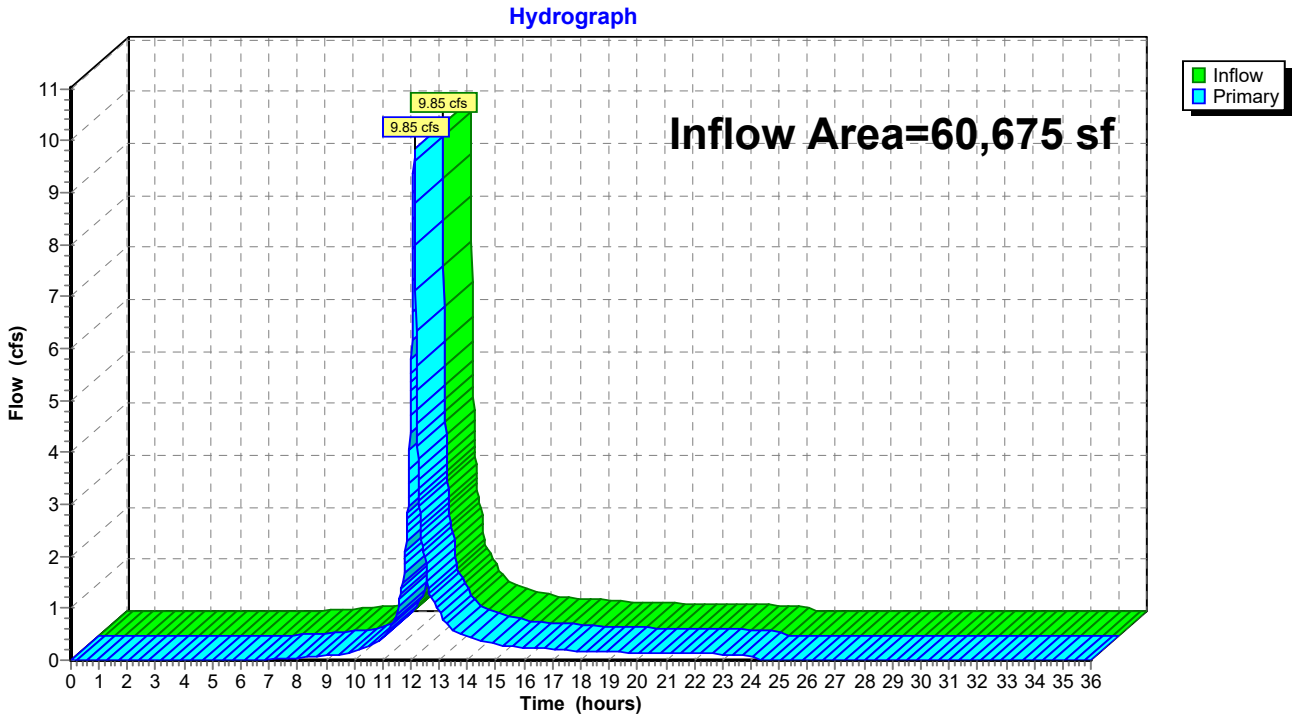


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 61.34% Impervious, Inflow Depth = 5.23" for 100-Year event
Inflow = 9.85 cfs @ 12.12 hrs, Volume= 26,452 cf
Primary = 9.85 cfs @ 12.12 hrs, Volume= 26,452 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

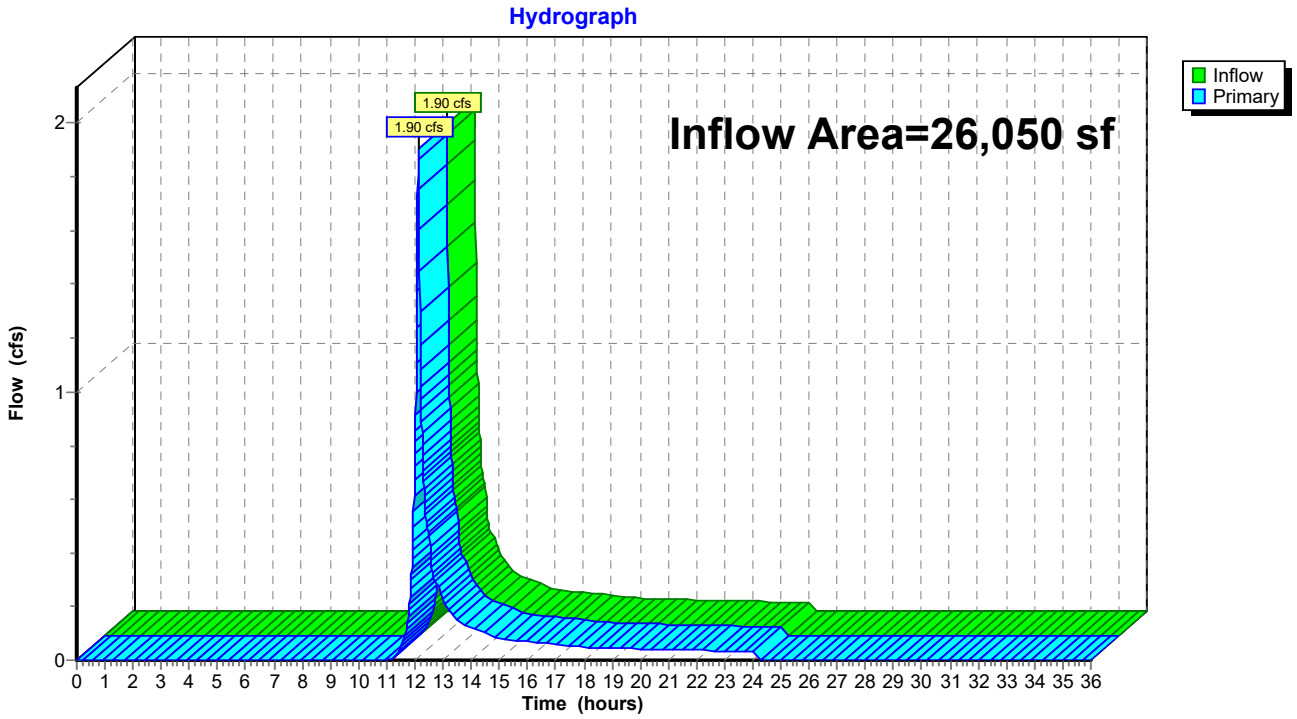


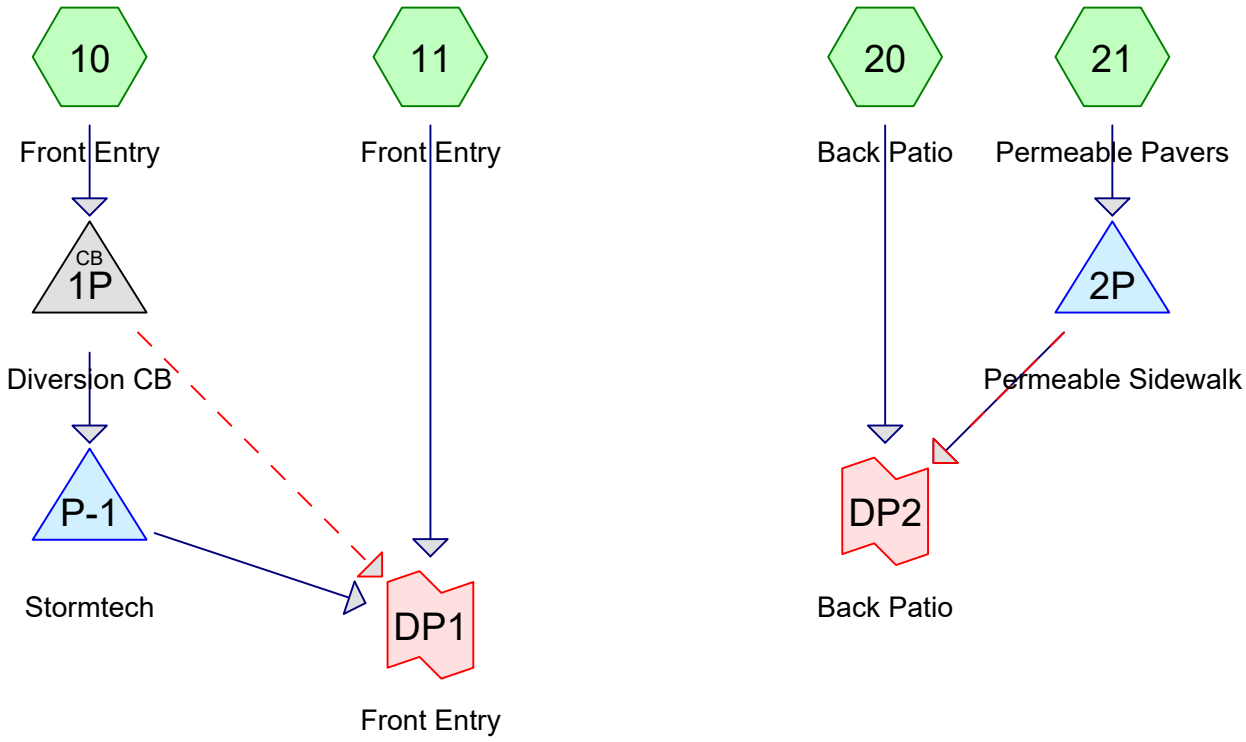
Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 19.27% Impervious, Inflow Depth = 2.38" for 100-Year event
Inflow = 1.90 cfs @ 12.13 hrs, Volume= 5,164 cf
Primary = 1.90 cfs @ 12.13 hrs, Volume= 5,164 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio





Subcat Reach Pond Link

Routing Diagram for 1462800_PR
Prepared by VHB, Printed 9/17/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
40,332	39	>75% Grass cover, Good, HSG A (10, 11, 20)
42,893	98	Paved parking, HSG A (10, 11, 20)
3,500	98	Permeable (21)
86,725	**71**	**TOTAL AREA**

Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10: Front Entry Runoff Area=34,320 sf 72.93% Impervious Runoff Depth=1.64"
Tc=5.0 min CN=82 Runoff=1.79 cfs 4,700 cf

Subcatchment11: Front Entry Runoff Area=26,355 sf 52.38% Impervious Runoff Depth=0.90"
Tc=5.0 min CN=70 Runoff=0.73 cfs 1,987 cf

Subcatchment20: Back Patio Runoff Area=22,550 sf 18.00% Impervious Runoff Depth=0.16"
Tc=5.0 min CN=50 Runoff=0.02 cfs 293 cf

Subcatchment21: Permeable Pavers Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=0.29 cfs 903 cf

Pond 1P: Diversion CB Peak Elev=93.98' Inflow=1.79 cfs 4,700 cf
Primary=1.79 cfs 4,700 cf Secondary=0.00 cfs 0 cf Outflow=1.79 cfs 4,700 cf

Pond 2P: Permeable Sidewalk Peak Elev=98.60' Storage=135 cf Inflow=0.29 cfs 903 cf
Discarded=0.08 cfs 904 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.08 cfs 904 cf

Pond P-1: Stormtech Peak Elev=93.98' Storage=2,771 cf Inflow=1.79 cfs 4,700 cf
Discarded=0.05 cfs 4,511 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 4,511 cf

Link DP1: Front Entry Inflow=0.73 cfs 1,987 cf
Primary=0.73 cfs 1,987 cf

Link DP2: Back Patio Inflow=0.02 cfs 293 cf
Primary=0.02 cfs 293 cf

Total Runoff Area = 86,725 sf Runoff Volume = 7,884 cf Average Runoff Depth = 1.09"
46.51% Pervious = 40,332 sf 53.49% Impervious = 46,393 sf

Summary for Subcatchment 10: Front Entry

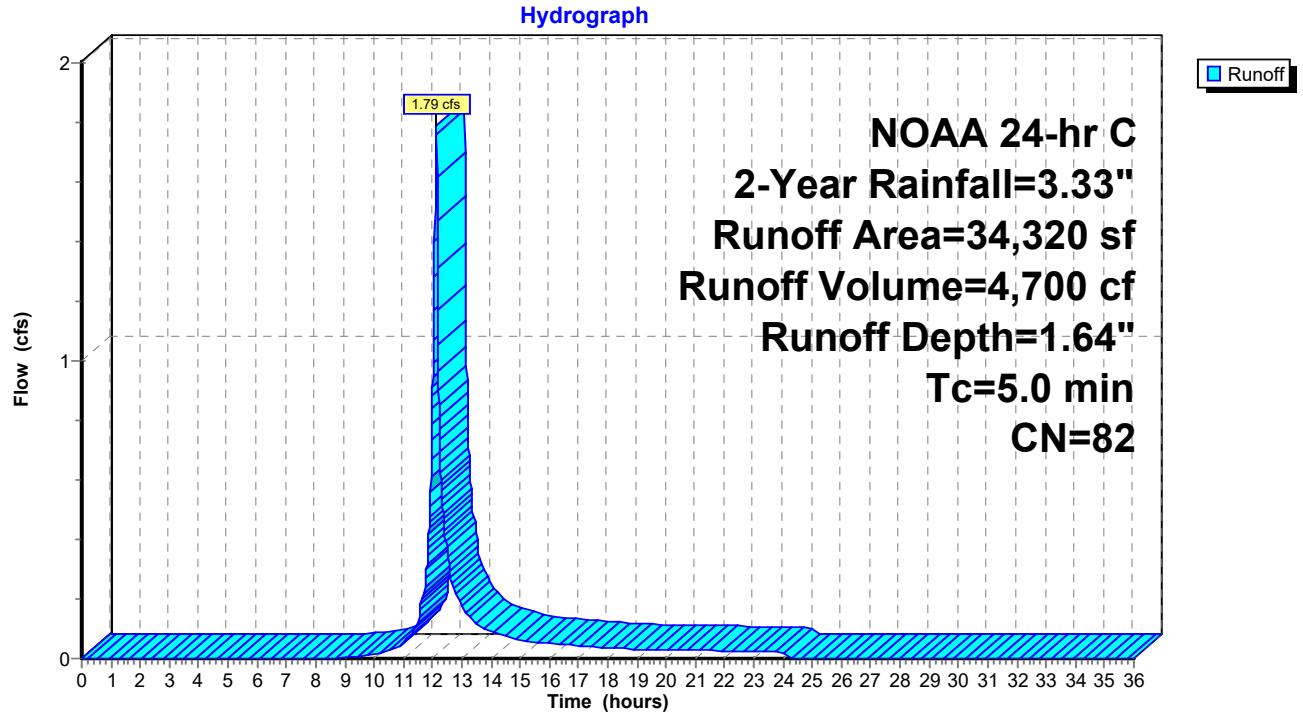
Runoff = 1.79 cfs @ 12.13 hrs, Volume= 4,700 cf, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.33"

Area (sf)	CN	Description
25,030	98	Paved parking, HSG A
9,290	39	>75% Grass cover, Good, HSG A
34,320	82	Weighted Average
9,290		27.07% Pervious Area
25,030		72.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 10: Front Entry



Summary for Subcatchment 11: Front Entry

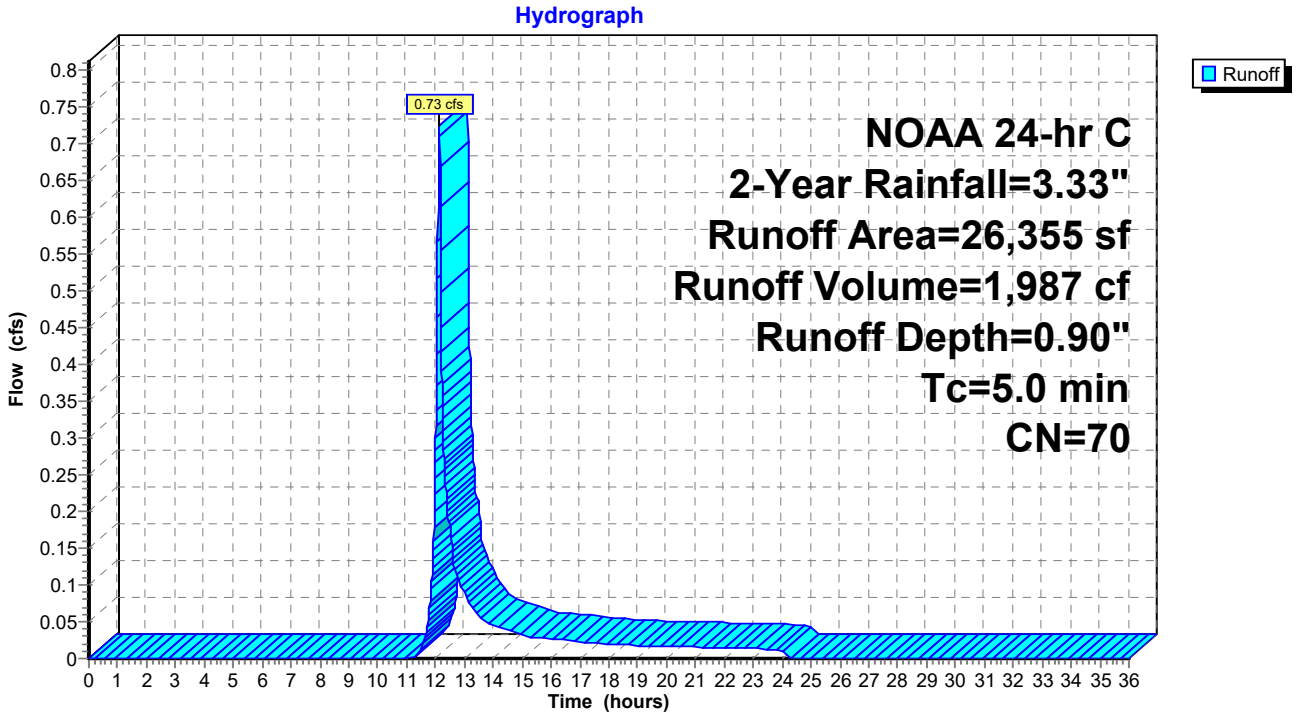
Runoff = 0.73 cfs @ 12.13 hrs, Volume= 1,987 cf, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.33"

Area (sf)	CN	Description
13,805	98	Paved parking, HSG A
12,550	39	>75% Grass cover, Good, HSG A
26,355	70	Weighted Average
12,550		47.62% Pervious Area
13,805		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 11: Front Entry



Summary for Subcatchment 20: Back Patio

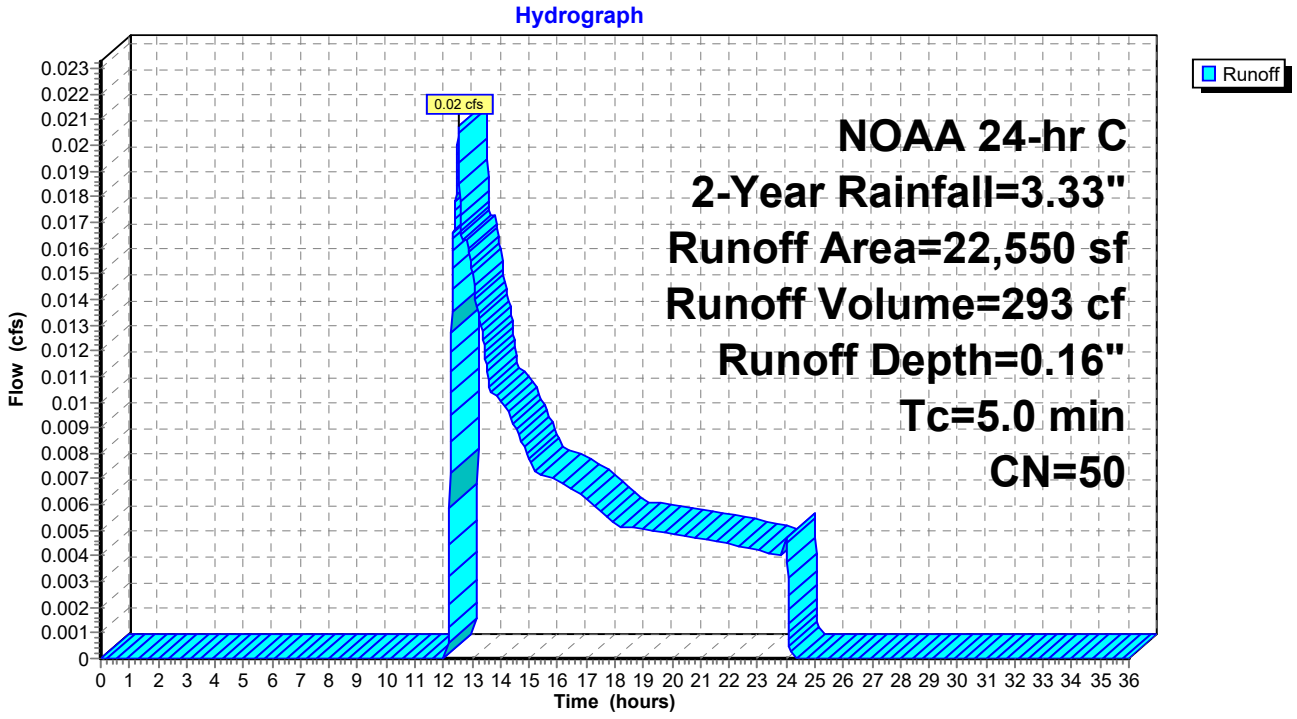
Runoff = 0.02 cfs @ 12.53 hrs, Volume= 293 cf, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.33"

Area (sf)	CN	Description
4,058	98	Paved parking, HSG A
18,492	39	>75% Grass cover, Good, HSG A
22,550	50	Weighted Average
18,492		82.00% Pervious Area
4,058		18.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 20: Back Patio



