NOTICE OF INTENT APPLICATION

648-654 Main Street & 63 Vine Street

Winchester, Massachusetts

August 2020

Prepared By:

AD MELIORA

Gillespie and Co., Inc.

Touloukian Touloukian Inc.
Architecture + Urban Design

Copley Wolff Design Group
Landscape Architects & Planners

HOWARD STEIN HUDSON
Engineers + Planners

BEALS · ASSOCIATES INC.

BEALS • ASSOCIATES INC.
2 PARK PLAZA, SUITE 200, BOSTON, MA 02116
PHONE: 617-242-1120

August 27, 2020

Winchester Conservation Commission
Town Hall
71 Mt. Vernon Street
Winchester, Massachusetts 01890

Reference: Notice of Intent Application
648-654 Main Street & 63 Vine Street
Winchester, Massachusetts

On behalf of the Applicant, 654 Main Street LLC, c/o Ad Meliora, and the Property Owner, Fells Realty, Inc., Beals Associates, Inc. is filing the enclosed Notice of Intent (NOI) Application and accompanying plans and documents with the Winchester Conservation Commission to redevelop 648-654 Main Street in Winchester, MA. Proposed activities include the construction of a four-story mixed-use building, as well as the reconstruction and renovation of the abutting and historically-registered building at 63 Vine Street. The mixed-use building will contain approximately 6,200 square feet of total commercial space (including basement storage) along Main Street and thirty-six (36) residential units distributed among all four floors of the building. Parking for the residential units will be provided beneath the ground level of the building and will be accessed via an automatic parking system from Elmwood Avenue. Portions of the proposed activities are located within a FEMA 100-Year Floodplain (Bordering Land Subject to Flooding), with no other resource areas or associated buffer zones located on the site. The Applicant proposes to implement erosion control measures, install a complete Stormwater Management System, and provide compensatory storage for a 100-year storm event in order to minimize any potential impacts within the FEMA 100-Year Floodplain during construction and to improve existing conditions.

Due to its location within a FEMA 100-Year Floodplain, any work in an area which would be flooded as a result of the 100-year storm event falls under the jurisdiction of the *Massachusetts Wetlands Protection Act* (M.G.L c. 131, s.40), its associated regulations (310 CMR 10.00), and the *Winchester Wetlands Bylaw* (Chapter 13), and is subject to the filing of a Notice of Intent Application. The existing conditions of the site are detailed on the *C1.0 Existing Conditions Plan – Fells Hardware Redevelopment*, prepared by Beals Associates, Inc., and dated August 18, 2020 (Appendix D). Further details of the stormwater management design, compensatory flood

storage, and a detailed Operation & Maintenance Plan can be found in the *Stormwater Management Report* (Appendix E) and on the *C3.0 Grading and Drainage Plan – Fells Hardware Redevelopment*, also prepared by Beals Associates, Inc., and dated August 18, 2020 (Appendix D).

Enclosed pleased find two checks payable to the Town of Winchester in the amounts of $537.50 and $2,112.90 as required for the filing of this NOI Application under Local and State regulations. A check made payable to the Commonwealth of Massachusetts (Department of Environmental Protection) in the amount of $512.50 has been mailed to the MassDEP Lockbox.

Thank you for your consideration of this Application. We look forward to meeting with the Commission at the September 8, 2020 Public Hearing. Please contact our office with any questions at *617-242-1120* or by email at *lbeals@bealsassociates.com*.

Sincerely,

Beals Associates, Inc.

Lawrence M. Beals
Principal

Bryan Sutherlin

cc: DEP, Northeast Region
Kevin Ryan, Fells Realty, Inc.
Paul Soughley, Ad Meliora
Ian Gillespie, Gillespie and Co., Inc.

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Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

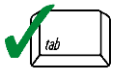
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Winchester
City/Town

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note: Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

648-654 Main Street & 63 Vine Street — a. Street Address
Winchester — b. City/Town
01890 — c. Zip Code

Latitude and Longitude:
42.454550 — d. Latitude
-71.137990 — e. Longitude

9 — f. Assessors Map/Plat Number
123, 124, 125 — g. Parcel /Lot Number

2. Applicant:

Paul — a. First Name
Soughley — b. Last Name
654 Main Street LLC, c/o Ad Meliora — c. Organization
10 Converse Place — d. Street Address
Winchester — e. City/Town
MA — f. State
01890 — g. Zip Code
617-448-3827 — h. Phone Number
i. Fax Number
paul.soughley@admeliorallc.com — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

Kevin — a. First Name
Ryan — b. Last Name
Fells Realty, Inc. — c. Organization
654 Main Street — d. Street Address
Winchester — e. City/Town
MA — f. State
01890 — g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Lawrence — a. First Name
Beals — b. Last Name
Beals Associates, Inc. — c. Company
2 Park Plaza, Suite 200 — d. Street Address
Boston — e. City/Town
MA — f. State
02116 — g. Zip Code
617-242-1120 — h. Phone Number
i. Fax Number
lbeals@bealsassociates.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

$1,050.00 — a. Total Fee Paid
$512.50 — b. State Fee Paid
$537.50 — c. City/Town Fee Paid

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A. General Information (continued)

6. General Project Description:

Construction of a four-story mixed-use building consisting of 2 ground level retail units and 36 residential units, and the reconstruction of a histroically registered building. Portions of activity are located within a FEMA 100-Year Floodplain. Other activities include the installation of a stormwater management system, which provides compensatory flood storage for a 100-year storm event.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☒ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☐ Transportation
9. ☒ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

Middlesex	
a. County	b. Certificate # (if registered land)
6771; 8878; 13862	169; 447; 365
c. Book	d. Page Number

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☐ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☒ Bordering Land Subject to Flooding	5,645 1. square feet 5,522 3. cubic feet of flood storage lost	4,868 2. square feet 10,073 4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☐ Riverfront Area	1. Name of Waterway (if available) - **specify coastal or inland**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: _____ square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet _____ b. square feet within 100 ft. _____ c. square feet between 100 ft. and 200 ft. _____

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

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B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   2017
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

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* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☒ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

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C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

      2. ☐ A portion of the site constitutes redevelopment

      3. ☒ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:

      1. ☐ Single-family house

      2. ☐ Emergency road repair

      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☒ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☒ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

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D. Additional Information (cont'd)

3. ☐ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Plans to Accompany Permit Documents for Fells Hardware Redevelopment
a. Plan Title

Beals Assocaites, Inc.
b. Prepared By

Todd Morey, P.E.
c. Signed and Stamped by

August 18, 2020
d. Final Revision Date

1" = 10'
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

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F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date 8/25/2020
3. Signature of Property Owner (if different)	4. Date 8/25/2020
5. Signature of Representative (if any)	6. Date 8/25/2020

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

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NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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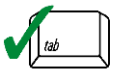

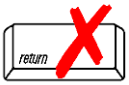

A. Applicant Information

1. Location of Project:

648-654 Main Street & 63 Vine Street	Winchester
a. Street Address	b. City/Town
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Paul	Soughley	
a. First Name	b. Last Name	
654 Main Street LLC, c/o Ad Meliora		
c. Organization		
10 Converse Place		
d. Mailing Address		
Winchester	MA	01890
e. City/Town	f. State	g. Zip Code
617-448-3827		paul.soughley@admeliorallc.com
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

Kevin	Ryan	
a. First Name	b. Last Name	
Fells Realty, Inc.		
c. Organization		
654 Main Street		
d. Mailing Address		
Winchester	MA	01890
e. City/Town	f. State	g. Zip Code
h. Phone Number	i. Fax Number	j. Email Address

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

B. Fees

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

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B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Category 3b.) each building (for development) including site	1	$1,050	$1,050

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

Total Project Fee:	$1,050 a. Total Fee from Step 5
State share of filing Fee:	$512.50 b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	$537.50 c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)