Summary for Subcatchment 21: Permeable Pavers

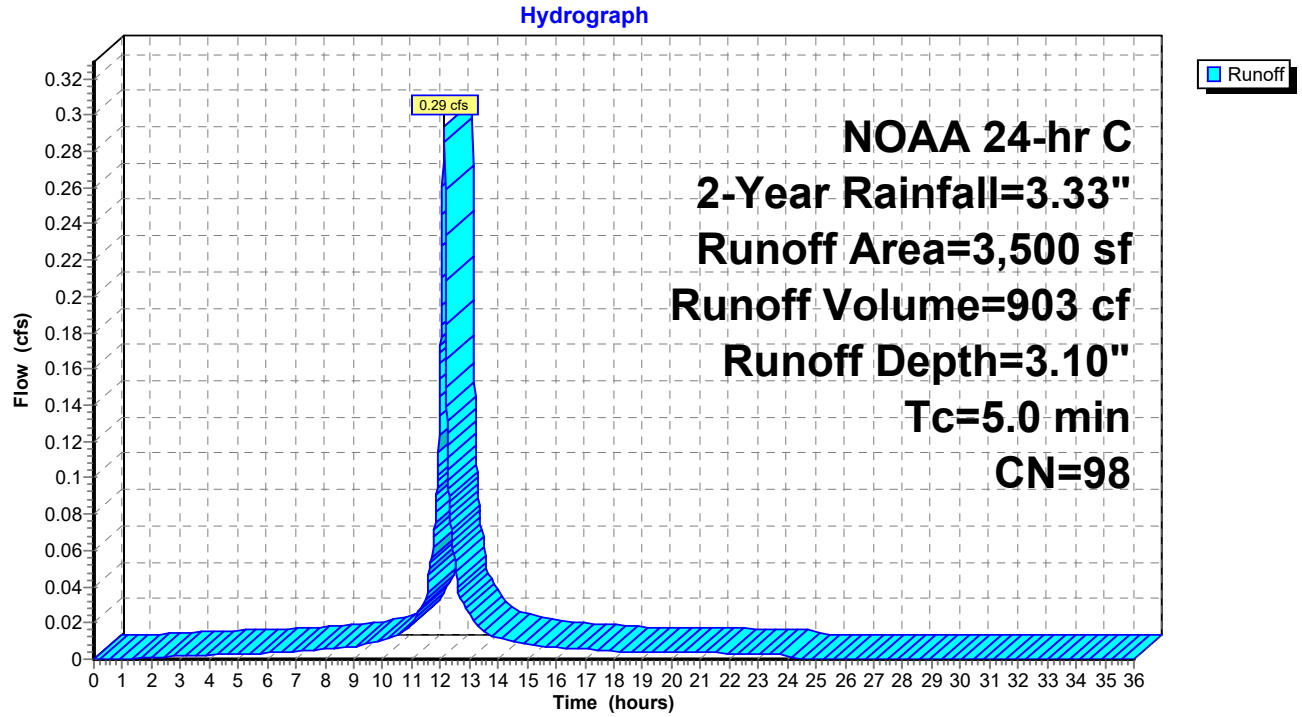
Runoff = 0.29 cfs @ 12.12 hrs, Volume= 903 cf, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 2-Year Rainfall=3.33"

	Area (sf)	CN	Description
*	3,500	98	Permeable
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 21: Permeable Pavers



Summary for Pond 1P: Diversion CB

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 1.64" for 2-Year event
Inflow = 1.79 cfs @ 12.13 hrs, Volume= 4,700 cf
Outflow = 1.79 cfs @ 12.13 hrs, Volume= 4,700 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.79 cfs @ 12.13 hrs, Volume= 4,700 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

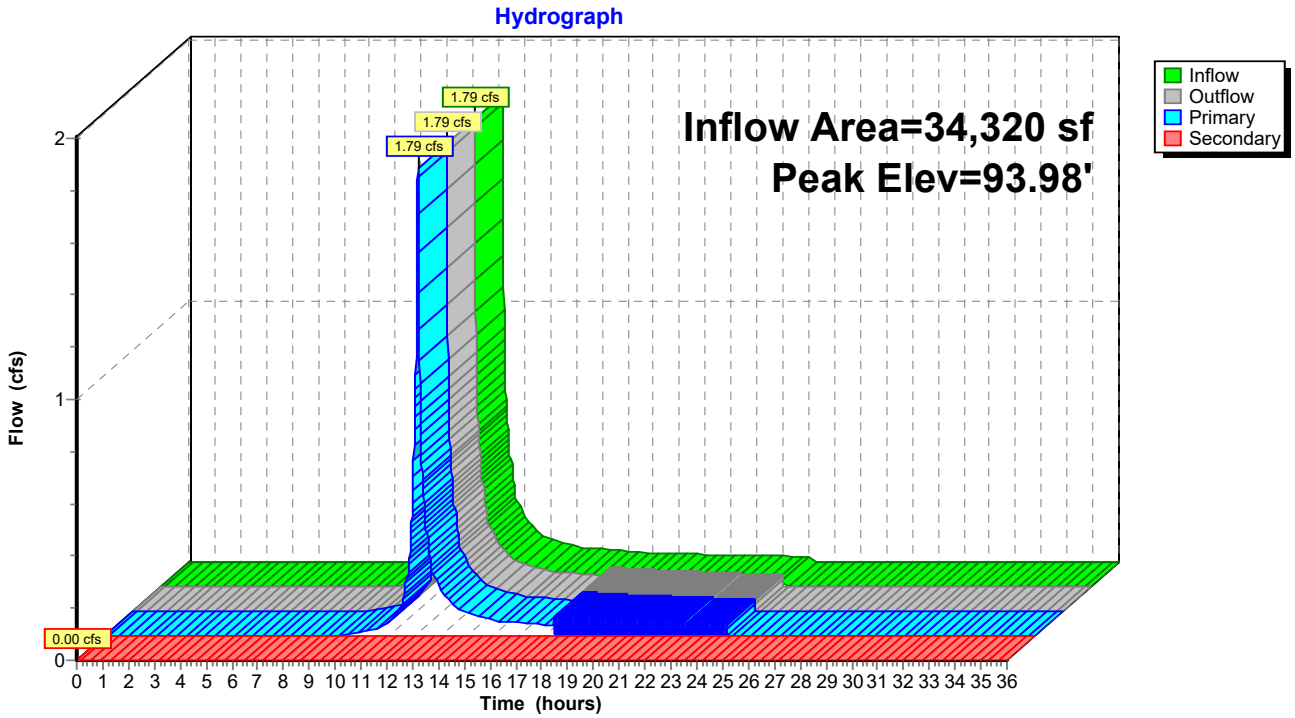
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 93.98' @ 16.27 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**24.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	94.40'	**10.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=1.78 cfs @ 12.13 hrs HW=93.24' TW=92.93' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.78 cfs @ 3.11 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.60' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond 1P: Diversion CB



Summary for Pond 2P: Permeable Sidewalk

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 3.10" for 2-Year event
Inflow = 0.29 cfs @ 12.12 hrs, Volume= 903 cf
Outflow = 0.08 cfs @ 12.01 hrs, Volume= 904 cf, Atten= 72%, Lag= 0.0 min
Discarded = 0.08 cfs @ 12.01 hrs, Volume= 904 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 98.60' @ 12.32 hrs Surf.Area= 3,500 sf Storage= 135 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.7 min (762.5 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1	98.50'	1,750 cf	**Permeable (Prismatic)**Listed below (Recalc) 4,375 cf Overall x 40.0% Voids
#2	99.75'	875 cf	**Surface (Prismatic)**Listed below (Recalc) -Impervious
		2,625 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.50	3,500	0	0
99.75	3,500	4,375	4,375

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.75	3,500	0	0
100.00	3,500	875	875

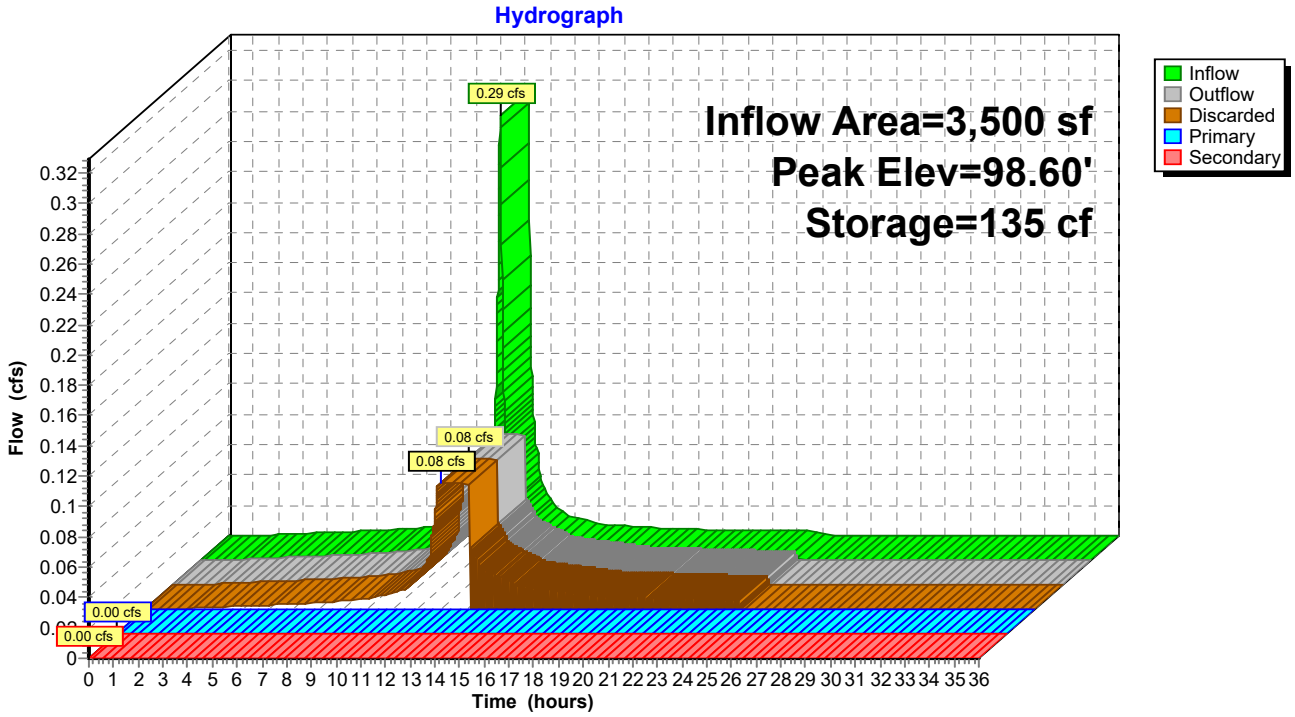
Device	Routing	Invert	Outlet Devices
#1	Discarded	98.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	98.75'	**6.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.75' / 98.40' S= 0.0350 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Secondary	99.95'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.08 cfs @ 12.01 hrs HW=98.52' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.50' TW=0.00' (Dynamic Tailwater)
↑└**2=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.50' TW=0.00' (Dynamic Tailwater)
↑└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Permeable Sidewalk



Summary for Pond P-1: Stormtech

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 1.64" for 2-Year event
Inflow = 1.79 cfs @ 12.13 hrs, Volume= 4,700 cf
Outflow = 0.05 cfs @ 11.95 hrs, Volume= 4,511 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.95 hrs, Volume= 4,511 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 93.98' @ 16.26 hrs Surf.Area= 2,062 sf Storage= 2,771 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 550.6 min (1,387.4 - 836.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.00'	1,878 cf	**44.25'W x 46.34'L x 3.50'H Field A** 7,176 cf Overall - 2,481 cf Embedded = 4,696 cf x 40.0% Voids
#2A	92.50'	2,481 cf	**ADS_StormTech SC-740 +Cap** x 54 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 54 Chambers in 9 Rows
#3	92.50'	861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,220 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
92.50	12	0	0
96.90	12	53	53
97.00	110	6	59
97.50	3,100	803	861

Device	Routing	Invert	Outlet Devices
#1	Primary	96.90'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	92.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.95 hrs HW=92.51' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-1: Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

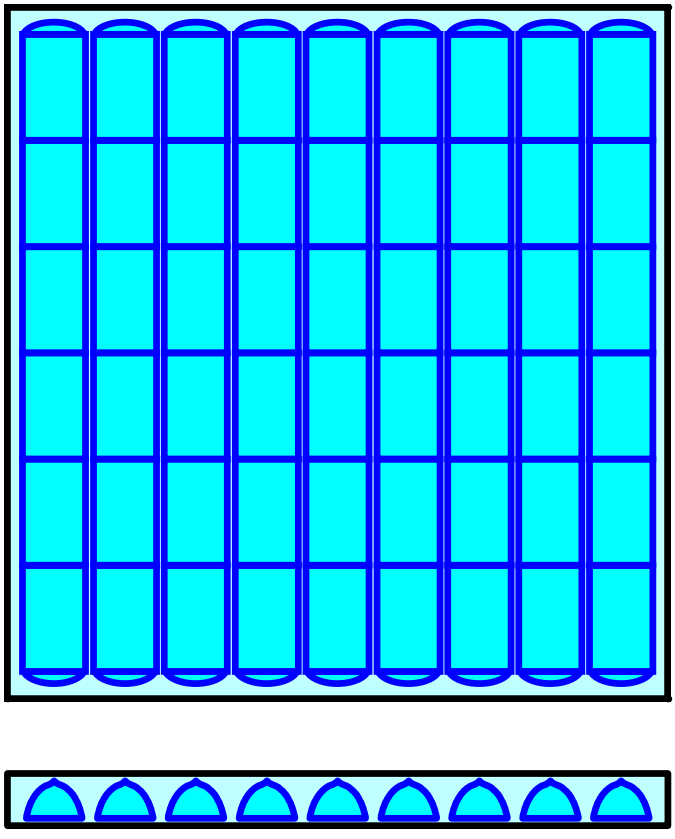
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
9 Rows x 51.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 44.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

54 Chambers x 45.9 cf = 2,480.8 cf Chamber Storage

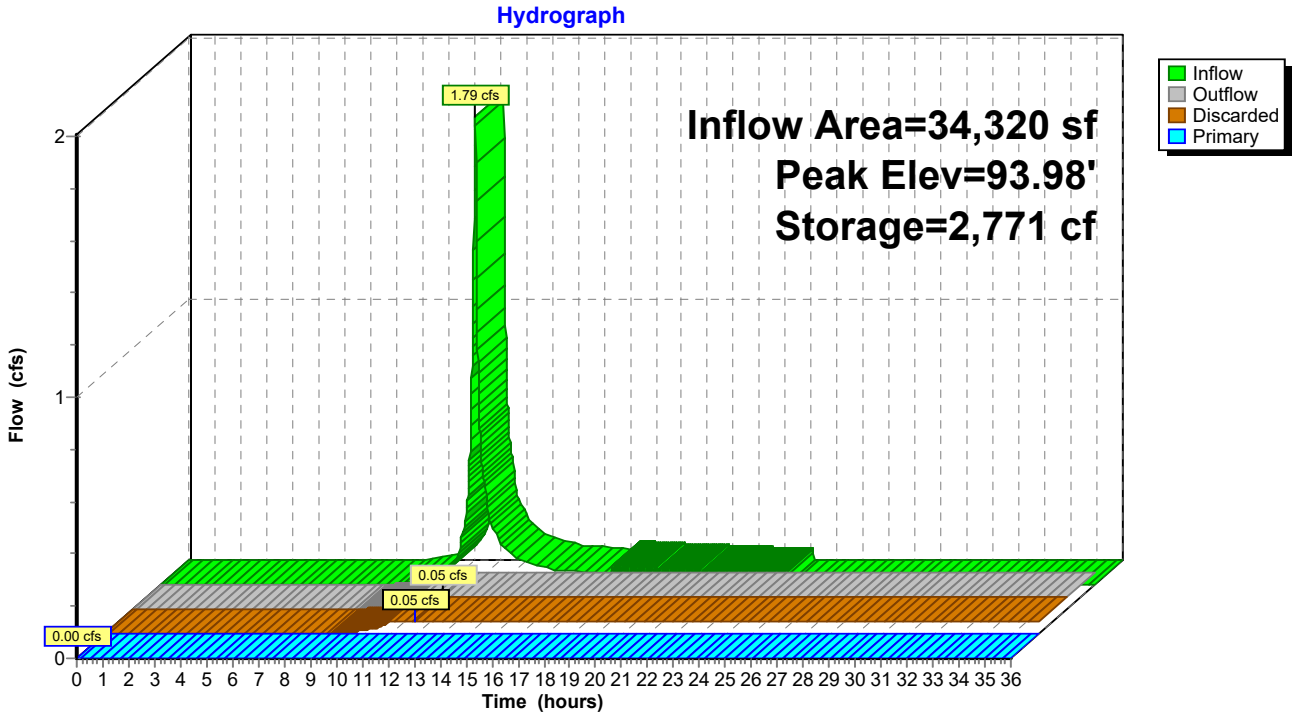
7,176.4 cf Field - 2,480.8 cf Chambers = 4,695.6 cf Stone x 40.0% Voids = 1,878.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,359.0 cf = 0.100 af
Overall Storage Efficiency = 60.7%
Overall System Size = 46.34' x 44.25' x 3.50'

54 Chambers
265.8 cy Field
173.9 cy Stone



Pond P-1: Stormtech

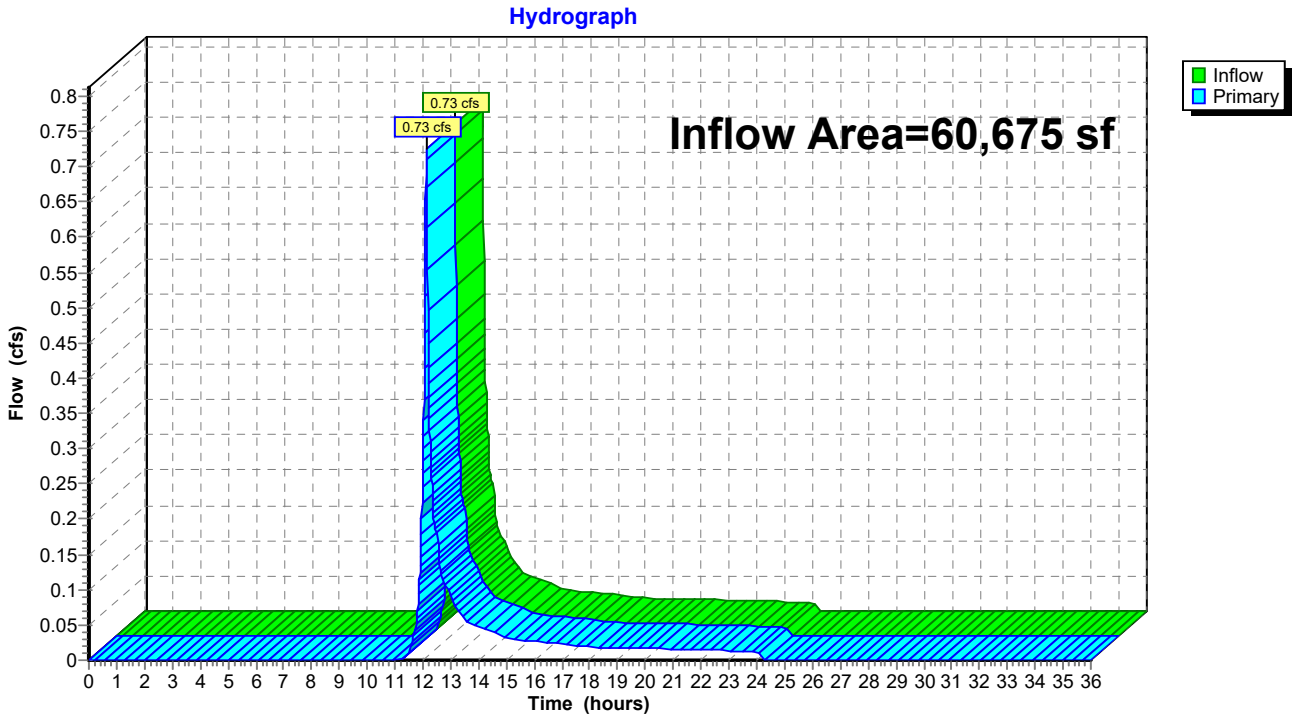


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 64.00% Impervious, Inflow Depth = 0.39" for 2-Year event
Inflow = 0.73 cfs @ 12.13 hrs, Volume= 1,987 cf
Primary = 0.73 cfs @ 12.13 hrs, Volume= 1,987 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

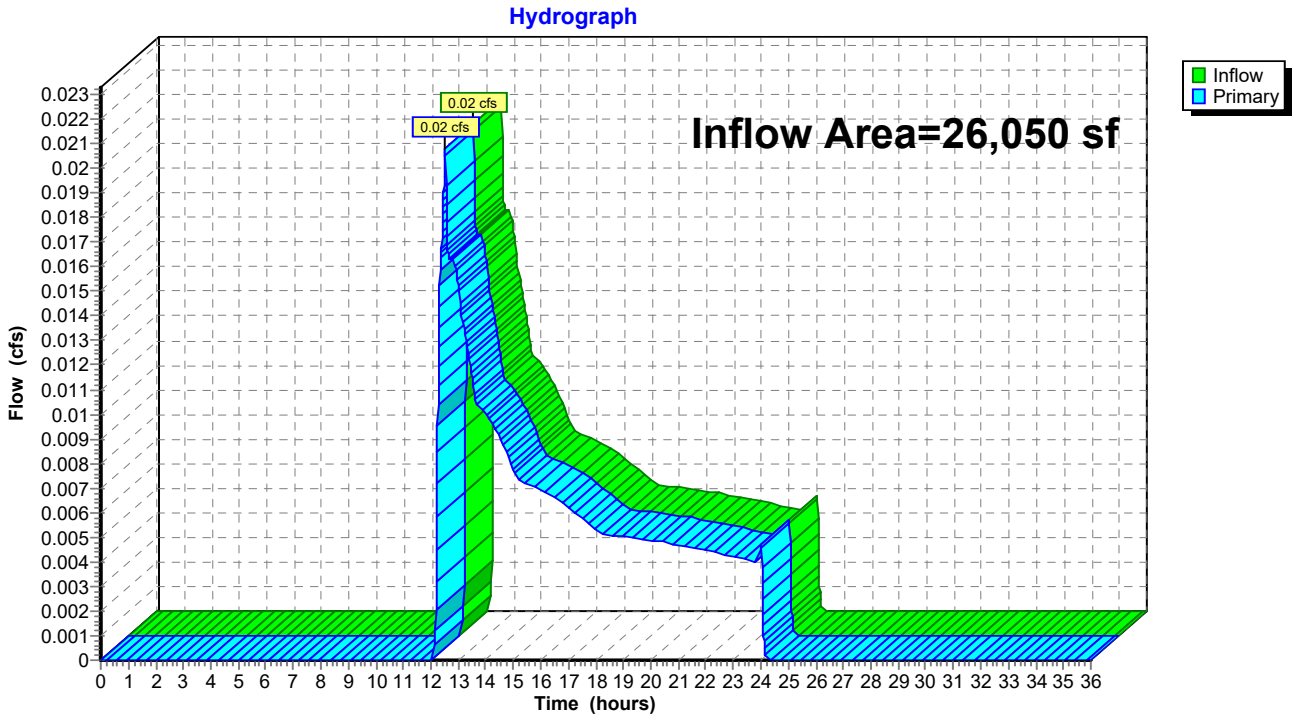


Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 29.01% Impervious, Inflow Depth = 0.14" for 2-Year event
Inflow = 0.02 cfs @ 12.53 hrs, Volume= 293 cf
Primary = 0.02 cfs @ 12.53 hrs, Volume= 293 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10: Front Entry Runoff Area=34,320 sf 72.93% Impervious Runoff Depth=3.28"
Tc=5.0 min CN=82 Runoff=3.50 cfs 9,371 cf