AFFIDAVIT OF SERVICE

Under the

Massachusetts Wetlands Protection Act

and the

Town of Winchester Wetlands Protection Bylaw

I, Bryan Sutherlin, on behalf of 654 Main Street LLC, c/o Ad Meliora and Fells Realty, Inc., hereby certify under the pains and penalties of perjury that on August 27, 2020 I gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and 310 CMR 10.05 (4) (a), in connection with the following matter:

> A Notice of Intent filed under the *Massachusetts Wetlands Protection Act* (M.G.L., c. 131, s. 40) and the *Town of Winchester Wetlands Protection Bylaw* by Beals Associates, Inc., on behalf of 654 Main Street LLC, c/o Ad Meliora and Fells Realty, Inc., with the Town of Winchester Conservation Commission on August 26, 2020 for property located at 648-654 Main Street & 63 Vine Street (Assessor's Parcel IDs: 9-125-0, 9-124-0, 9-123-0) in Winchester, Massachusetts.

The form of notification, and a list of the abutters to whom it was given and their addresses, are attached to this Affidavit of Service.

Bryan Sutherlin

Bryan Sutherlin

8/27/20

Date

BEALS • ASSOCIATES INC.
2 PARK PLAZA, SUITE 200, BOSTON, MA 02116
PHONE: 617-242-1120

August 26, 2020
CERTIFIED MAIL

<<Name>>
<<Name2>>
<<Address>>
<<City>>, <<State>> <<Zip>>

Reference: **Notice of Intent Application**
648-654 Main Street & 63 Vine Street
Winchester, Massachusetts

Dear Abutter,

On behalf of the Applicant, 654 Main Street LLC, c/o Ad Meliora, and the Property Owner, Fells Realty, Inc., Beals Associates, Inc. has filed a Notice of Intent (NOI) Application with the Winchester Conservation Commission to redevelop 648-654 Main Street in Winchester, MA. Proposed activities include the construction of a four-story mixed-use building, as well as the reconstruction and renovation of the abutting and historically-registered building at 63 Vine Street. Portions of the proposed activities are located within a FEMA 100-Year Floodplain (Bordering Land Subject to Flooding), with no other resource areas or associated buffer zones located on the site. The Applicant proposes to implement erosion control measures, install a complete Stormwater Management System, and provide compensatory storage for a 100-year storm event in order to minimize any potential impacts within the FEMA 100-Year Floodplain during construction and to improve existing conditions.

The report submitted to the Town of Winchester entitled *Notice of Intent Application 648-654 Main Street & 63 Vine Street* and accompanying plan set are available for review by the public by contacting the Winchester Conservation Commission. The Public Hearing will be held on Tuesday, September 8, 2020 at 7:30pm, via remote access, in accordance with the *Massachusetts Wetlands Protection Act* (M.G.L. c. 131, s. 40), its associated regulations (310 CMR 10.00), and the *Winchester Wetlands Bylaws* (Chapter 13). Notice of the Public Hearing, including the date and time, will be published in the *Woburn Daily Times Chronicle* at least five (5) days in advance and will also be posted at Winchester Town Hall at least 48 hours prior to the Public Hearing.

If you have any questions or concerns regarding the proposed project, we encourage a review of the materials and/or attend the public hearing.

Sincerely,

Beals Associates, Inc.

Lawrence M. Beals
Principal

Bryan Sutherlin

Notification to Abutters Under the Massachusetts Wetlands Protection Act and the Winchester Wetlands Bylaw

In accordance with the second paragraph of the Massachusetts General Laws Chapter 131, Section 40, and the Winchester Wetlands Bylaw, you are hereby notified of the following:

A. The name of the Applicant is: *654 Main Street LLC, c/o Ad Meliora*

B. The Applicants have filed a Notice of Intent with the Winchester Conservation Commission seeking to *construct a four-story mixed-use building with commercial space and residential units, and the reconstruction of a historically-registered dwelling.*

C. The address of the lot where activity is proposed is: *648-654 Main Street & 63 Vine Street*

D. Electronic copies of the Notice of Intent may be examined upon request to the Conservation office. Please contact Elaine Vreeland at: Evreeland@winchester.us. A copy of the Notice of Intent will also be posted on the town website.

E. Electronic copies of the Notice of Intent may be obtained from the Winchester Conservation Office. For more information, call (781) 721-7152, or email: Evreeland@winchester.us.

F. A public hearing will be held on *Tuesday, September 8, 2020, at 7:30 PM, via remote access. Information regarding remote access will be posted on the Conservation Commission agenda, located on the town of Winchester website.*

Note: Notice of the public hearing, including its date, time and place, will be published at least five (5) days in advance in the ***Woburn Daily Times Chronicle***.

Note: Notice of the public hearing, including its date, time and place, will be posted on the Town Hall website not less than forty-eight (48) hours in advance of the public hearing.

Note: You may also contact your local Conservation Commission or the nearest Department of Environmental Protection Regional office for more information about this application or the Wetlands Protection Act.

To contact DEP call:

Northeast Region: 978-694-3200

BEALS • ASSOCIATES INC.
2 PARK PLAZA, SUITE 200, BOSTON, MA 02116
PHONE: 617-242-1120

CERTIFIED LIST OF ABUTTERS

(WITHIN 100')

648-654 MAIN STREET & 63 VINE STREET

Loc: 45 49 VINE ST PID #: 9 121 0

LUC: 105

A + M REALTY TRUST
MARINO V MATRUNDOLA TR
87 LAWSON RD

WINCHESTER MA 01890

Loc: 51 VINE ST PID #: 9 122 0

LUC: 101

ZHOU ZIYI + YAPING ZHANG

51 VINE STREET

WINCHESTER MA 01890

Loc: 63 VINE ST PID #: 9 123 0

LUC: 101

FELLS REALTY INC

654 MAIN ST

WINCHESTER MA 01890

Loc: 648 654 MAIN ST PID #: 9 124 0

LUC: 325

FELLS REALTY INC

654 MAIN ST

WINCHESTER MA 01890

Loc: ELMWOOD + MAIN ST PID #: 9 125 0

LUC: 337

FELLS REALTY INC

648 MAIN STREET

WINCHESTER MA 01890

Loc: 632 MAIN ST PID #: 9 131 0

LUC: 325

WILDCAT REALTY 2 LLC

3 TAFT CIRCLE

WINCHESTER MA 01890

Loc: 666 U L-1 MAIN ST PID #: 9 186 0

LUC: 102

DALLESANDRO GINA M

666 U L-1 MAIN ST

WINCHESTER MA 01890

Loc: 666 U L-2 MAIN ST PID #: 9 187 0

LUC: 102

DEFLUMERE MICHAEL E + PATRICIA

PO BOX 154

BRYANT POND ME 04219

Loc: 666 U L-3 MAIN ST PID #: 9 188 0

LUC: 102

WELLENS SANDRA J

666 MAIN STREET - UNIT L-3

WINCHESTER MA 01890

Loc: 666 U L-4 MAIN ST PID #: 9 189 0

LUC: 102

HARRINGTON JUDITH A

666 MAIN ST #L-4

WINCHESTER MA 01890

Loc: 666 U L-5 MAIN ST PID #: 9 190 0

LUC: 102

HUDGINS MICHAEL P + MARILOUIS

666 MAIN STREET UNIT L-5

WINCHESTER MA 01890

Loc: 62 VINE ST PID #: 9 191 0

LUC: 102

DEVEAUX SUZANNE C

62 VINE STREET

WINCHESTER MA 01890