Subcatchment11: Front Entry Runoff Area=26,355 sf 52.38% Impervious Runoff Depth=2.20"
Tc=5.0 min CN=70 Runoff=1.84 cfs 4,834 cf

Subcatchment20: Back Patio Runoff Area=22,550 sf 18.00% Impervious Runoff Depth=0.78"
Tc=5.0 min CN=50 Runoff=0.44 cfs 1,474 cf

Subcatchment21: Permeable Pavers Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=4.98"
Tc=5.0 min CN=98 Runoff=0.46 cfs 1,453 cf

Pond 1P: Diversion CB Peak Elev=94.94' Inflow=3.50 cfs 9,371 cf
Primary=3.50 cfs 6,045 cf Secondary=0.87 cfs 3,325 cf Outflow=3.50 cfs 9,370 cf

Pond 2P: Permeable Sidewalk Peak Elev=98.73' Storage=320 cf Inflow=0.46 cfs 1,453 cf
Discarded=0.08 cfs 1,454 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=0.08 cfs 1,454 cf

Pond P-1: Stormtech Peak Elev=94.94' Storage=3,928 cf Inflow=3.50 cfs 6,045 cf
Discarded=0.05 cfs 4,813 cf Primary=0.00 cfs 0 cf Outflow=0.05 cfs 4,813 cf

Link DP1: Front Entry Inflow=1.84 cfs 8,158 cf
Primary=1.84 cfs 8,158 cf

Link DP2: Back Patio Inflow=0.44 cfs 1,474 cf
Primary=0.44 cfs 1,474 cf

Total Runoff Area = 86,725 sf Runoff Volume = 17,132 cf Average Runoff Depth = 2.37"
46.51% Pervious = 40,332 sf 53.49% Impervious = 46,393 sf

Summary for Subcatchment 10: Front Entry

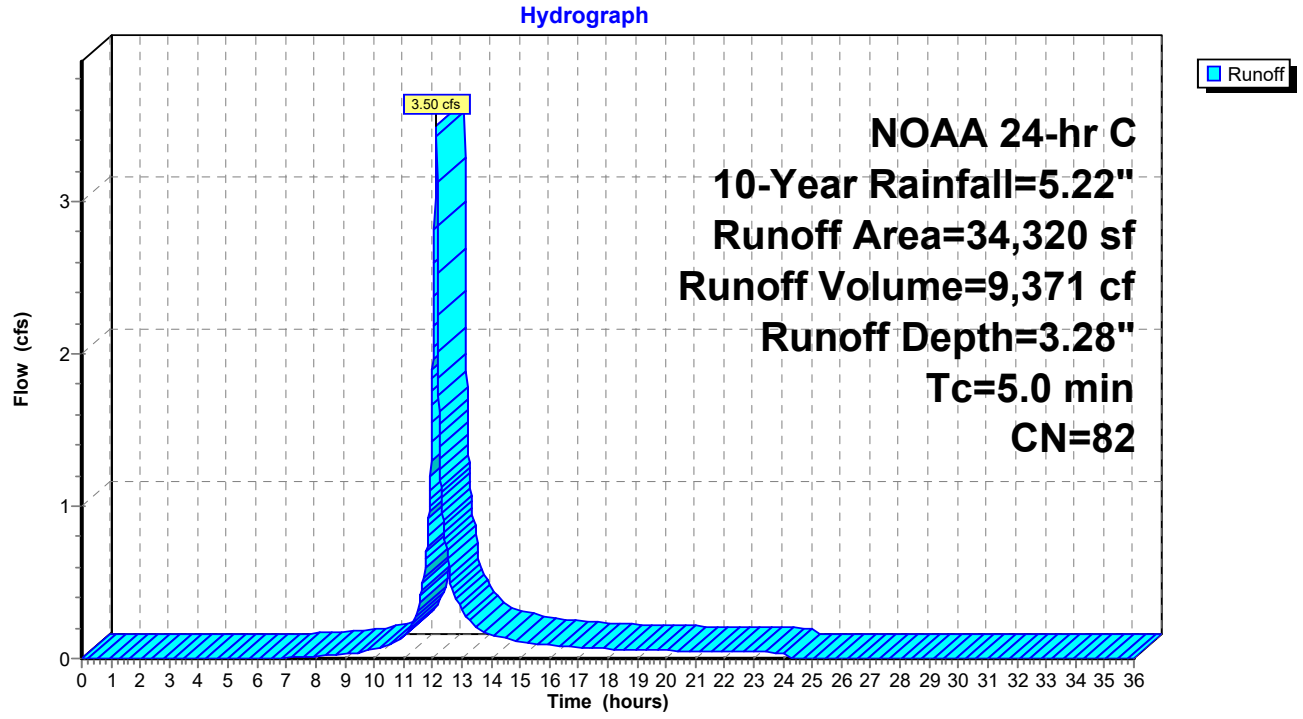
Runoff = 3.50 cfs @ 12.12 hrs, Volume= 9,371 cf, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=5.22"

Area (sf)	CN	Description
25,030	98	Paved parking, HSG A
9,290	39	>75% Grass cover, Good, HSG A
34,320	82	Weighted Average
9,290		27.07% Pervious Area
25,030		72.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 10: Front Entry



Summary for Subcatchment 11: Front Entry

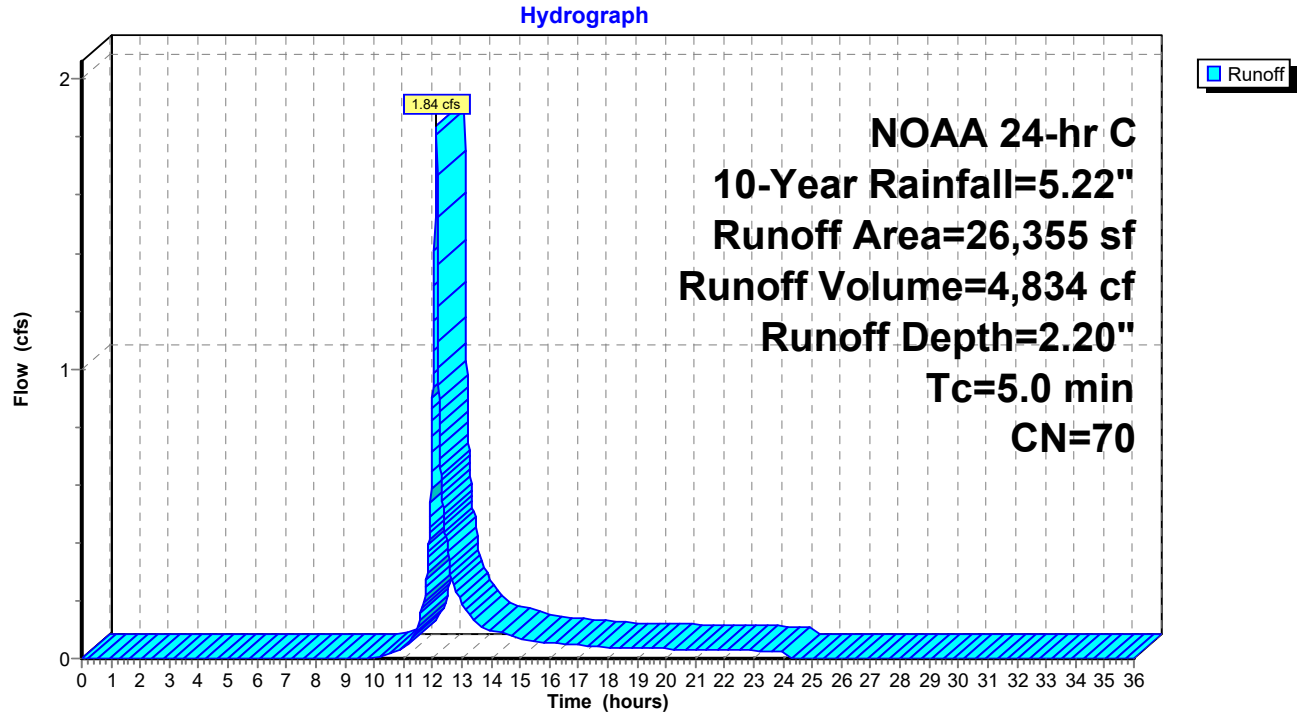
Runoff = 1.84 cfs @ 12.13 hrs, Volume= 4,834 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=5.22"

Area (sf)	CN	Description
13,805	98	Paved parking, HSG A
12,550	39	>75% Grass cover, Good, HSG A
26,355	70	Weighted Average
12,550		47.62% Pervious Area
13,805		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 11: Front Entry



Summary for Subcatchment 20: Back Patio

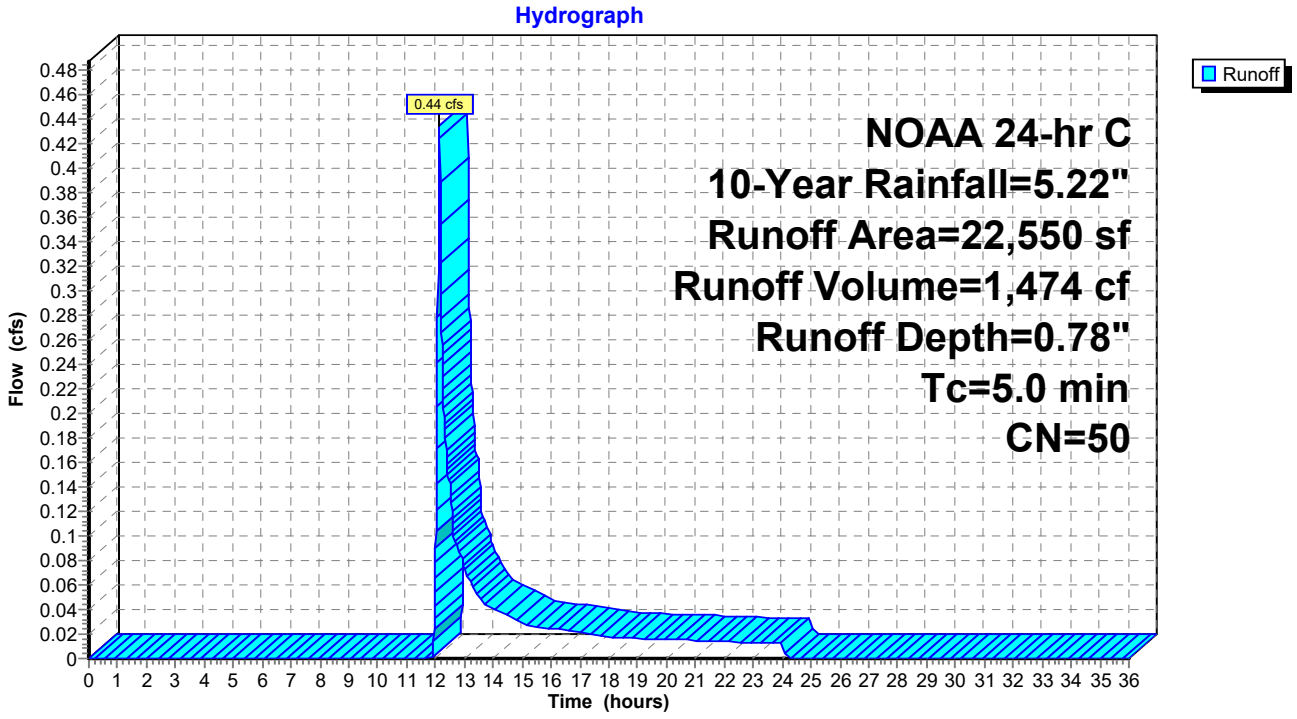
Runoff = 0.44 cfs @ 12.14 hrs, Volume= 1,474 cf, Depth= 0.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=5.22"

Area (sf)	CN	Description
4,058	98	Paved parking, HSG A
18,492	39	>75% Grass cover, Good, HSG A
22,550	50	Weighted Average
18,492		82.00% Pervious Area
4,058		18.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 20: Back Patio



Summary for Subcatchment 21: Permeable Pavers

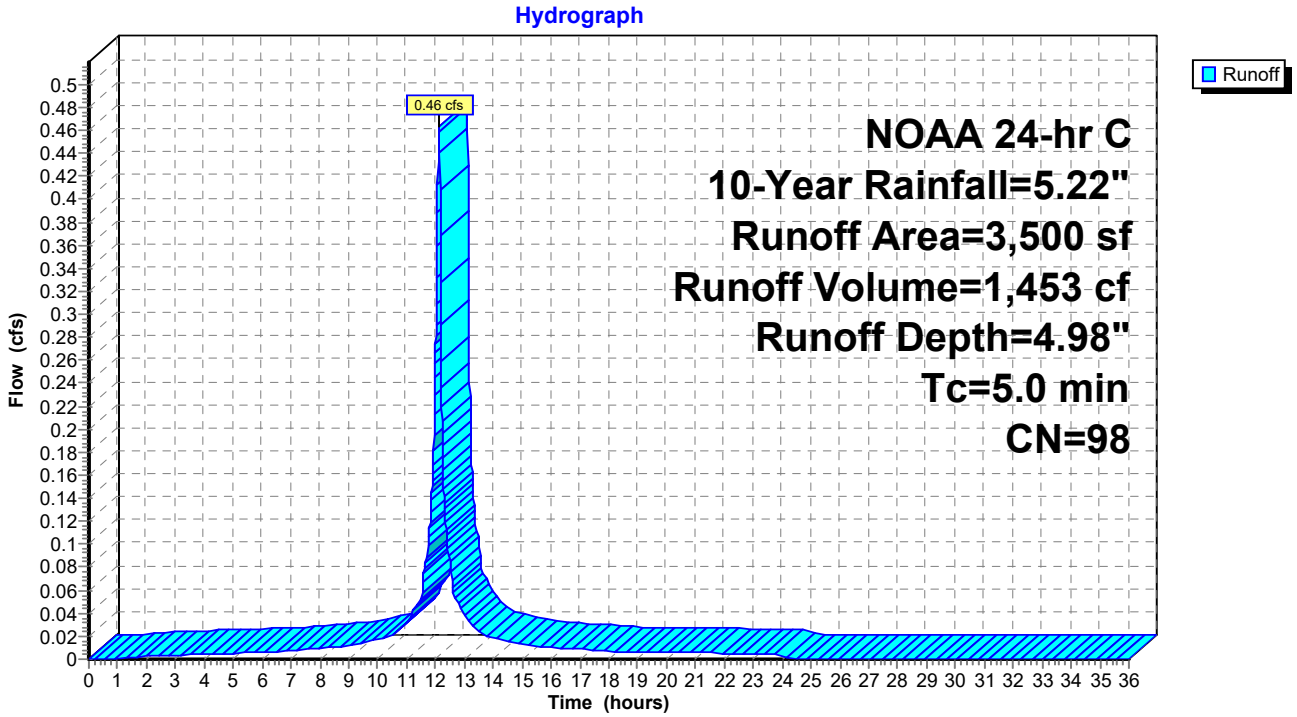
Runoff = 0.46 cfs @ 12.12 hrs, Volume= 1,453 cf, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	3,500	98	Permeable
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 21: Permeable Pavers



Summary for Pond 1P: Diversion CB

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 3.28" for 10-Year event
Inflow = 3.50 cfs @ 12.12 hrs, Volume= 9,371 cf
Outflow = 3.50 cfs @ 12.12 hrs, Volume= 9,370 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.50 cfs @ 12.12 hrs, Volume= 6,045 cf
Secondary = 0.87 cfs @ 12.36 hrs, Volume= 3,325 cf

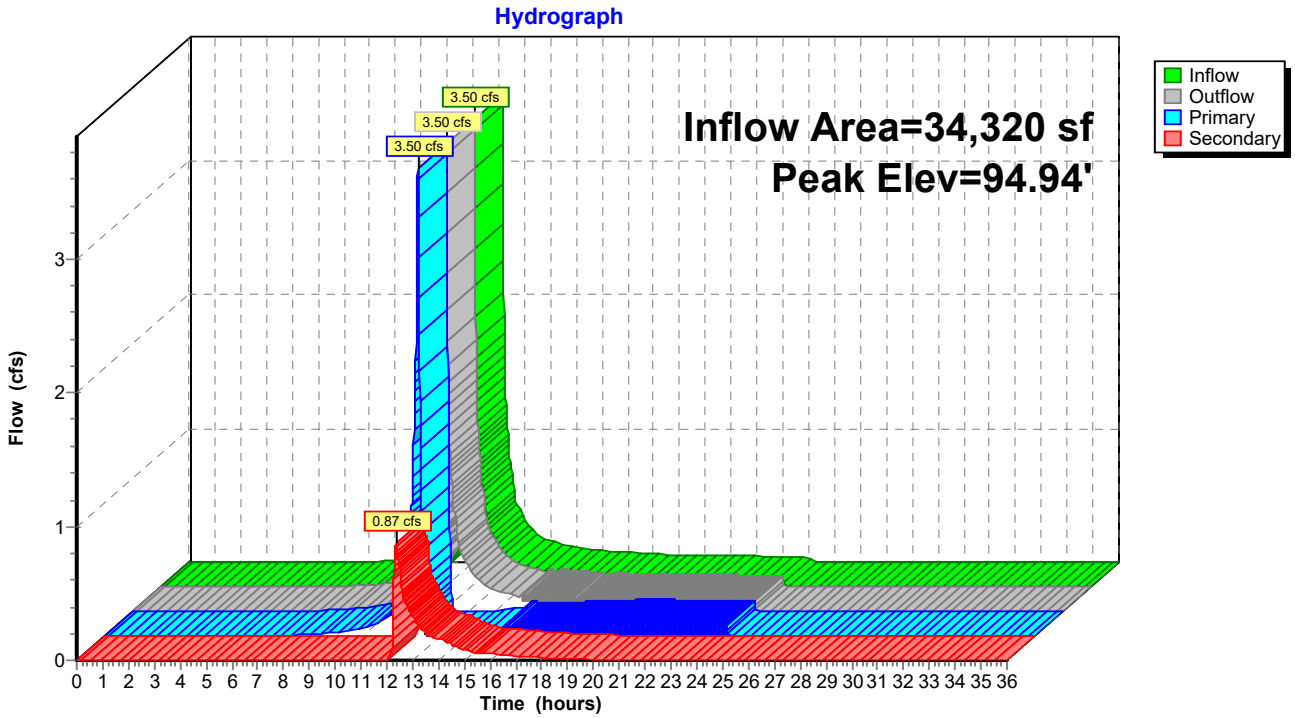
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 94.94' @ 12.36 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**24.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	94.40'	**10.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=1.41 cfs @ 12.12 hrs HW=94.03' TW=94.02' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 1.41 cfs @ 0.82 fps)

Secondary OutFlow Max=0.87 cfs @ 12.36 hrs HW=94.94' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 0.87 cfs @ 3.32 fps)

Pond 1P: Diversion CB



Summary for Pond 2P: Permeable Sidewalk

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 4.98" for 10-Year event
Inflow = 0.46 cfs @ 12.12 hrs, Volume= 1,453 cf
Outflow = 0.08 cfs @ 11.89 hrs, Volume= 1,454 cf, Atten= 82%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.89 hrs, Volume= 1,454 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 98.73' @ 12.54 hrs Surf.Area= 3,500 sf Storage= 320 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 19.2 min (766.4 - 747.2)

Volume	Invert	Avail.Storage	Storage Description
#1	98.50'	1,750 cf	**Permeable (Prismatic)**Listed below (Recalc) 4,375 cf Overall x 40.0% Voids
#2	99.75'	875 cf	**Surface (Prismatic)**Listed below (Recalc) -Impervious
		2,625 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.50	3,500	0	0
99.75	3,500	4,375	4,375

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.75	3,500	0	0
100.00	3,500	875	875

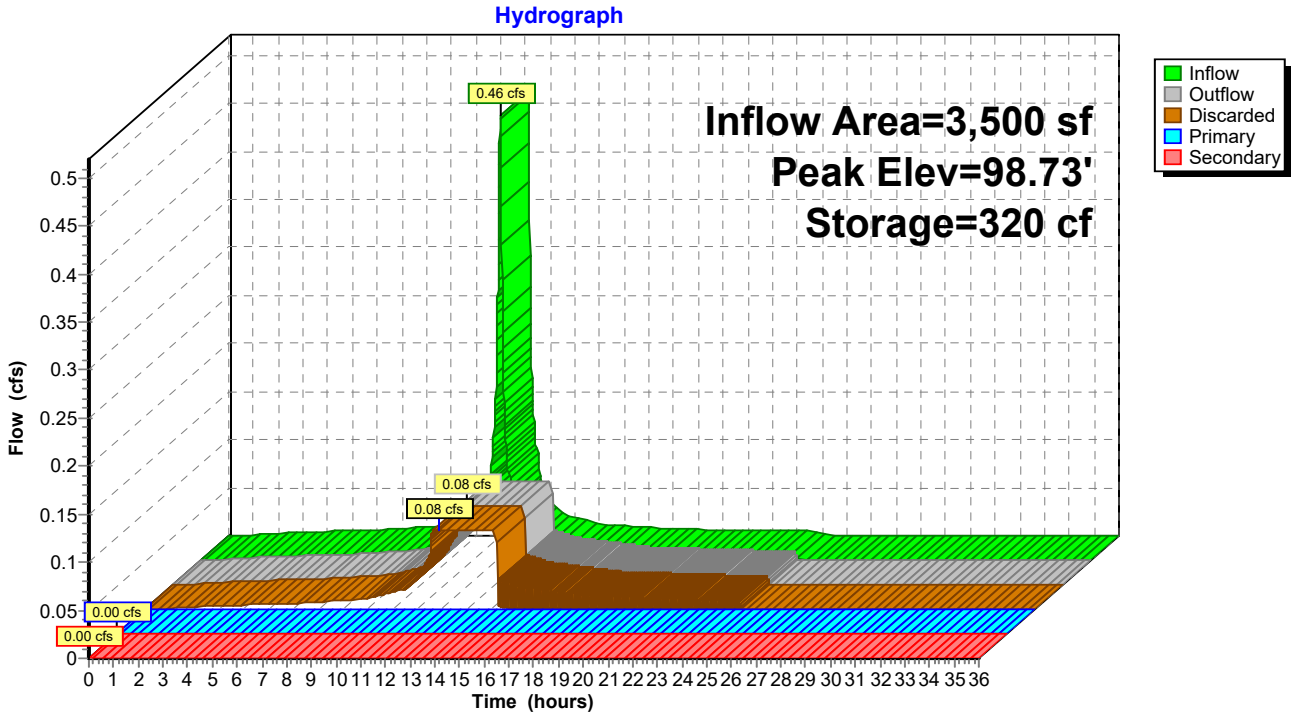
Device	Routing	Invert	Outlet Devices
#1	Discarded	98.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	98.75'	**6.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.75' / 98.40' S= 0.0350 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Secondary	99.95'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.08 cfs @ 11.89 hrs HW=98.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.50' TW=0.00' (Dynamic Tailwater)
↑**2=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.50' TW=0.00' (Dynamic Tailwater)
↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Permeable Sidewalk



Summary for Pond P-1: Stormtech

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 2.11" for 10-Year event
Inflow = 3.50 cfs @ 12.12 hrs, Volume= 6,045 cf
Outflow = 0.05 cfs @ 11.45 hrs, Volume= 4,813 cf, Atten= 99%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.45 hrs, Volume= 4,813 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 94.94' @ 12.36 hrs Surf.Area= 2,062 sf Storage= 3,928 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 523.5 min (1,335.6 - 812.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.00'	1,878 cf	**44.25'W x 46.34'L x 3.50'H Field A** 7,176 cf Overall - 2,481 cf Embedded = 4,696 cf x 40.0% Voids
#2A	92.50'	2,481 cf	**ADS_StormTech SC-740 +Cap** x 54 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 54 Chambers in 9 Rows
#3	92.50'	861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,220 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
92.50	12	0	0
96.90	12	53	53
97.00	110	6	59
97.50	3,100	803	861

Device	Routing	Invert	Outlet Devices
#1	Primary	96.90'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	92.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.45 hrs HW=92.50' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-1: Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

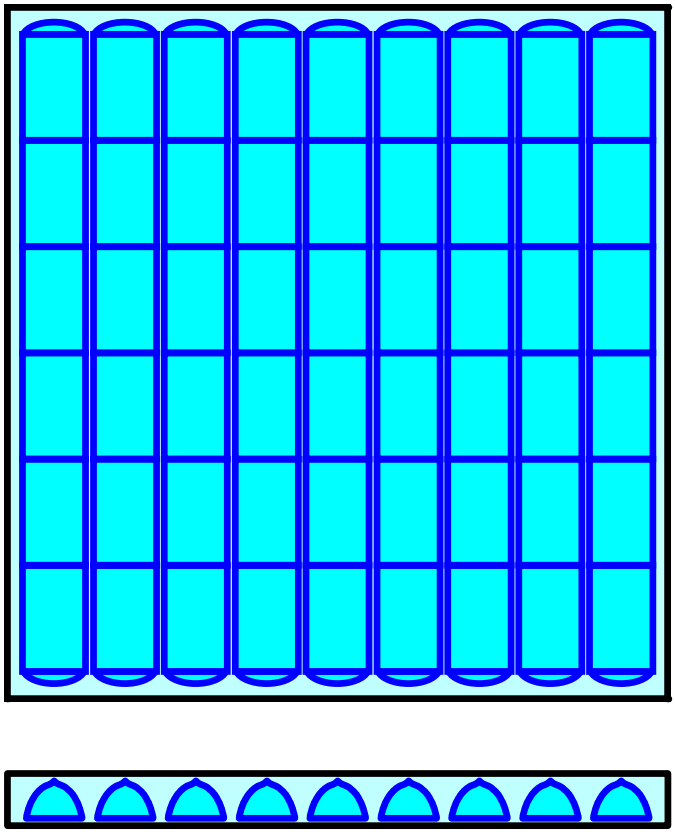
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
9 Rows x 51.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 44.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

54 Chambers x 45.9 cf = 2,480.8 cf Chamber Storage

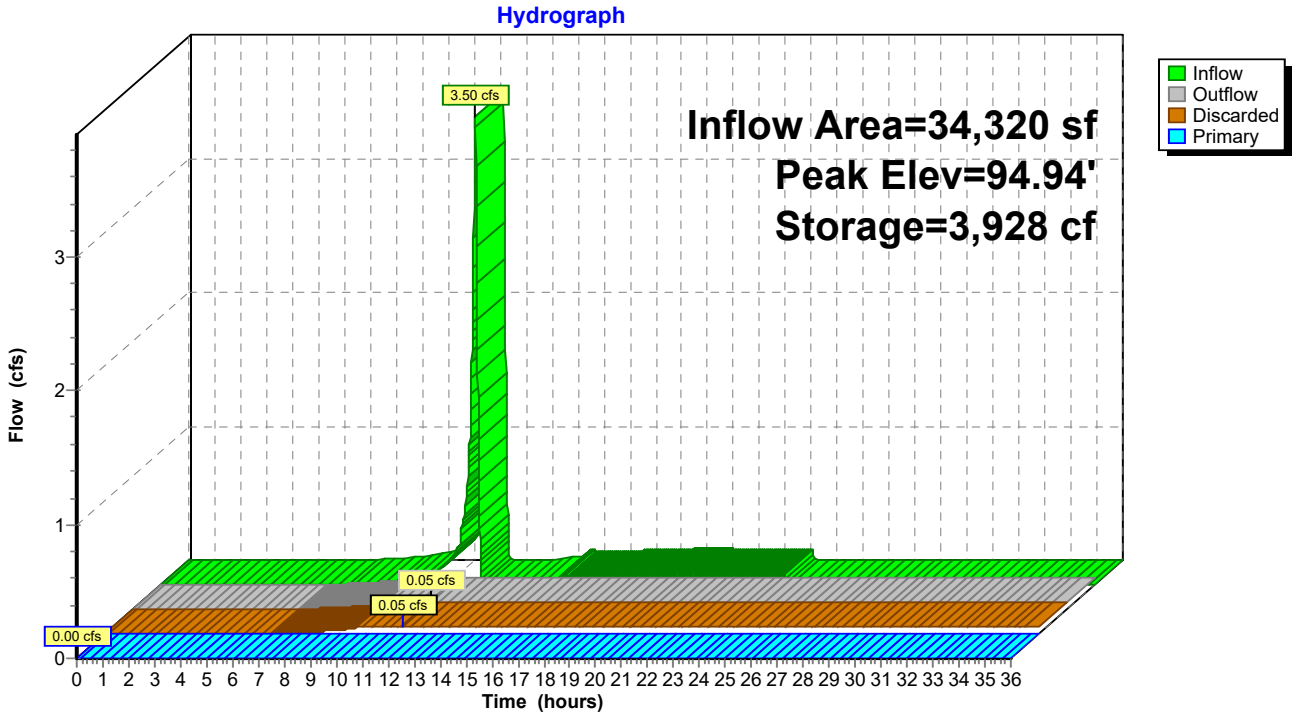
7,176.4 cf Field - 2,480.8 cf Chambers = 4,695.6 cf Stone x 40.0% Voids = 1,878.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,359.0 cf = 0.100 af
Overall Storage Efficiency = 60.7%
Overall System Size = 46.34' x 44.25' x 3.50'

54 Chambers
265.8 cy Field
173.9 cy Stone



Pond P-1: Stormtech

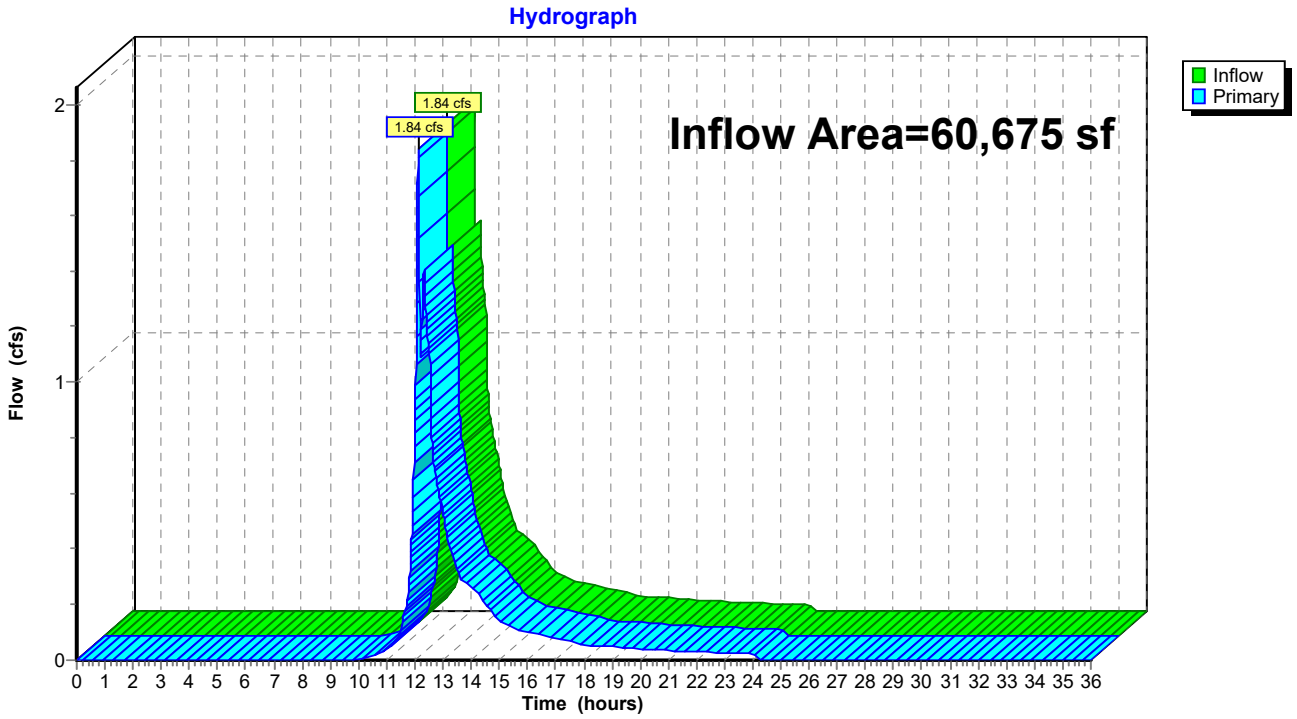


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 64.00% Impervious, Inflow Depth = 1.61" for 10-Year event
Inflow = 1.84 cfs @ 12.13 hrs, Volume= 8,158 cf
Primary = 1.84 cfs @ 12.13 hrs, Volume= 8,158 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

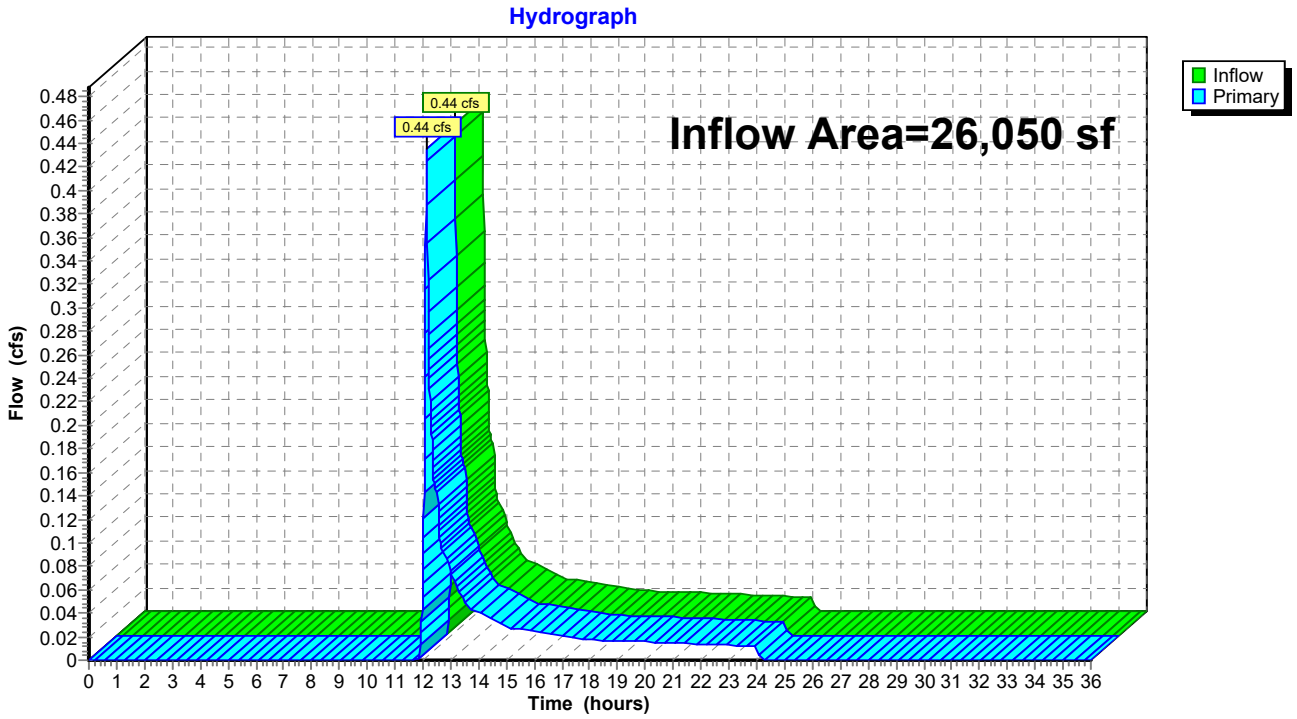


Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 29.01% Impervious, Inflow Depth = 0.68" for 10-Year event
Inflow = 0.44 cfs @ 12.14 hrs, Volume= 1,474 cf
Primary = 0.44 cfs @ 12.14 hrs, Volume= 1,474 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10: Front Entry Runoff Area=34,320 sf 72.93% Impervious Runoff Depth=4.35"
Tc=5.0 min CN=82 Runoff=4.58 cfs 12,433 cf

Subcatchment11: Front Entry Runoff Area=26,355 sf 52.38% Impervious Runoff Depth=3.12"
Tc=5.0 min CN=70 Runoff=2.61 cfs 6,848 cf

Subcatchment20: Back Patio Runoff Area=22,550 sf 18.00% Impervious Runoff Depth=1.34"
Tc=5.0 min CN=50 Runoff=0.86 cfs 2,517 cf

Subcatchment21: Permeable Pavers Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=6.15"
Tc=5.0 min CN=98 Runoff=0.57 cfs 1,794 cf

Pond 1P: Diversion CB Peak Elev=95.75' Inflow=4.58 cfs 12,433 cf
Primary=4.16 cfs 6,296 cf Secondary=2.94 cfs 6,137 cf Outflow=4.58 cfs 12,433 cf

Pond 2P: Permeable Sidewalk Peak Elev=98.82' Storage=445 cf Inflow=0.57 cfs 1,794 cf
Discarded=0.08 cfs 1,766 cf Primary=0.01 cfs 28 cf Secondary=0.00 cfs 0 cf Outflow=0.10 cfs 1,794 cf

Pond P-1: Stormtech Peak Elev=97.03' Storage=4,425 cf Inflow=4.16 cfs 6,296 cf
Discarded=0.06 cfs 4,979 cf Primary=0.25 cfs 17 cf Outflow=0.31 cfs 4,995 cf

Link DP1: Front Entry Inflow=4.88 cfs 13,001 cf
Primary=4.88 cfs 13,001 cf

Link DP2: Back Patio Inflow=0.86 cfs 2,545 cf
Primary=0.86 cfs 2,545 cf

Total Runoff Area = 86,725 sf Runoff Volume = 23,592 cf Average Runoff Depth = 3.26"
46.51% Pervious = 40,332 sf 53.49% Impervious = 46,393 sf

Summary for Subcatchment 10: Front Entry

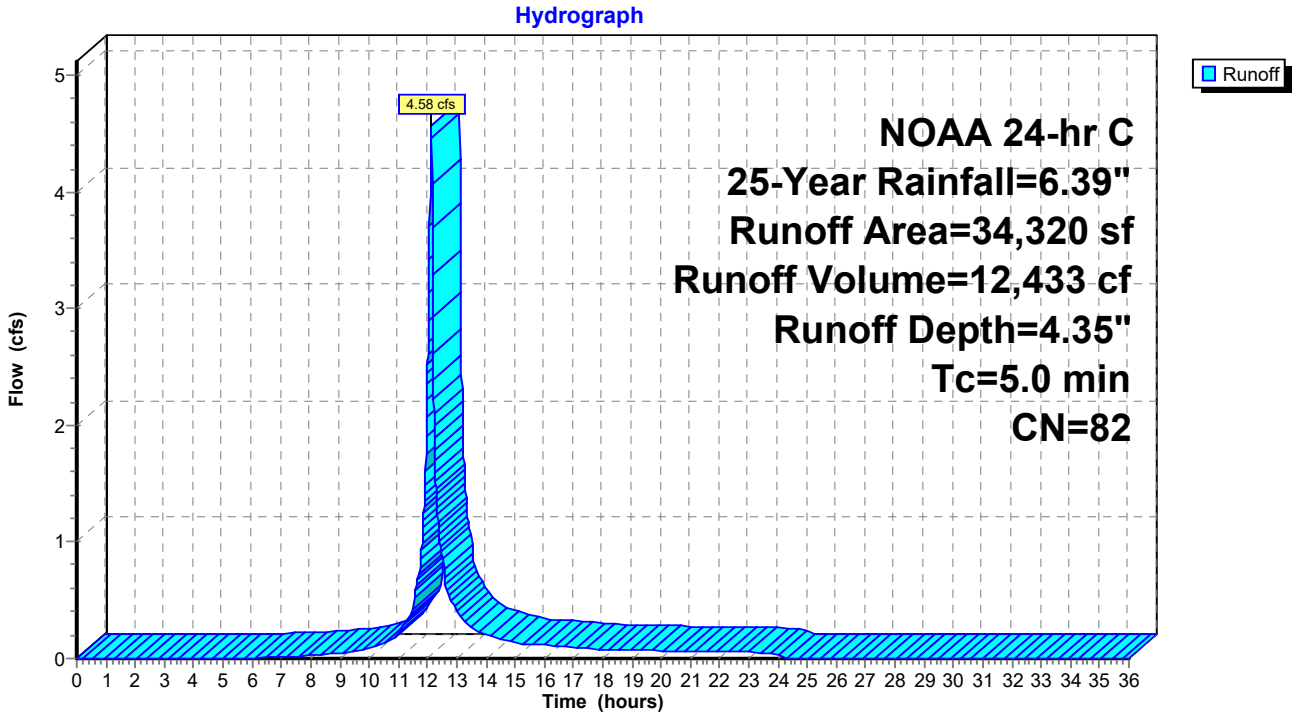
Runoff = 4.58 cfs @ 12.12 hrs, Volume= 12,433 cf, Depth= 4.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.39"

Area (sf)	CN	Description
25,030	98	Paved parking, HSG A
9,290	39	>75% Grass cover, Good, HSG A
34,320	82	Weighted Average
9,290		27.07% Pervious Area
25,030		72.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 10: Front Entry



Summary for Subcatchment 11: Front Entry

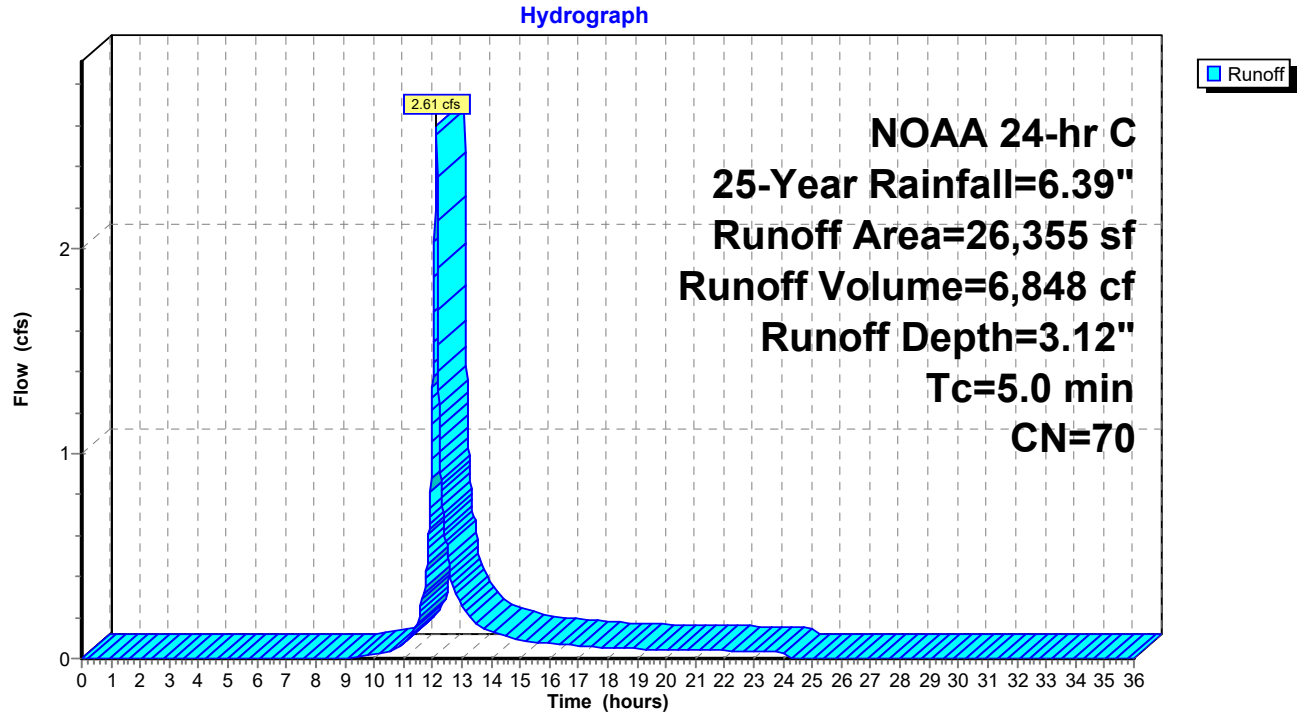
Runoff = 2.61 cfs @ 12.13 hrs, Volume= 6,848 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.39"