Loc: 666 U 201 MAIN ST PID #: 9 192 0

LUC: 102

BALDWIN ROSEMARY M

666 MAIN ST UNIT 201

WINCHESTER MA 01890

Loc: 666 U 202 MAIN ST PID #: 9 193 0

LUC: 102

DELLARCIPRETE BLANCHE TRUST
BLANCHE DELLARCIPRETE, TR
666 MAIN ST UNIT 202

WINCHESTER MA 01890

Loc: 666 U 203 MAIN ST PID #: 9 194 0
LUC: 102

DE CASSIA COUTO RITA

666 MAIN ST #203

WINCHESTER MA 01890

Loc: 666 U 204 MAIN ST PID #: 9 195 0
LUC: 102

LATZANAKIS FAMILY TRUST
STEPHEN + SANDRA LATZANAKIS TR
666 MAIN ST UNIT 204

WINCHESTER MA 01890

Loc: 666 U 205 MAIN ST PID #: 9 196 0
LUC: 102

CHENG HONG-MING + BETTY H CHAO

3 RIDGEFIELD ROAD

WINCHESTER MA 01890

Loc: 666 U 206 MAIN ST PID #: 9 197 0
LUC: 102

HENEGHAN REALTY TRUST
THERESA J. HENEGHAN, TR
666 MAIN ST UNIT 206

WINCHESTER MA 01890

Loc: 666 U 207 MAIN ST PID #: 9 198 0
LUC: 102

FIVE MYSTIC TR + FOUR HOLLYWOO
JAMES JR MARCHANT+ E THIBEAULT
666 MAIN ST #207

WINCHESTER MA 01890

Loc: 666 U 208 MAIN ST PID #: 9 199 0
LUC: 102

AMBERWOOD REALTY TRUST
SALIL K MIDHA TRUSTEE
17 ST. THOMAS MORE DRIVE

WINCHESTER MA 01890

Loc: 666 U 209 MAIN ST PID #: 9 200 0
LUC: 102

KEEFE CHARLES J + MARY M

666 MAIN STREET UNIT 209

WINCHESTER MA 01890

Loc: 666 U 210 MAIN ST PID #: 9 201 0
LUC: 102

GANNON SARAH + THOMAS

666 MAIN ST #210

WINCHESTER MA 01890

Loc: 666 U 211 MAIN ST PID #: 9 202 0
LUC: 102

HYDE BARBARA A

52 OXFORD STREET

WINCHESTER MA 01890

Loc: 666 U 212 MAIN ST PID #: 9 203 0
LUC: 102

WILLIAMS SUSAN

666 MAIN ST #212

WINCHESTER MA 01890

Loc: 666 U 215 MAIN ST PID #: 9 204 0
LUC: 102

OSSEN RONALD + ELVIRA

666 MAIN STREET UNIT 215

WINCHESTER MA 01890

Loc: 666 U 217 MAIN ST PID #: 9 205 0
LUC: 102

FORTIN REALTY LLC

39 CHURCH STREET

WINCHESTER MA 01890

Loc: 666 U 301 MAIN ST PID #: 9 206 0
LUC: 102

COOK-CAMPBELL JANE E

666 MAIN STREET UNIT 301

WINCHESTER MA 01890

Loc: 666 U 302 MAIN ST PID #: 9 207 0
LUC: 102

MURPHY JEAN M FAMILY TRUST
JEAN M MURPHY, TRUSTEE
666 MAIN STREET UNIT 302

WINCHESTER MA 01890

Loc: 666 U 303 MAIN ST PID #: 9 208 0
LUC: 102

STEWART GAIL A LIFE ESTATE

PO BOX 478

WILMINGTON MA 01887

Loc: 666 U 304 MAIN ST PID #: 9 209 0
LUC: 102

FALLON MAUREEN K TRUST
MAUREEN + JAMES FALLON TRS
20801 RIVERS FORD

ESTERO FL 33928

Loc: 666 U 305 MAIN ST PID #: 9 210 0
LUC: 102

CURTIS DAVID AMES REVOCABLE TR
DAVID A CURTIS TRUSTEE
666 MAIN ST - UNIT 305

WINCHESTER MA 01890

Loc: 666 U 306 MAIN ST PID #: 9 211 0
LUC: 102

KHERUZE ALEXANDER + LARISA

666 MAIN STREET-UNIT 306

WINCHESTER MA 01890