Area (sf)	CN	Description
13,805	98	Paved parking, HSG A
12,550	39	>75% Grass cover, Good, HSG A
26,355	70	Weighted Average
12,550		47.62% Pervious Area
13,805		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 11: Front Entry



Summary for Subcatchment 20: Back Patio

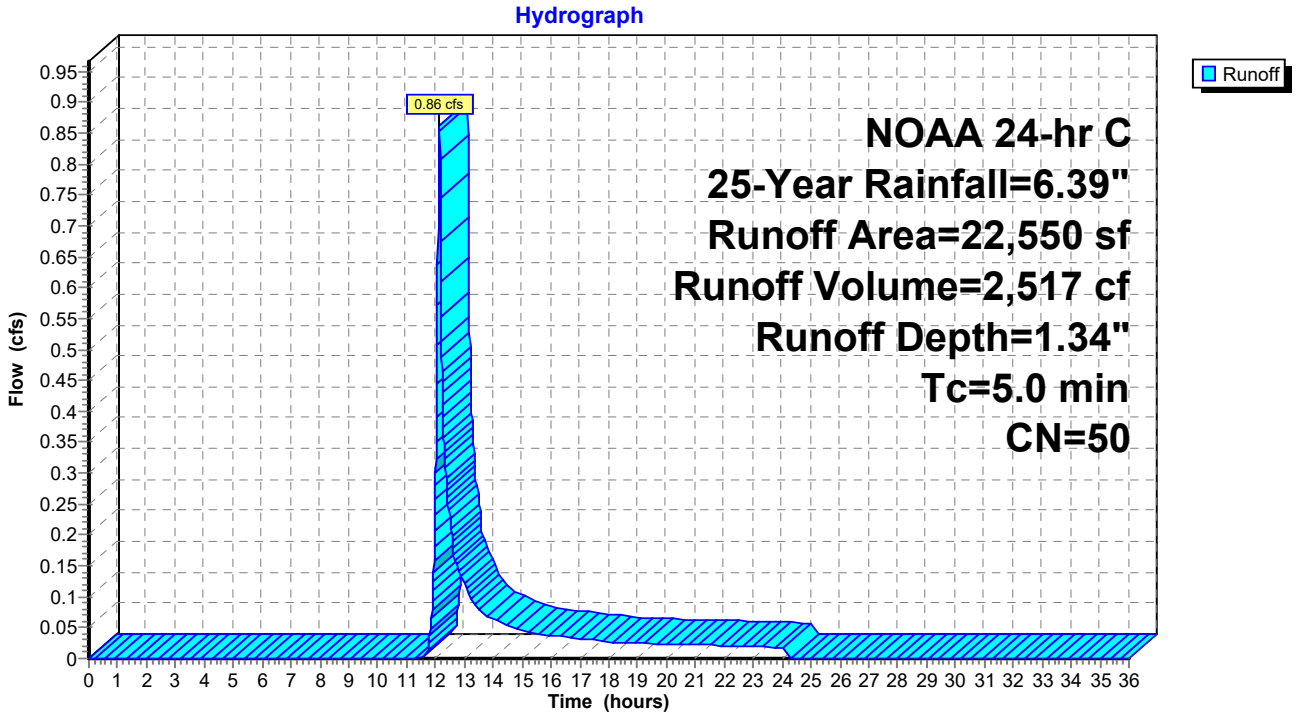
Runoff = 0.86 cfs @ 12.13 hrs, Volume= 2,517 cf, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.39"

Area (sf)	CN	Description
4,058	98	Paved parking, HSG A
18,492	39	>75% Grass cover, Good, HSG A
22,550	50	Weighted Average
18,492		82.00% Pervious Area
4,058		18.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 20: Back Patio



Summary for Subcatchment 21: Permeable Pavers

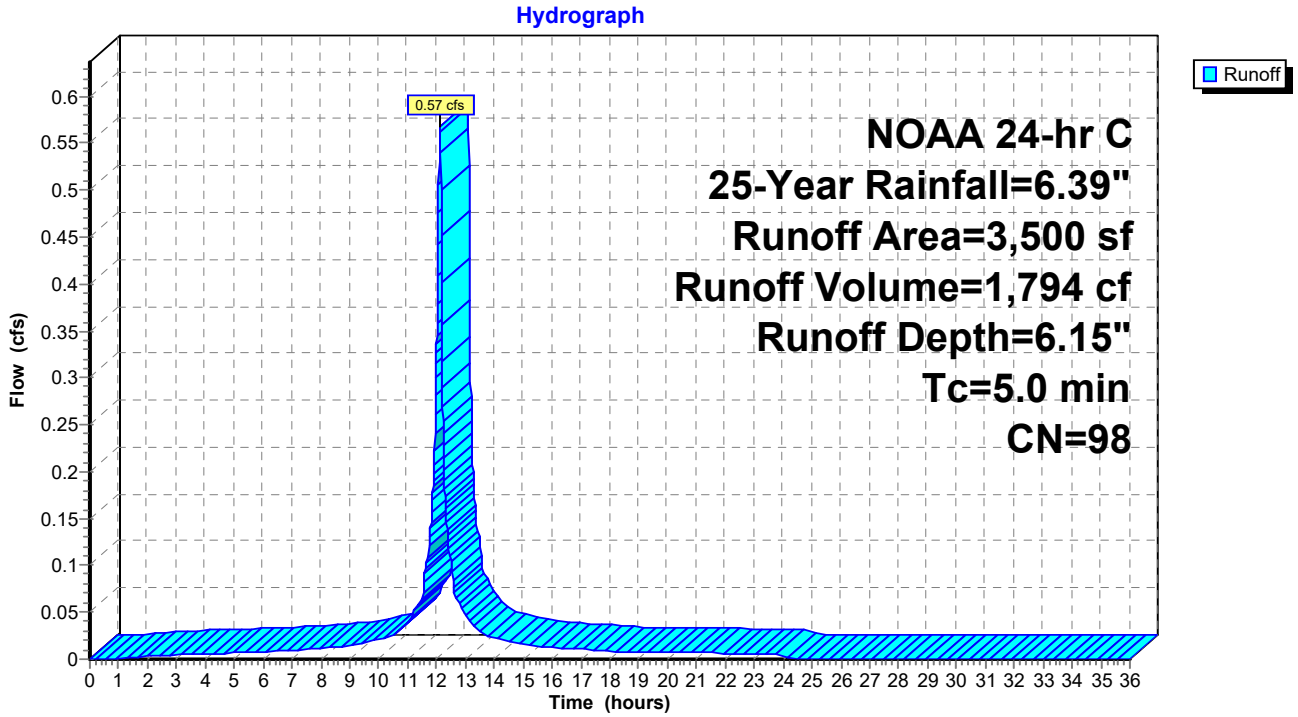
Runoff = 0.57 cfs @ 12.12 hrs, Volume= 1,794 cf, Depth= 6.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 25-Year Rainfall=6.39"

	Area (sf)	CN	Description
*	3,500	98	Permeable
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 21: Permeable Pavers



Summary for Pond 1P: Diversion CB

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 4.35" for 25-Year event
Inflow = 4.58 cfs @ 12.12 hrs, Volume= 12,433 cf
Outflow = 4.58 cfs @ 12.12 hrs, Volume= 12,433 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.16 cfs @ 12.10 hrs, Volume= 6,296 cf
Secondary = 2.94 cfs @ 12.18 hrs, Volume= 6,137 cf

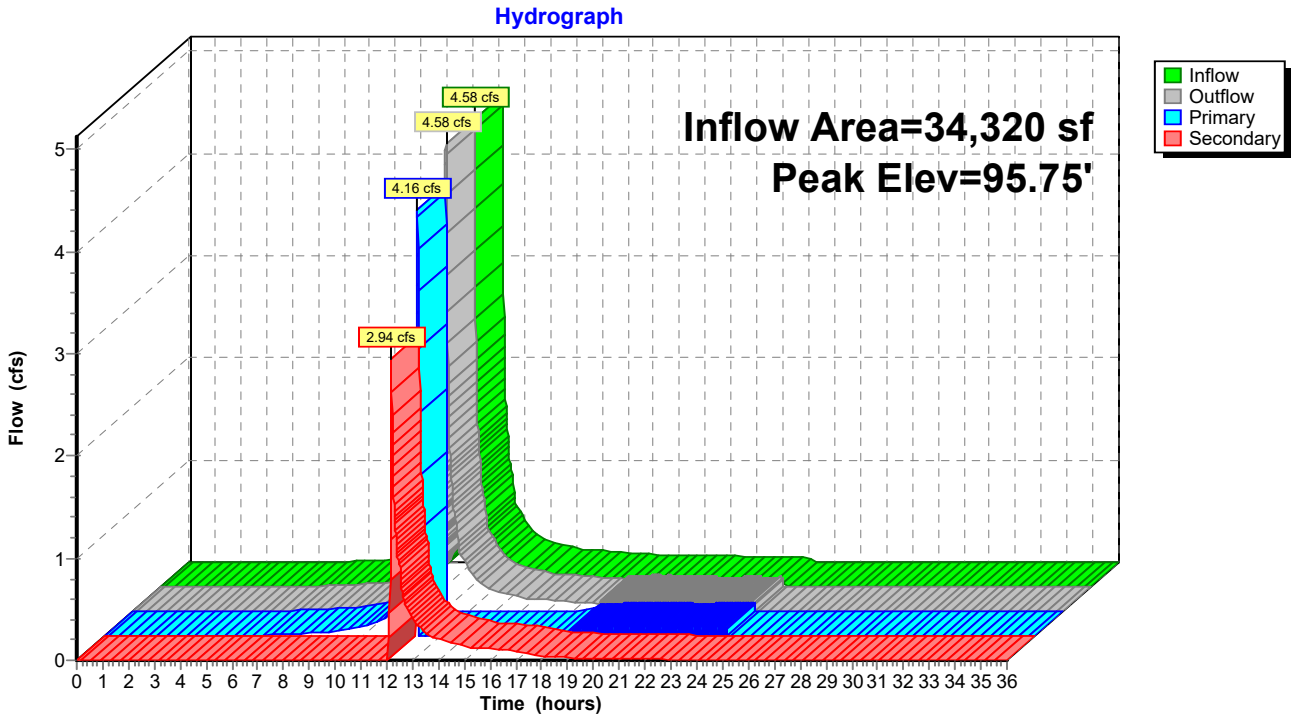
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 95.75' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**24.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	94.40'	**10.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=0.00 cfs @ 12.10 hrs HW=94.60' TW=94.65' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=2.87 cfs @ 12.18 hrs HW=95.72' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 2.87 cfs @ 5.27 fps)

Pond 1P: Diversion CB



Summary for Pond 2P: Permeable Sidewalk

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 6.15" for 25-Year event
Inflow = 0.57 cfs @ 12.12 hrs, Volume= 1,794 cf
Outflow = 0.10 cfs @ 12.55 hrs, Volume= 1,794 cf, Atten= 83%, Lag= 25.7 min
Discarded = 0.08 cfs @ 11.80 hrs, Volume= 1,766 cf
Primary = 0.01 cfs @ 12.55 hrs, Volume= 28 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 98.82' @ 12.55 hrs Surf.Area= 3,500 sf Storage= 445 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 27.2 min (771.2 - 744.0)

Volume	Invert	Avail.Storage	Storage Description
#1	98.50'	1,750 cf	**Permeable (Prismatic)**Listed below (Recalc) 4,375 cf Overall x 40.0% Voids
#2	99.75'	875 cf	**Surface (Prismatic)**Listed below (Recalc) -Impervious
		2,625 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.50	3,500	0	0
99.75	3,500	4,375	4,375

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.75	3,500	0	0
100.00	3,500	875	875

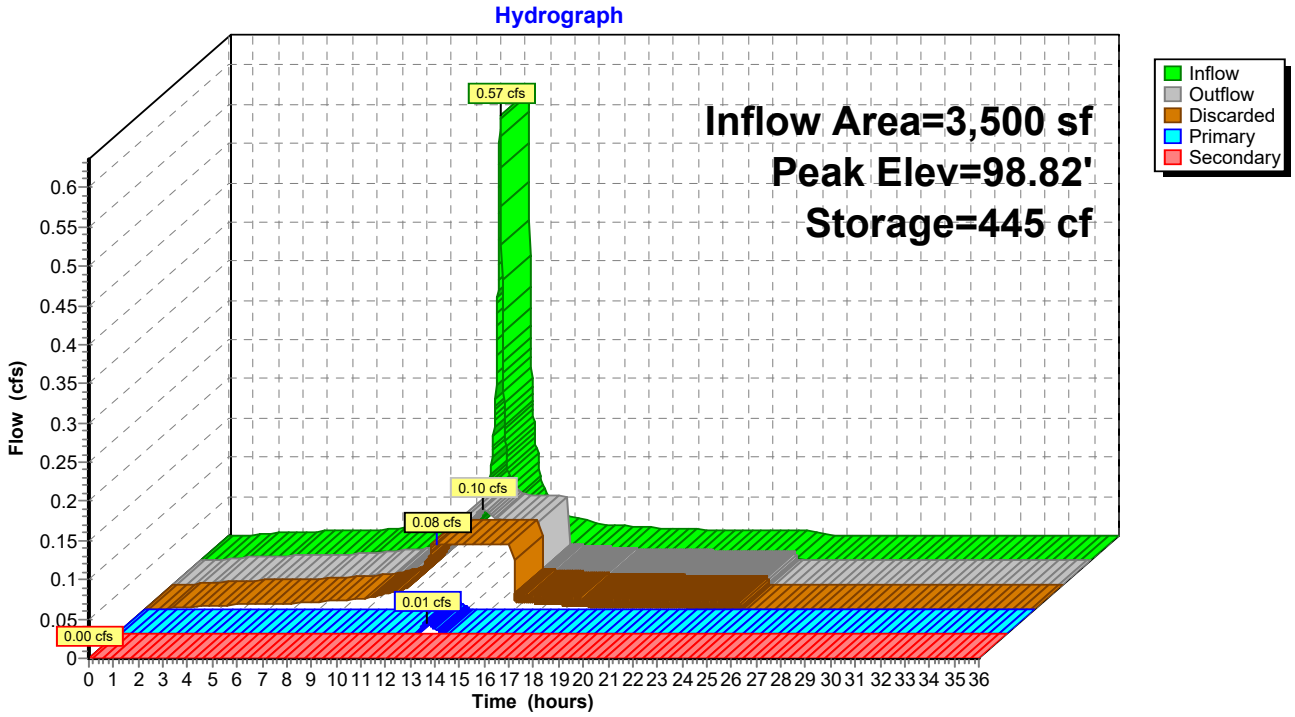
Device	Routing	Invert	Outlet Devices
#1	Discarded	98.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	98.75'	**6.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.75' / 98.40' S= 0.0350 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Secondary	99.95'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.08 cfs @ 11.80 hrs HW=98.52' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.01 cfs @ 12.55 hrs HW=98.82' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 0.01 cfs @ 0.89 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.50' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 2P: Permeable Sidewalk



Summary for Pond P-1: Stormtech

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 2.20" for 25-Year event
Inflow = 4.16 cfs @ 12.10 hrs, Volume= 6,296 cf
Outflow = 0.31 cfs @ 12.18 hrs, Volume= 4,995 cf, Atten= 93%, Lag= 5.1 min
Discarded = 0.06 cfs @ 12.18 hrs, Volume= 4,979 cf
Primary = 0.25 cfs @ 12.18 hrs, Volume= 17 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 97.03' @ 12.18 hrs Surf.Area= 2,367 sf Storage= 4,425 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 522.9 min (1,305.2 - 782.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.00'	1,878 cf	**44.25'W x 46.34'L x 3.50'H Field A** 7,176 cf Overall - 2,481 cf Embedded = 4,696 cf x 40.0% Voids
#2A	92.50'	2,481 cf	**ADS_StormTech SC-740 +Cap** x 54 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 54 Chambers in 9 Rows
#3	92.50'	861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,220 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
92.50	12	0	0
96.90	12	53	53
97.00	110	6	59
97.50	3,100	803	861

Device	Routing	Invert	Outlet Devices
#1	Primary	96.90'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	92.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.06 cfs @ 12.18 hrs HW=97.03' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.24 cfs @ 12.18 hrs HW=97.03' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.24 cfs @ 0.92 fps)

Pond P-1: Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

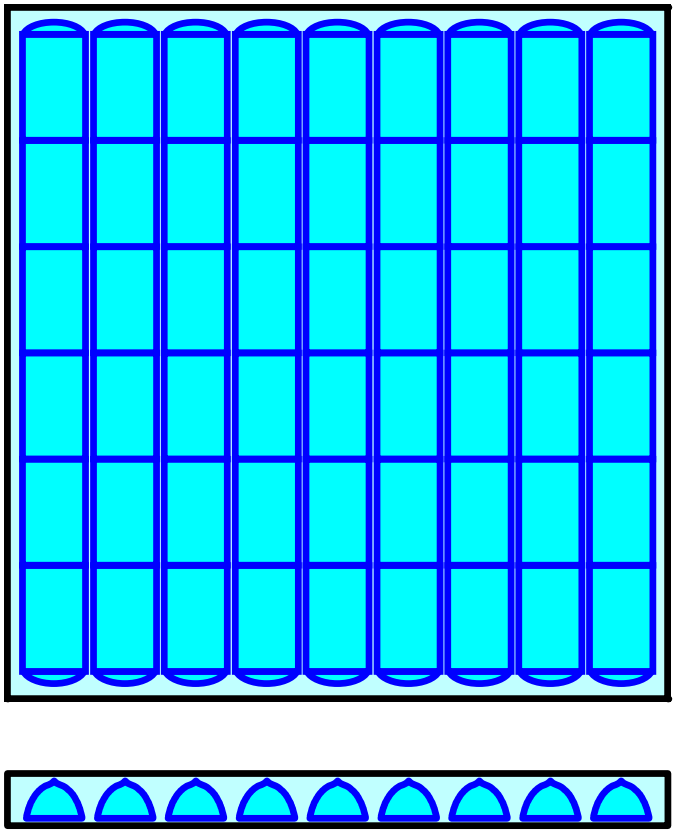
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
9 Rows x 51.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 44.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

54 Chambers x 45.9 cf = 2,480.8 cf Chamber Storage

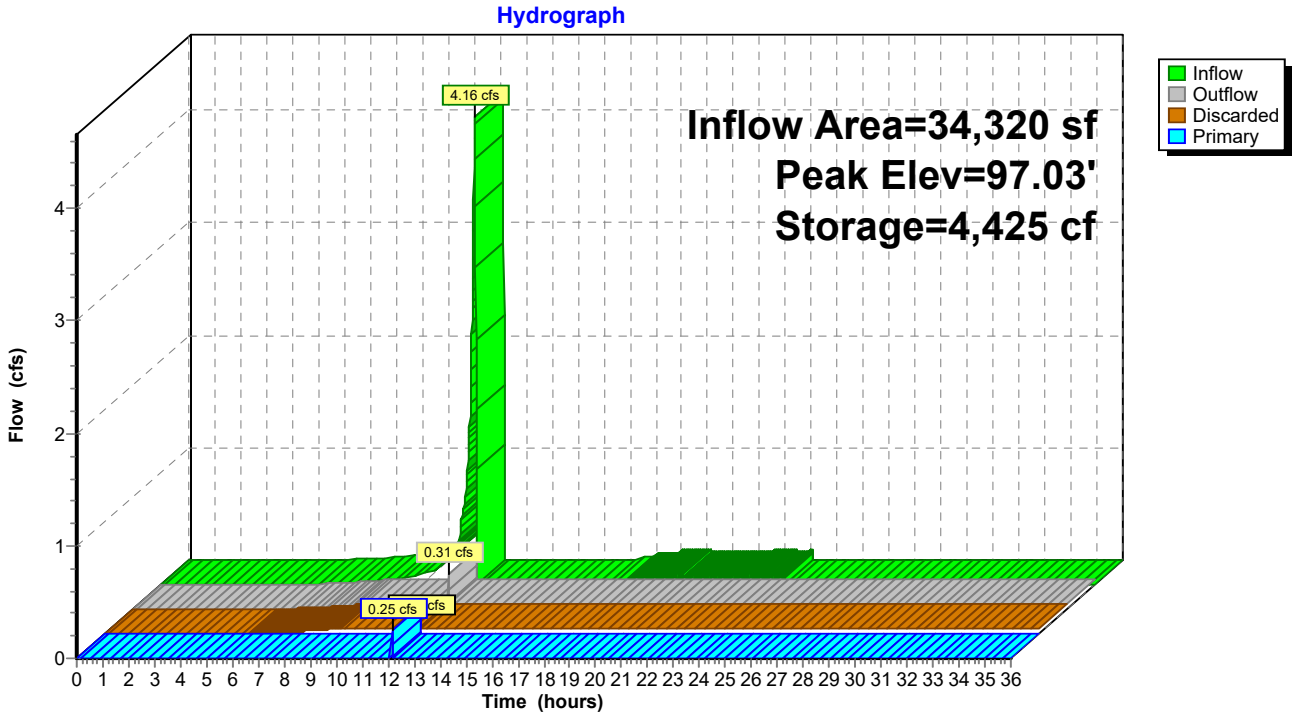
7,176.4 cf Field - 2,480.8 cf Chambers = 4,695.6 cf Stone x 40.0% Voids = 1,878.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,359.0 cf = 0.100 af
Overall Storage Efficiency = 60.7%
Overall System Size = 46.34' x 44.25' x 3.50'

54 Chambers
265.8 cy Field
173.9 cy Stone



Pond P-1: Stormtech

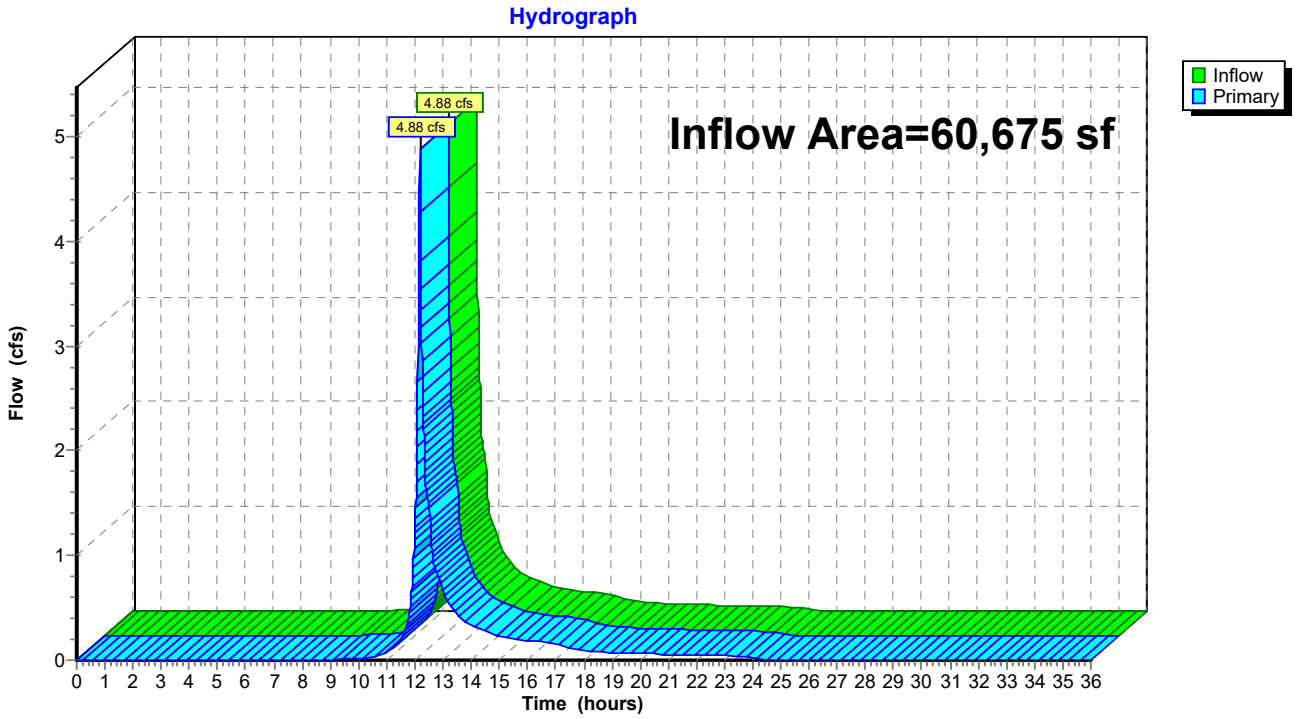


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 64.00% Impervious, Inflow Depth = 2.57" for 25-Year event
Inflow = 4.88 cfs @ 12.18 hrs, Volume= 13,001 cf
Primary = 4.88 cfs @ 12.18 hrs, Volume= 13,001 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

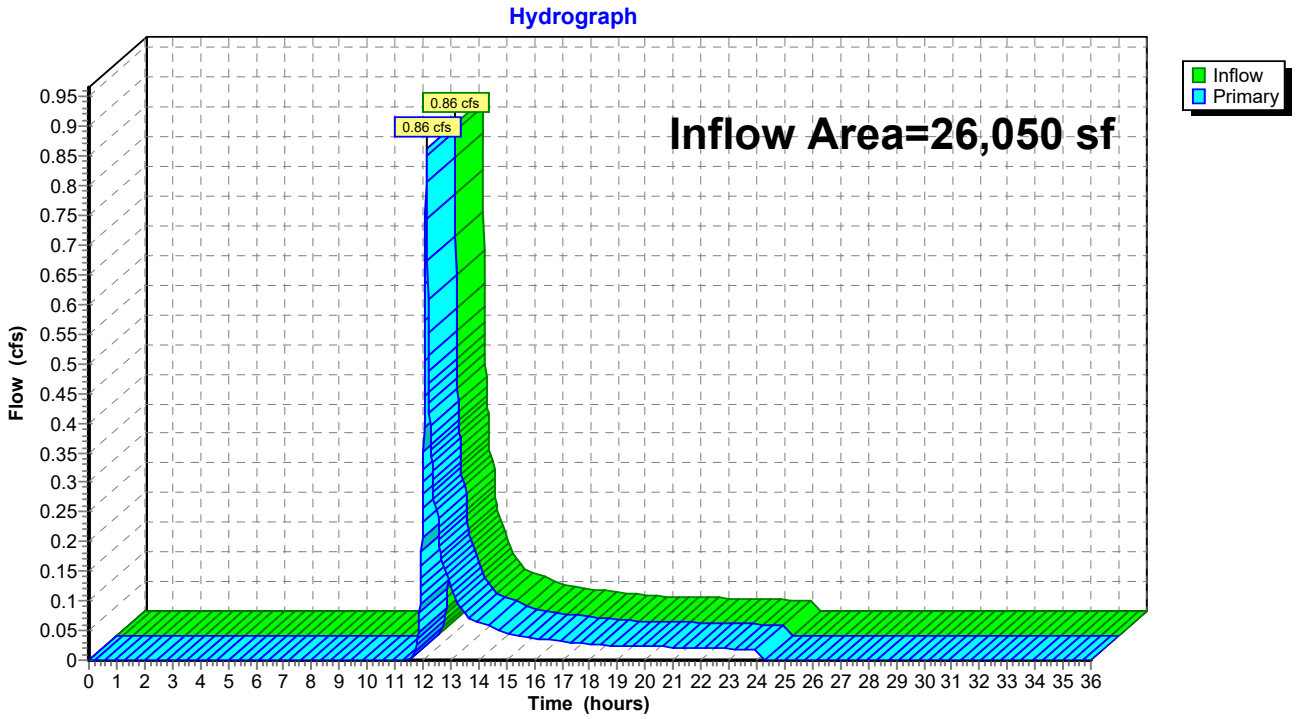


Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 29.01% Impervious, Inflow Depth = 1.17" for 25-Year event
Inflow = 0.86 cfs @ 12.13 hrs, Volume= 2,545 cf
Primary = 0.86 cfs @ 12.13 hrs, Volume= 2,545 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment10: Front Entry Runoff Area=34,320 sf 72.93% Impervious Runoff Depth=6.06"
Tc=5.0 min CN=82 Runoff=6.26 cfs 17,330 cf

Subcatchment11: Front Entry Runoff Area=26,355 sf 52.38% Impervious Runoff Depth=4.65"
Tc=5.0 min CN=70 Runoff=3.85 cfs 10,202 cf

Subcatchment20: Back Patio Runoff Area=22,550 sf 18.00% Impervious Runoff Depth=2.38"
Tc=5.0 min CN=50 Runoff=1.65 cfs 4,471 cf

Subcatchment21: Permeable Pavers Runoff Area=3,500 sf 100.00% Impervious Runoff Depth=7.97"
Tc=5.0 min CN=98 Runoff=0.73 cfs 2,325 cf

Pond 1P: Diversion CB Peak Elev=97.19' Inflow=6.26 cfs 17,330 cf
Primary=2.68 cfs 6,882 cf Secondary=5.05 cfs 10,449 cf Outflow=6.26 cfs 17,331 cf

Pond 2P: Permeable Sidewalk Peak Elev=98.92' Storage=585 cf Inflow=0.73 cfs 2,325 cf
Discarded=0.08 cfs 2,116 cf Primary=0.08 cfs 210 cf Secondary=0.00 cfs 0 cf Outflow=0.16 cfs 2,326 cf

Pond P-1: Stormtech Peak Elev=97.18' Storage=4,540 cf Inflow=2.68 cfs 6,882 cf
Discarded=0.08 cfs 5,210 cf Primary=0.78 cfs 331 cf Outflow=0.86 cfs 5,540 cf

Link DP1: Front Entry Inflow=9.63 cfs 20,981 cf
Primary=9.63 cfs 20,981 cf

Link DP2: Back Patio Inflow=1.66 cfs 4,681 cf
Primary=1.66 cfs 4,681 cf

Total Runoff Area = 86,725 sf Runoff Volume = 34,327 cf Average Runoff Depth = 4.75"
46.51% Pervious = 40,332 sf 53.49% Impervious = 46,393 sf

Summary for Subcatchment 10: Front Entry

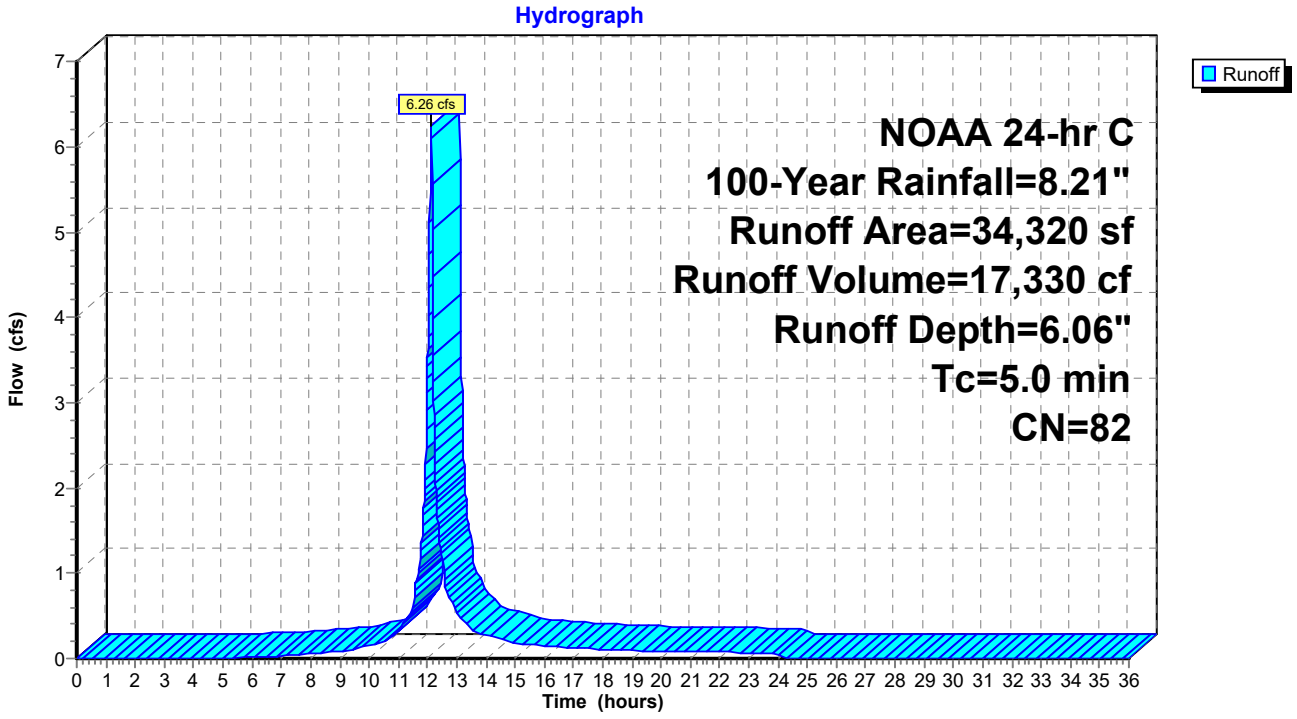
Runoff = 6.26 cfs @ 12.12 hrs, Volume= 17,330 cf, Depth= 6.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (sf)	CN	Description
25,030	98	Paved parking, HSG A
9,290	39	>75% Grass cover, Good, HSG A
34,320	82	Weighted Average
9,290		27.07% Pervious Area
25,030		72.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 10: Front Entry



Summary for Subcatchment 11: Front Entry

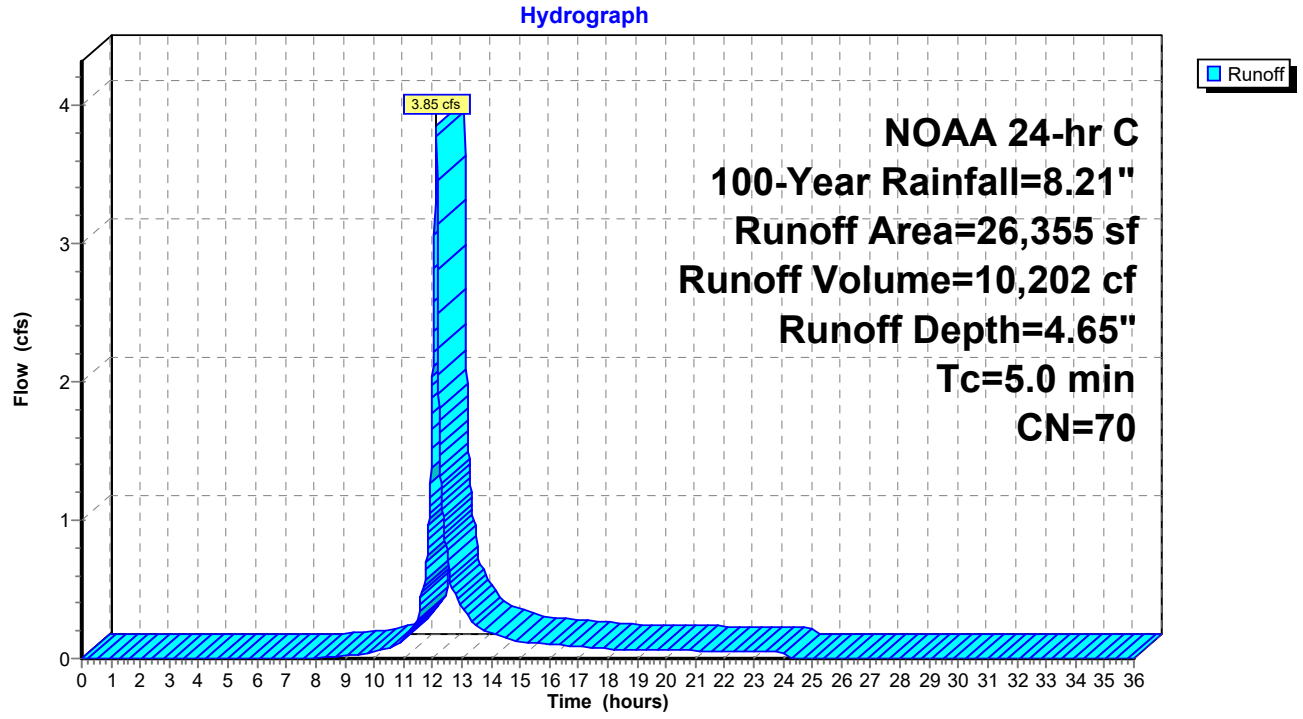
Runoff = 3.85 cfs @ 12.12 hrs, Volume= 10,202 cf, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (sf)	CN	Description
13,805	98	Paved parking, HSG A
12,550	39	>75% Grass cover, Good, HSG A
26,355	70	Weighted Average
12,550		47.62% Pervious Area
13,805		52.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 11: Front Entry



Summary for Subcatchment 20: Back Patio

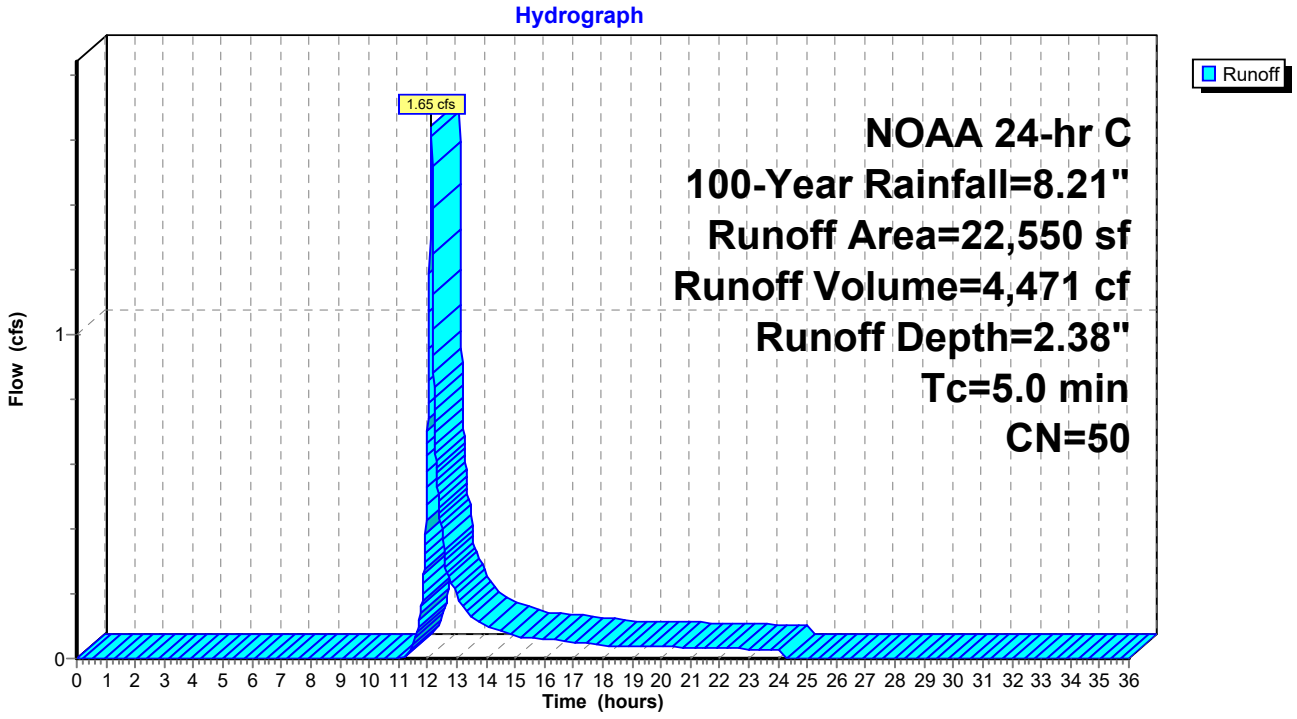
Runoff = 1.65 cfs @ 12.13 hrs, Volume= 4,471 cf, Depth= 2.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

Area (sf)	CN	Description
4,058	98	Paved parking, HSG A
18,492	39	>75% Grass cover, Good, HSG A
22,550	50	Weighted Average
18,492		82.00% Pervious Area
4,058		18.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 20: Back Patio



Summary for Subcatchment 21: Permeable Pavers

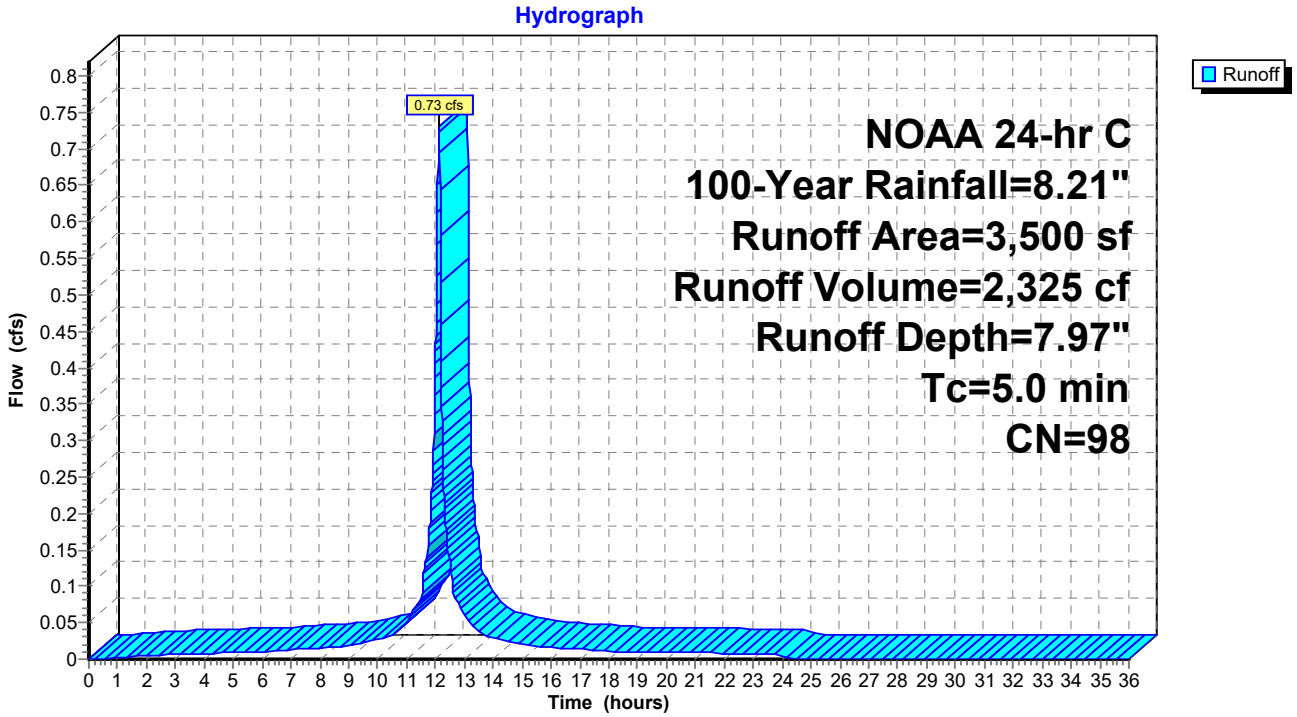
Runoff = 0.73 cfs @ 12.12 hrs, Volume= 2,325 cf, Depth= 7.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NOAA 24-hr C 100-Year Rainfall=8.21"

	Area (sf)	CN	Description
*	3,500	98	Permeable
	3,500		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 21: Permeable Pavers



Summary for Pond 1P: Diversion CB

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 6.06" for 100-Year event
Inflow = 6.26 cfs @ 12.12 hrs, Volume= 17,330 cf
Outflow = 6.26 cfs @ 12.12 hrs, Volume= 17,331 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.68 cfs @ 11.98 hrs, Volume= 6,882 cf
Secondary = 5.05 cfs @ 12.15 hrs, Volume= 10,449 cf