Loc: 666 U 307 MAIN ST PID #: 9 212 0
LUC: 102

TOMASONE ANTHONY

666 MAIN ST #307

WINCHESTER MA 01890

Loc: 666 U 308 MAIN ST PID #: 9 213 0
LUC: 102

LOMBARDO ALICE IRREVOCABLE TRU
KENDRA A AHERN TRUSTEE
666 MAIN ST - UNIT 311

WINCHESTER MA 01890

Loc: 666 U 309 MAIN ST PID #: 9 214 0
LUC: 102

TAVARES MANUEL J + JANE M

666 MAIN ST - UNIT 309

WINCHESTER MA 01890

Loc: 666 U 310 MAIN ST PID #: 9 215 0
LUC: 102

COUGHLIN ANN HEIRS OF

666 MAIN STREET - UNIT 310

WINCHESTER MA 01890

Loc: 666 U 311 MAIN ST PID #: 9 216 0
LUC: 102

LOMBARDO R + A LOMBARDO IRR TR
KENDRA AHERN TRUSTEE
666 MAIN ST UNIT 311

WINCHESTER MA 01890

Loc: 666 U 312 MAIN ST PID #: 9 217 0
LUC: 102

SOUTHWICK MICHAEL

666 MAIN ST # 312

WINCHESTER MA 01890

Loc: 666 U 315 MAIN ST PID #: 9 218 0
LUC: 102

MAGEE FAMILY REV TRUST
THOMAS + ISOBEL MAGEE TRUSTEES
666 MAIN ST #315

WINCHESTER MA 01890

Loc: 666 U 317 MAIN ST PID #: 9 219 0
LUC: 102

RILEY STEPHEN P 2020 TRUST
STEPHEN P RILEY TRUSTEE
22 GROVE STREET #24

WINCHESTER MA 01890

Loc: 666 U 401 MAIN ST PID #: 9 220 0
LUC: 102

CLEARY SUSAN M + THOMAS W

666 MAIN ST #401

WINCHESTER MA 01890

Loc: 666 U 402 MAIN ST PID #: 9 221 0
LUC: 102

MARINI STEPHEN + KATHLEEN TR
STEPHEN + KATHLEEN MARINI,TR
666 MAIN ST #402

WINCHESTER MA 01890

Loc: 666 U 403 MAIN ST PID #: 9 222 0
LUC: 102

UNIT 403 NOMINEE TRUST
ANNA TSAKARISSIANOS
UNIT 859 BAY VILLAGE
8400 VAMO ROAD
SARASOTA FL 34231

Loc: 666 U 404 MAIN ST PID #: 9 223 0
LUC: 102

FUREY JUSTINA

666 MAIN ST #404

WINCHESTER MA 01890

Loc: 666 U 405 MAIN ST PID #: 9 224 0
LUC: 102

ONEIL WEDGEWOOD REALTY TRUST
WILLIAM F + GLORIA T O'NEIL,TR
PO BOX 204

WINCHESTER MA 01890

Loc: 666 U 406 MAIN ST PID #: 9 225 0
LUC: 102

MCGIVNEY WILLIAM + ANNE OESTE

666 MAIN ST UNIT 406

WINCHESTER MA 01890

Loc: 666 U 407 MAIN ST PID #: 9 226 0
LUC: 102

ALVES MARIA G - LIFE ESTATE
C/O JORGE M ALVES ET AL
200 SWANTON ST #233

WINCHESTER MA 01890

Loc: 666 U 408 MAIN ST PID #: 9 227 0
LUC: 102

CAB REVOCABLE TRUST
C ANDREW BATTINELLI TRUSTEE
23 GERALD RD

MARBLEHEAD MA 01945

Loc: 666 U 409 MAIN ST PID #: 9 228 0
LUC: 102

CRONAN BEVERLY + ROBERT R

666 MAIN ST UNIT 409

WINCHESTER MA 01890

Loc: 666 U 410 MAIN ST PID #: 9 229 0
LUC: 102

MOISAN ROBERT + LINDA

666 MAIN ST #410

WINCHESTER MA 01890

Loc: 666 U 411 MAIN ST PID #: 9 230 0
LUC: 102

WEDGEWOOD PLACE REALTY TRUST
JOSEPH + JOHN PIANTEDOSI TRS
666 MAIN ST UNIT 411

WINCHESTER MA 01890

Loc: 666 U 412 MAIN ST PID #: 9 231 0