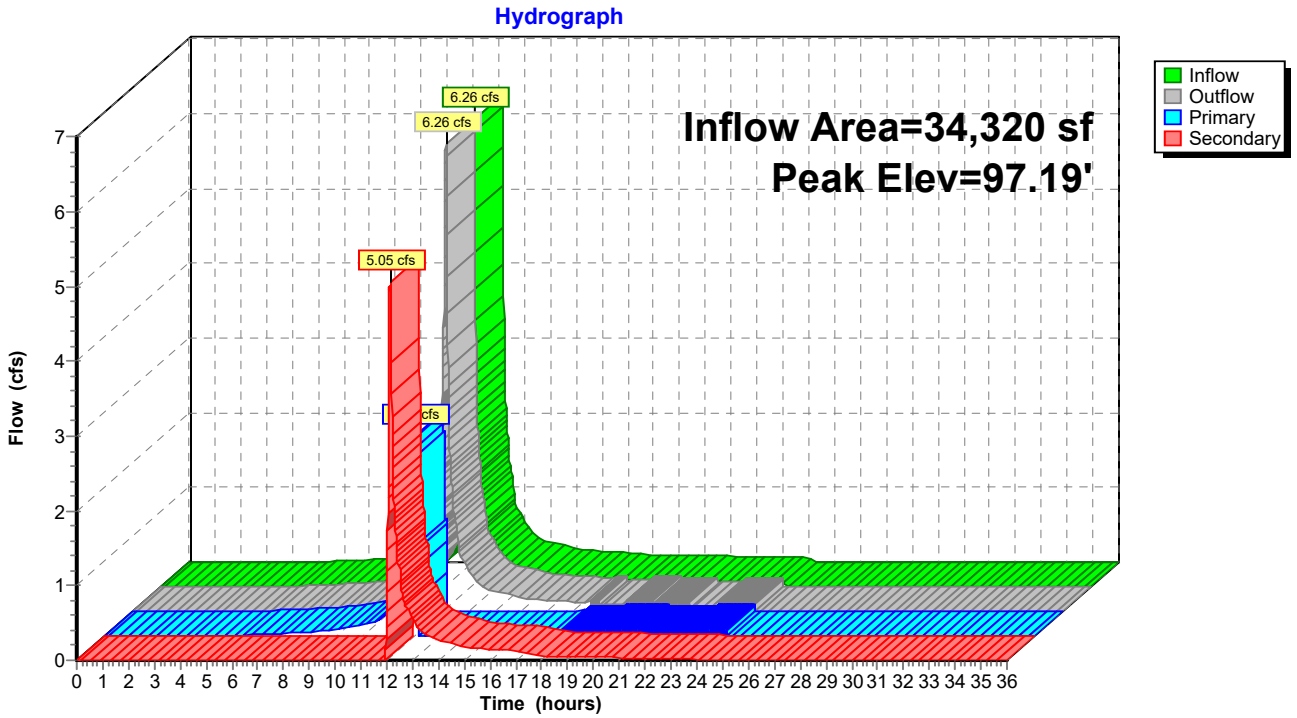
Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 97.19' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**24.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	94.40'	**10.0" Round Culvert** L= 5.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0200 '/' Cc= 0.900 n= 0.012, Flow Area= 0.55 sf

Primary OutFlow Max=0.00 cfs @ 11.98 hrs HW=94.76' TW=94.82' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=5.05 cfs @ 12.15 hrs HW=97.19' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 5.05 cfs @ 9.26 fps)

Pond 1P: Diversion CB



Summary for Pond 2P: Permeable Sidewalk

Inflow Area = 3,500 sf,100.00% Impervious, Inflow Depth = 7.97" for 100-Year event
Inflow = 0.73 cfs @ 12.12 hrs, Volume= 2,325 cf
Outflow = 0.16 cfs @ 12.38 hrs, Volume= 2,326 cf, Atten= 78%, Lag= 15.6 min
Discarded = 0.08 cfs @ 11.69 hrs, Volume= 2,116 cf
Primary = 0.08 cfs @ 12.38 hrs, Volume= 210 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 98.92' @ 12.38 hrs Surf.Area= 3,500 sf Storage= 585 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 30.3 min (770.8 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1	98.50'	1,750 cf	**Permeable (Prismatic)**Listed below (Recalc) 4,375 cf Overall x 40.0% Voids
#2	99.75'	875 cf	**Surface (Prismatic)**Listed below (Recalc) -Impervious
		2,625 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
98.50	3,500	0	0
99.75	3,500	4,375	4,375

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
99.75	3,500	0	0
100.00	3,500	875	875

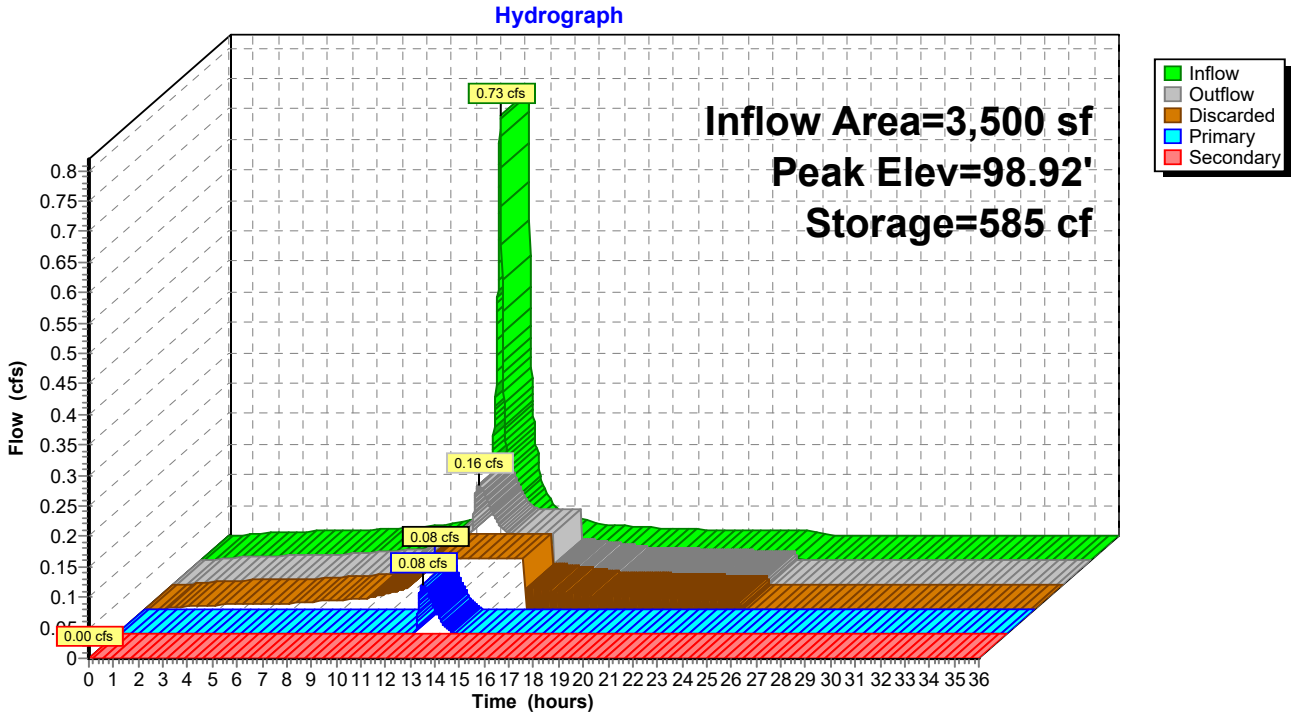
Device	Routing	Invert	Outlet Devices
#1	Discarded	98.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	98.75'	**6.0" Round Culvert** L= 10.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 98.75' / 98.40' S= 0.0350 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Secondary	99.95'	**20.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.08 cfs @ 11.69 hrs HW=98.52' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.08 cfs @ 12.38 hrs HW=98.92' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 0.08 cfs @ 1.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=98.50' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 2P: Permeable Sidewalk



Summary for Pond P-1: Stormtech

Inflow Area = 34,320 sf, 72.93% Impervious, Inflow Depth = 2.41" for 100-Year event
Inflow = 2.68 cfs @ 11.98 hrs, Volume= 6,882 cf
Outflow = 0.86 cfs @ 12.14 hrs, Volume= 5,540 cf, Atten= 68%, Lag= 9.7 min
Discarded = 0.08 cfs @ 12.14 hrs, Volume= 5,210 cf
Primary = 0.78 cfs @ 12.14 hrs, Volume= 331 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 97.18' @ 12.14 hrs Surf.Area= 3,265 sf Storage= 4,540 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 479.8 min (1,236.3 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.00'	1,878 cf	**44.25'W x 46.34'L x 3.50'H Field A** 7,176 cf Overall - 2,481 cf Embedded = 4,696 cf x 40.0% Voids
#2A	92.50'	2,481 cf	**ADS_StormTech SC-740 +Cap** x 54 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 54 Chambers in 9 Rows
#3	92.50'	861 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		5,220 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
92.50	12	0	0
96.90	12	53	53
97.00	110	6	59
97.50	3,100	803	861

Device	Routing	Invert	Outlet Devices
#1	Primary	96.90'	**2.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	92.00'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 12.14 hrs HW=97.18' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.78 cfs @ 12.14 hrs HW=97.18' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.78 cfs @ 1.37 fps)

Pond P-1: Stormtech - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

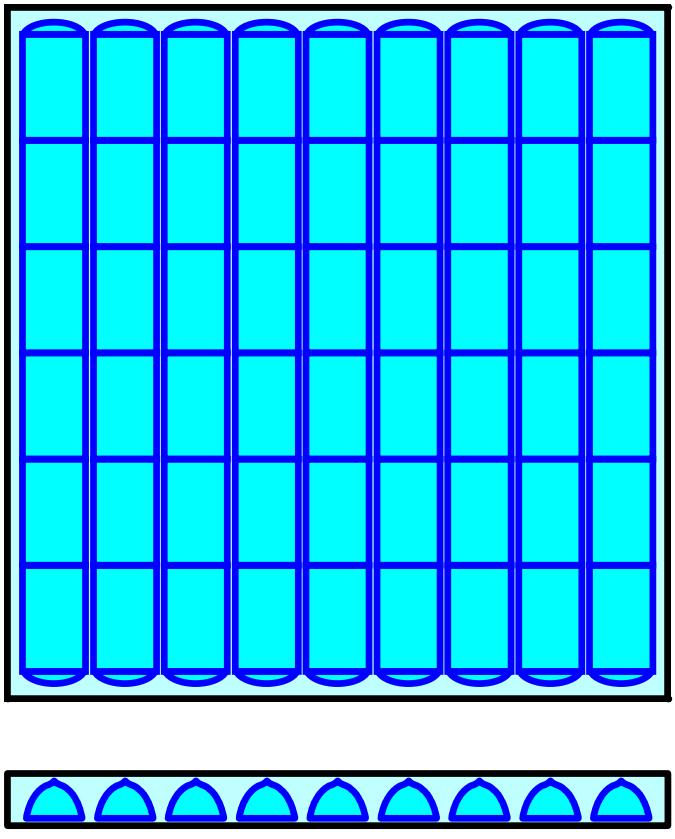
6 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 44.34' Row Length +12.0" End Stone x 2 = 46.34' Base Length
9 Rows x 51.0" Wide + 6.0" Spacing x 8 + 12.0" Side Stone x 2 = 44.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

54 Chambers x 45.9 cf = 2,480.8 cf Chamber Storage

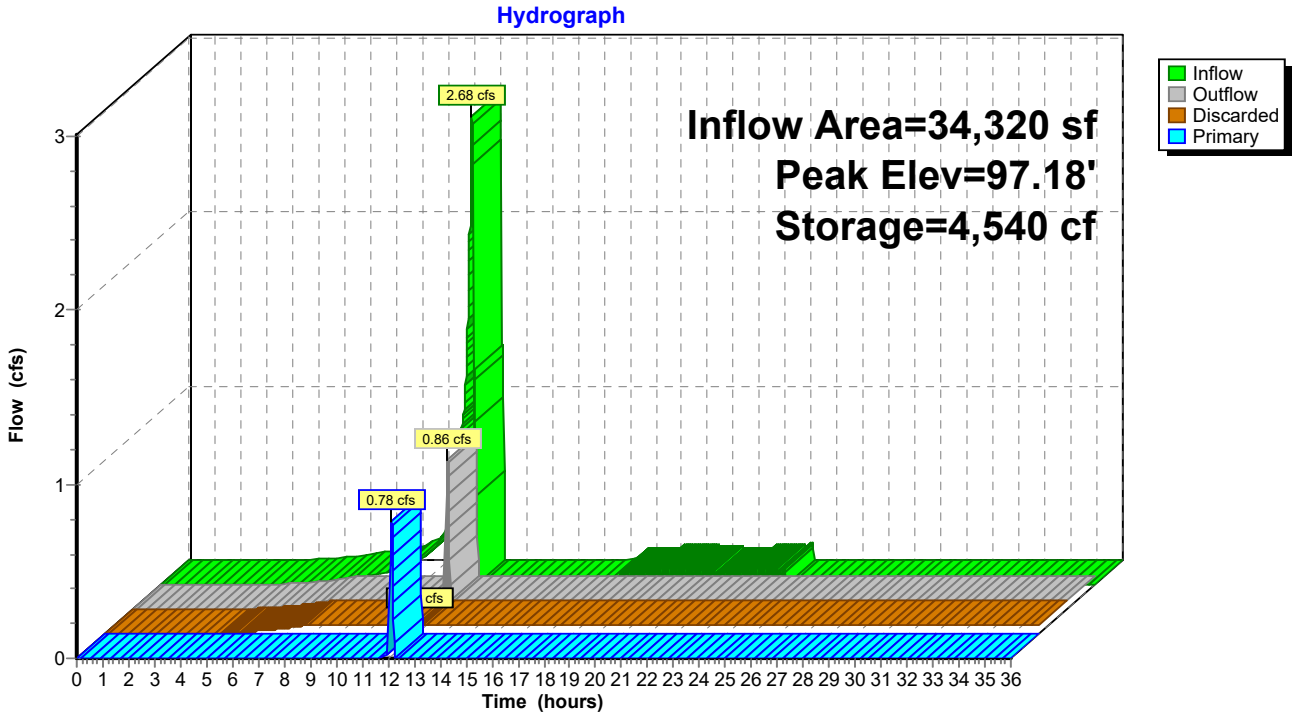
7,176.4 cf Field - 2,480.8 cf Chambers = 4,695.6 cf Stone x 40.0% Voids = 1,878.3 cf Stone Storage

Chamber Storage + Stone Storage = 4,359.0 cf = 0.100 af
Overall Storage Efficiency = 60.7%
Overall System Size = 46.34' x 44.25' x 3.50'

54 Chambers
265.8 cy Field
173.9 cy Stone



Pond P-1: Stormtech

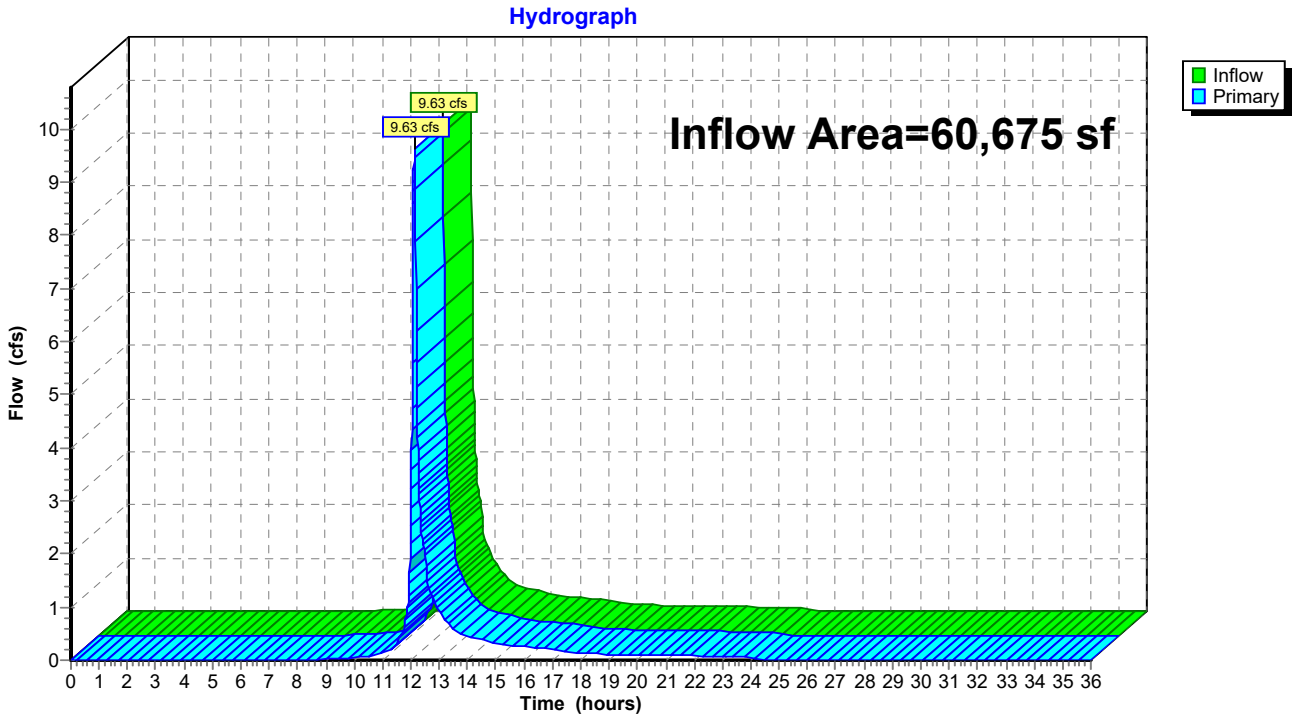


Summary for Link DP1: Front Entry

Inflow Area = 60,675 sf, 64.00% Impervious, Inflow Depth = 4.15" for 100-Year event
Inflow = 9.63 cfs @ 12.13 hrs, Volume= 20,981 cf
Primary = 9.63 cfs @ 12.13 hrs, Volume= 20,981 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP1: Front Entry

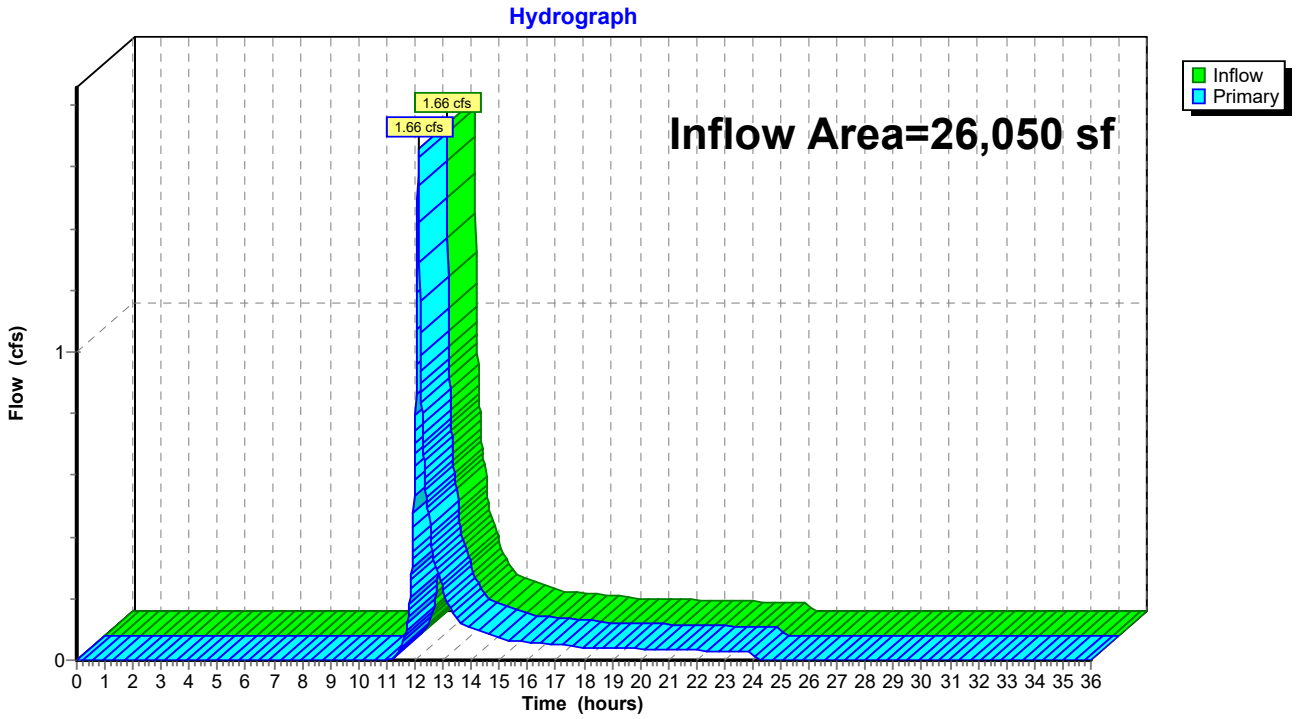


Summary for Link DP2: Back Patio

Inflow Area = 26,050 sf, 29.01% Impervious, Inflow Depth = 2.16" for 100-Year event
Inflow = 1.66 cfs @ 12.13 hrs, Volume= 4,681 cf
Primary = 1.66 cfs @ 12.13 hrs, Volume= 4,681 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Link DP2: Back Patio



Long-Term Pollution Prevention Plan

This Long-Term Pollution Prevention Plan has been developed to establish site management practices that improve the quality of stormwater discharges from the Project.

Description of Pollutant Sources

The project contains parking and drive areas that will experience high volume traffic that will potentially be a pollutant source.

Pollutant Control Approach

Maintenance of Pavement Systems

Standard Asphalt Pavement

Regular maintenance of pavement surfaces will prevent pollutants such as oil and grease, trash, and sediments from entering the stormwater management system. The following practices should be performed:

- Sweep or vacuum asphalt pavement areas [semi-annually, annually, monthly, etc] with a commercial cleaning unit and dispose of removed material.
- Check loading docks and dumpster areas frequently for spillage and/or pavement staining and clean as necessary
- Routinely pick up and remove litter from the parking areas, islands, and perimeter landscaping.

Permeable Pavers

The primary maintenance requirement for permeable pavers is to clean the surface drainage voids. Fine debris and dirt accumulate in the drainage openings and reduce the pavement's flow capacity. Even though some irreplaceable loss in permeability should be expected over the paver's lifetime, one can increase the longevity of the system by following the maintenance schedule for vacuum sweeping and high-

pressure washing, restricting the area's use by heavy vehicles, limiting the use of de-icing chemicals and sand, and implementing a stringent sediment control plan.

Preventing Clogging of Permeable Paver Surface Areas

- Patio areas and/or other areas with permeable pavers shall be cleaned annually with vacuums or washed with high pressure washers.
- Do not allow construction staging, soil/mulch storage, etc. on unprotected pavement surface.
- Maintain vegetated areas adjacent to areas with permeable pavers to prevent washout of soil onto surface.
- Do not apply any type of sealant to permeable pavers.

Inspecting the System

- Inspect areas paved with permeable pavers monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect areas paved with permeable pavers annually after initial three month period. Annual inspections should take place after large storms, when puddles will make any clogging obvious.

Maintenance of Vegetated Areas

Proper maintenance of vegetated areas can prevent the pollution of stormwater runoff by controlling the source of pollutants such as suspended sediments, excess nutrients, and chemicals from landscape care products. Practices that should be followed under the regular maintenance of the vegetated landscape include:

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.
- Pet waste provision if applicable.

Storage and Disposal

Snow shall be stockpiled on standard pavement surfaces so sand and salt may be swept in the spring or removed as snow melts and drains through the stormwater management system. Recommended locations for snow storage are shown on the attached Snow Storage Plan. Key practices for the safe storage and disposal of snow include:

- Under no circumstances shall snow be disposed or stored in wetland resource areas.
- Under no circumstances shall snow be disposed or stored in stormwater basins, ponds, rain gardens, swales, channels, or trenches.
- Do not stockpile snow on permeable pavement surfaces. Sand and grit in snow will clog pavement.
- Plow parking areas paved with permeable asphalt pavement carefully. Plow blades should be set approximately 1" higher than usual to avoid scarring the pavement and loosening material that could potentially clog surface pores.
- Do not apply abrasives such as sand or grit on or adjacent to permeable asphalt pavement.
- Monitor application rates of deicing materials on permeable pavement areas and reduce application rate accordingly. Permeable pavements tend to require less deicer per unit area because the water is not required to remain liquid over the entire parking surface area before discharge.
- Do not apply abrasives such as sand or grit on or adjacent to permeable pavers.
- Avoid plowing of areas with permeable pavers.

Salt and Deicing Chemicals

The amount of salt and deicing chemicals to be used on the site shall be reduced to the minimum amount needed to provide safe pedestrian and vehicle travel. The following practices should be followed to control the amount of salt and deicing materials that come into contact with stormwater runoff:

- Devices used for spreading salt and deicing chemicals should be capable of varying the rate of application based on the site specific conditions.
- Specific environmentally sensitive areas [engineer to identify] should be designated as no and/or reduced salt areas.
- Alternate materials [list alternate materials] should be used in place of standard salt and deicing chemicals in specific environmentally sensitive areas [engineer to identify].
- Sand and salt should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials

Spill Prevention and Response Plan

Spill prevention equipment and training will be provided by the property management company.

Initial Notification

In the event of a spill the facility and/or construction manager or supervisor will be notified immediately.

FACILITY MANAGER

Name: _____ Home Phone: _____

Phone: _____ E-mail: _____

CONSTRUCTION MANAGER

Name: _____ Home Phone: _____

Phone: _____ E-mail: _____

The supervisor will first contact the Fire Department and then notify the Police Department, the Public Health Commission and the Conservation Commission. The Fire Department is ultimately responsible for matters of public health and safety and should be notified immediately.

Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the main construction/facility office and readily accessible to all employees. A hazardous waste spill report shall be completed as necessary using the attached form.

Emergency Notification Phone Numbers

1. FACILITY MANAGER

Name: _____ Home Phone: _____

Phone: _____ E-mail: _____

ALTERENATE

Name: _____ Home Phone: _____

Phone: _____ E-mail: _____

2. FIRE DEPARTMENT

Emergency: **911**

Business: (781) 270-1925

POLICE DEPARTMENT

Emergency: **911**

Business: _____

3. CLEANUP CONTRACTOR:

Address: _____

Phone: _____

4. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

Emergency: _____

Northeast Region – Woburn Office: _____

5. NATIONAL RESPONSE CENTER

Phone: (800) 424-8802

ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY

Emergency: _____

Business: _____

6. CONSERVATION COMMISSION

Contact: _____

Phone: _____

BOARD OF HEALTH

Contact: _____

Phone: _____

Hazardous Waste / Oil Spill Report

Date _____ Time _____ AM / PM

Exact location (Transformer #) _____

Type of equipment _____ Make _____ Size _____

S / N _____ Weather Conditions _____

On or near Water ☐ Yes If Yes, name of body of Water _____

☐ No

Type of chemical/oil spilled _____

Amount of chemical/oil spilled _____

Cause of Spill _____

Measures taken to contain or clean up spill _____

Amount of chemical/oil recovered _____ Method _____

Material collected as a result of cleanup:

_____ Drums containing _____

_____ Drums containing _____

_____ Drums containing _____

Location and method of debris disposal

_____

Name and address of any person, firm, or corporation suffering damages:

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring:

_____

Spill reported to General Office by _____ Time _____ AM / PM

Spill reported to DEP / National Response Center by _____

DEP Date _____ Time _____ AM / PM Inspector _____

NRC Date _____ Time _____ AM / PM Inspector _____

Additional comments: _____

Assessment - Initial Containment

The supervisor or manager will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. A list of recommended spill equipment to be kept on site is included on the following page.

Fire / Police Department	911
Municipality Health Department	
Municipality Conservation Commission:	

Emergency Response Equipment

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

Supplies		Recommended Suppliers
SORBENT PILLOWS/"PIGS"	**2**	http://www.newpig.com
SORBENT BOOM/SOCK	**25 FEET**	Item # KIT276 — mobile container with two pigs,
SORBENT PADS	**50**	26 feet of sock, 50 pads, and five pounds of
LITE-DRI® ABSORBENT	**5**	absorbent (or equivalent)
POUNDS		http://www.forestry-suppliers.com
SHOVEL	**1**	Item # 43210 — Manhole cover pick (or
PRY BAR	**1**	equivalent)
GOGGLES	**1 PAIR**	Item # 33934 — Shovel (or equivalent)
GLOVES – HEAVY	**1 PAIR**	Item # 90926 — Gloves (or equivalent)
		Item # 23334 — Goggles (or equivalent)

Stormwater Operation and Maintenance Plan

Project Information

Site

140 Kendrick Street
Needham MA

Owner

Boston Properties
101 Federal Street
Boston, MA 02110

Site Supervisor

Name: __TBD_____

Telephone: _____

Cell phone: _____

Email: _____

Description of Stormwater Maintenance Measures

The following Operation and Maintenance (O&M) program is proposed to ensure the continued effectiveness of the stormwater management system. Attached to this plan are a Stormwater Best Management Practices Checklist and Maintenance Figure for use during the long term operation and maintenance of the stormwater management system.

Catch Basins

- All catch basins shall be inspected and cleaned a minimum of at least once per year.
- Sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations.
- Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary
- During colder periods, the catch basin grates must be kept free of snow and ice.
- During warmer periods, the catch basin grates must be kept free of leaves, litter, sand, and debris.

Subsurface Infiltration System

- The subsurface infiltration systems will be inspected at least once each year by removing the manhole/access port covers and determining the thickness of sediment that has accumulated in the sediment removal row.
- If sediment is more than six inches deep, it must be suspended via flushing with clean water and removed using a vactor truck.
- Manufacturer's specifications and instructions for cleaning the sediment removal row is provided as an attachment to this section.
- Emergency overflow pipes will be examined at least once each year and verified that no blockage has occurred.
- System will be observed after rainfalls to see if it is properly draining.

Inspection & Maintenance

Step 1) Inspect Isolator Row for Sediment

A. Inspection ports (if present)

A.1. Remove/open lid on Nyloplast inline drain

A.2. Remove and clean Flexstorm filter (if installed)

A.3. Using a flashlight and stadia rod, measure depth of sediment and record on maintenance log

A.4. Lower a camera into Isolator Row for visual inspection of sediment levels (optional)

A.5. If sediment is at, or above, 3" proceed to Step 2. If not, proceed to Step 3

Step 2) Clean out Isolator Row using the JetVac process

A. A fixed culvert cleaning nozzle with rear facing spread of 45" (1.1m) or more is preferred.

B. Apply multiple passes of JetVac until backflush water is clean

C. Vacuum structure sump as required

Permeable Pavers

The primary maintenance requirement for permeable pavers is to clean the surface drainage voids. Fine debris and dirt accumulate in the drainage openings and reduce the pavement's flow capacity. Even though some irreplaceable loss in permeability should be expected over the paver's lifetime, one can increase the longevity of the system by following the maintenance schedule for vacuum sweeping and high-pressure washing, restricting the area's use by heavy vehicles, limiting the use of de-icing chemicals and sand, and implementing a stringent sediment control plan.

Preventing Clogging of Permeable Paver Surface Areas

- Patio areas and/or other areas with permeable pavers shall be cleaned annually with vacuums or washed with high pressure washers.
- Do not allow construction staging, soil/mulch storage, etc. on unprotected pavement surface.
- Maintain vegetated areas adjacent to areas with permeable pavers to prevent washout of soil onto surface.
- Do not apply any type of sealant to permeable pavers.

Inspecting the System

- Inspect areas paved with permeable pavers monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect areas paved with permeable pavers annually after initial three month period. Annual inspections should take place after large storms, when puddles will make any clogging obvious.

Stormwater Outfalls

- Inspect outfall locations monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect outfalls annually after initial three month period.

- Annual inspections should be supplemented after large storms, when washouts may occur.
- Maintain vegetation around outfalls to prevent blockages at the outfall.
- Maintain rip rap pad below each outfall and replace any washouts.
- Remove and dispose of any trash or debris at the outfall.

Roof Drain Leaders

- Perform routine roof inspections quarterly.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.
- Clean inlets draining to the subsurface bed twice per year as necessary.

not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography. Base map files were provided in digital format by Massachusetts Geographic Information Systems (MassGIS). Ortho imagery was produced at a scale of 1:5,000. Aerial photography is dated April 2005.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

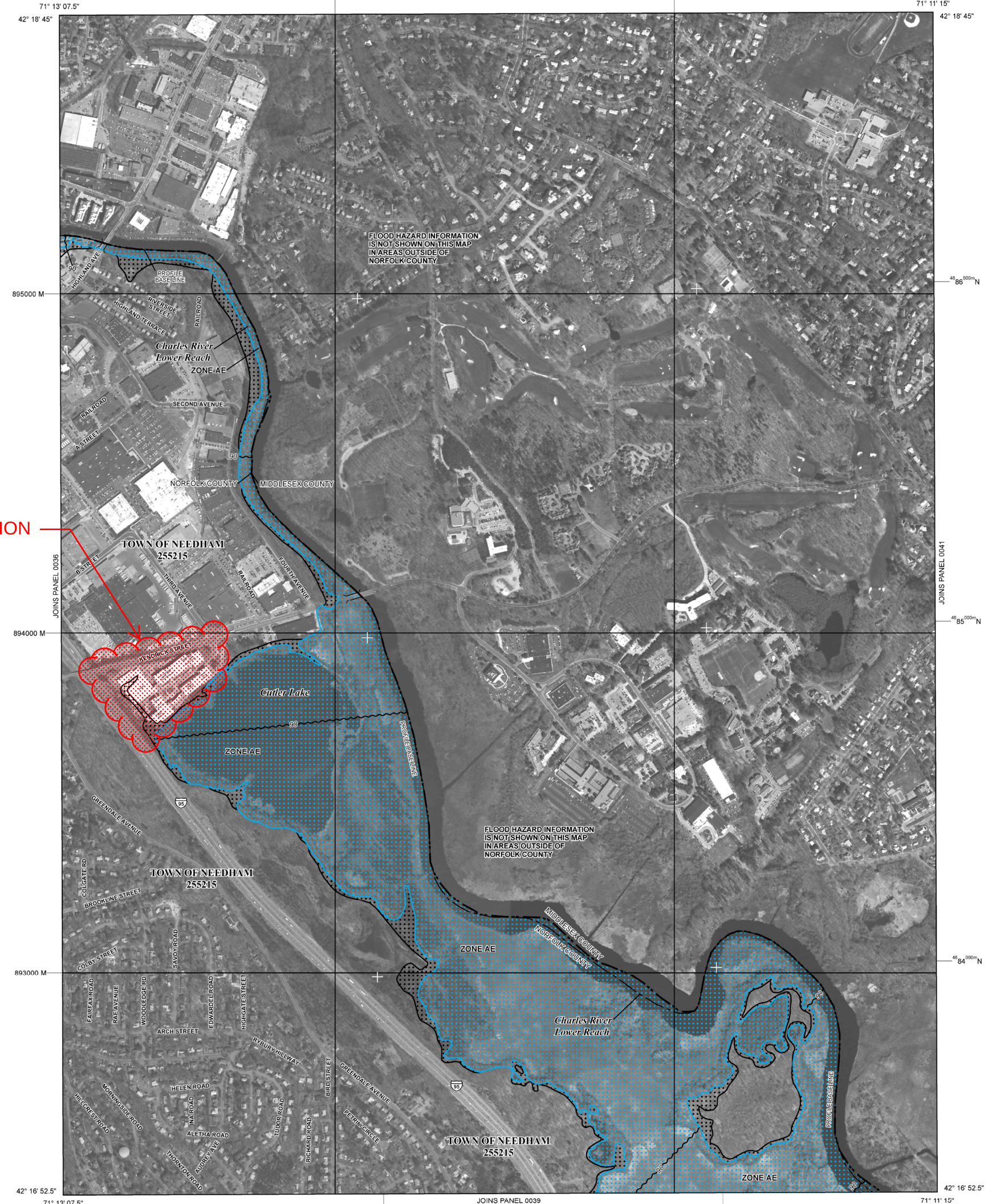
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center** (MSC) website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at **1 -877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A A	Cross section line
23 23	Transect line
	Culvert
	Bridge
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter ticks: Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
4689000mN	1000-meter Universal Transverse Mercator grid values, zone 19N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
July 17, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0037E

FIRM

FLOOD INSURANCE RATE MAP

NORFOLK COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 37 OF 430
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEEDHAM, TOWN OF	255215	0037	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25021C0037E

Design Review Board Meeting Minutes
Monday, October 5, 2020
7:30 PM

Board Members:

Mark Gluesing, Chair (P)
Len Karan, Board Member (P)
Chad Reilly, Board Member (p)
Deborah Robinson, Board Member (P)
Steve Tanner, Board Member (P)
Rana Mana-Doerfer, DRB Recording Secretary (P)
Elisa Litchman, Administrative Assistant, Planning & Community Development (P)

Applicants & Attendees:

1. Daniel Sheehan, StretchMed Studios Inc. applying for signage for StretchMed Studios located at 1093 Great Plain Avenue.
   - Brian Cook President of StretchMed Studios.

2. Phill Naffah, Harvey Signs representing PetCo and VetCo Total Care and applying for signage at 163 Highland Avenue.

3. Tiffany Suddarth, One Stop Signs representing TD Bank and applying for signage at 95 Highland Avenue.
   - Bridgette Morris of One Stop Signs.

Mr. Chair called the meeting to order on October 5, 2020 at 7:30 PM EST.
Mr. Chair notified attendees of new public meeting orders issued by the governor of Massachusetts.

Agenda Item 1: (Signage)

StretchMed Studios Inc. located at 1093 Great Plain Avenue applying for signage - Daniel Sheehan and Brian Cook, StretchMed Studios

Mr. Sheehan presented a signage proposal to replace the existing sign which is covered with a temporary banner at StretchMed Studios. The sign is the same imagery of the banner that is

currently up on the building. The size of the proposed sign is the same as the current existing sign on the building 24”x168”.

The sign is an aluminum pan panel with raised lettering and a raised circular logo 22" diameter. The applicant included images of a finished sign lying on a floor. Mr. Chair noted that the Board frowns upon applicants presenting finished signs before they have been reviewed because the Board may reject it or suggest alterations. Something possible in this case. The Chair stated the logo size was too large, and more negative space was needed to the edges of the sign panel.

Mr. Karan said the aluminum material does not seem to fit with the neighboring aesthetics. He also concurs with the Chair regarding the circular logo taking up a lot of space.

Mr. Tanner said he had a problem with the size of the logo. He would like to see it reduced. He said he does not have a problem with the material of the sign.

Ms. Robinson said she concurs with Mr. Karan & Mr. Tanner. She thought the logo is too big and does not ‘love’ the background color.

Mr. Reilly said he agrees with other Board members. If the logo is to be reduced, he would like to see more white space between the logo and the “S”, and more white space between the “D” and the right edge of sign. Perhaps shrinking the whole thing and resizing the text. Mr. Reilly also suggested a dark background and having the word “stretch” in a lighter color if they are open to that. Mr. Cook, President of StretchMed indicated they are trying to maintain similarity with their franchises in Belmont and Wellesley.

Mr. Chair asked if the objections from the Board are strong enough to not approve this sign. Given the state of the business world the Board is trying to be user friendly.

Motion to approve the signage on the condition it is reduced by a third made by Mr. Tanner
The motion was not seconded. The motion failed.

Motion to approve the signage as submitted by Mr. Reilly
Motion was seconded by Mr. Karan

Name	Aye	Nay
Mark Gluesing	Aye	
Len Karan	Aye	
Chad Reilly	Aye	
Deborah Robinson	Aye	
Steve Tanner	Nay	

Agenda Item 2: (Signage)

PetCo and VetCo Total Care located at 163 Highland Avenue applying for signage - Phill Naffah, Harvey Signs.

Mr. Naffah came before the Board to present the signage his client wishes to install. PetCo is looking to install 3 signs and 1 banner as well as remove one sign.
PetCo is opening a veterinarian hospital at their Needham Location, and VetCo will become an important focus. They need a special permit from the Planning Board to operate the veterinarian service. They do not have approval at this time. The Chair noted that would be a condition noted on any sign approvals.

Sign A is a 31 sq. ft. internally illuminated LED sign with individual channel letters. The sign will read "VetCo Total Care". This sign is to be installed on the building and the sign will be installed above where the grooming sign is currently.

Sign B is an individual non-internally illuminated FCO letters that will read "Grooming, Dog Training & Vet Care" on the large pillar at the portico entrance area. They will be illuminated with gooseneck light fixtures.

Sign C is a replacement panel to the composite pylon sign. They propose to replace the vinyl on the existing Lexan panels with applied vinyl that reads "PetCo | VetCo Total Care"

PetCo is also looking to install a banner than reads "Vetco Total Care | Coming Soon" & "Vetco Total Care | Now Open!" before and after the opening.

Mr. Chair asked if the door under the grooming sign will be removed or filled in. Mr. Naffah said no, the door will still be used.

Mr. Reilly said that the Town has some concerns about temporary banners. He asked the Board that they double check what they can and cannot authorize. Mr. Reilly asked whether the name "VetCo Total Care" is a subsidiary of the business. Mr. Naffah said that is a play on the word "PetCo" but it is also a subdivision of the pet store itself.

In terms of the "Grooming, Dog Training & Vet Care" Mr. Reilly said that the Board generally likes to steer away from listing what the businesses do. And he would like more conversation on all the proposed signage before he would be agreeable to the additional lettering.
For the wall and pylon sign if the "VetCo" was a little larger and the "Total Care" was smaller, it would look better. Everything in the current proposal looks a little crammed.

Ms. Robinson said she thinks the pylon sign is fine. But she does not like "VetCo Total Care" sign that is to be installed above the grooming door. It looks a little awkward regarding where it is to be installed.

Mr. Tanner said if the pylon sign is only to be re-lettered there will be ghosting of old lettering. He would prefer new lexan panels to be installed. He also asked for the banner to be resized to the allotted amount of 32 sq. ft.

Mr. Chair said he echoes Mr. Reilly's comments. He said the VetCo Total Care sign is not well designed. He believes it would look better if the word "VetCo" is a little larger.

Mr. Tanner said he would prefer if the gooseneck lighting is eliminated for Sign B. Mr. Reilly agreed. He suggested something smaller right next to the door that says "Grooming", and to also examine the overall square footage for the 3 words together.

Mr. Chair said the store has other options for them to advertise their new services, on the glass doors for example.

Mr. Chair informed Mr. Naffah of what the Board would be comfortable voting on during this meeting. The Board would continue the hearing on the other signs. The applicant said he had time to revise the proposals since they still were in process with the Planning Board.

Mr. Naffah said he would not mind coming back during the next meeting for approval on all proposed signage once he incorporates the Board's recommendations.

Motion to continue the PetCo/VetCo application on October 19th by Mr. Reilly
Motion was seconded by Ms. Robinson.

Name	Aye	Nay
Mark Gluesing	Aye	
Len Karan	Aye	
Chad Reilly	Aye	
Deborah Robinson	Aye	
Steve Tanner	Aye	

Agenda Item 3: (Signage & Awning)

TD Bank located at 95 Highland Avenue applying for signage and awning. - Tiffany Suddarth, and Bridgette Morris, One Stop Signs

Bridgette Morris presented the Board with a request for face changes to the 6 signs at the TD Bank Needham location. The changes consist of a color change from dark green to a lighter green. They will also be taking off the word "Bank" on their ATM sign and changing their awning from a dark green to a light green.

Mr. Chair asked the Board members if they had any feedback. The Board members said they had no objections to the changes being proposed.

Motion to approve the sign modifications as submitted by Ms. Robinson.
Motion was seconded by Mr. Reilly.

Name	Aye	Nay
Mark Gluesing	Aye	
Len Karan	Aye	
Chad Reilly	Aye	
Deborah Robinson	Aye	
Steve Tanner	Aye	

Motion to approve the change in the awning fabric color as submitted by Mr. Karan
Motion was seconded by Mr. Reilly

Name	Aye	Nay
Mark Gluesing	Aye	
Len Karan	Aye	
Chad Reilly	Aye	
Deborah Robinson	Aye	
Steve Tanner	Aye	

Approval of Minutes:

Motion to approve the minutes of September 14th made by Ms. Robinson.
Motion was seconded by Mr. Reilly.

Name	Aye	Nay
Mark Gluesing	Aye	
Len Karan	Abstained	
Chad Reilly	Aye	
Deborah Robinson	Aye	
Steve Tanner	Abstained	

Motion to Adjourn:

Motion to adjourn the Design Review Board meeting was made by Mr. Tanner. Motion was seconded by Mr. Reilly.
Meeting adjourned at 8:24 PM.

Name	Aye	Nay
Mark Gluesing	Aye	
Len Karan	Aye	
Chad Reilly	Aye	
Deborah Robinson	Aye	
Steve Tanner	Aye	

Future Meetings

October 19, 2020	Via Zoom
November 2, 2020	Via Zoom
November 16, 2020	Via Zoom
December 7, 2020	Via Zoom
December 21, 2020	Via Zoom