LUC: 102

EHRIG NANCY J + PHYLIS A MIQUE

2508 HIGHLAND TRAIL

LEANDER TX 78641

Loc: 666 U 415 MAIN ST PID #: 9 232 0
LUC: 102

DORS ALLEN + BRANWEN L COOK

666 MAIN ST #415

WINCHESTER MA 01890

Loc: 666 U 417 MAIN ST PID #: 9 233 0
LUC: 102

GOODE BRIAN + S LEE-GOODE

666 MAIN ST - UNIT 417

WINCHESTER MA 01890

Loc: 36 ELMWOOD AV PID #: 9 294 0
LUC: 112

36-40 ELMWOOD LLC

2 OLIVER STREET

BOSTON MA 02109

Loc: 635 MAIN ST PID #: 9 53 0
LUC: 334

YIRIKIAN REAL ESTATE LLC

641 MAIN STREET

WINCHESTER MA 01890

Loc: 643 MAIN ST PID #: 9 54 0

LUC: 334

TIERNO NICHOLAS REVOCABLE TR
NICHOLAS + JUDITH TIERNO, TRS
29 ARDSMOOR RD

MELROSE MA 02176

Loc: 661 MAIN ST PID #: 9 55 0

LUC: 341

WINCHESTER SAVINGS BANK

661 MAIN STREET

WINCHESTER MA 01890

Loc: 58 VINE ST PID #: 9 98 0

LUC: 101

EVANS KAREN LANZON

58 VINE STREET

WINCHESTER MA 01890

1.0 INTRODUCTION

Aerial photo of subject property (Google Earth Imagery)

On behalf of the Applicant, 654 Main Street LLC, c/o Ad Meliora, and Property Owner, Fells Realty, Inc., Beals Associates, Inc. is filing the enclosed Notice of Intent (NOI) Application and accompanying plans and documents with the Winchester Conservation Commission under the *Massachusetts Wetlands Protection Act* (M.G.L. c.131, s.40), its associated regulations (310 CMR 10.00), and the *Winchester Wetlands Bylaws* (Chapter 13). The proposed project will involve the redevelopment of the three parcels at 648-654 Main Street and 63 Vine Street, which will consist of the construction of a four-story mixed-use building containing approximately 6,200 square feet of commercial space (including basement storage) along Main Street and thirty-six (36) residential units distributed among all four floors of the building. The existing building at 63 Vine Street will be maintained for reconstruction and renovation because it is a historically-registered building. Portions of the proposed project are located within a FEMA 100-Year Floodplain and are considered Bordering Lands Subject to Flooding (BLSF), thus protected under the local and state regulations listed above. There are no other wetland resource areas or associated buffer zones present on site.

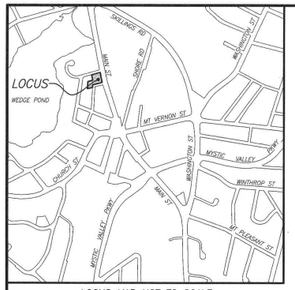
As part of this filing, the Applicants propose to implement erosion control measures, such as inlet protection for all adjacent catch basins and the installation of a silt fence and straw bale or silt sock barrier along the perimeter of the site intended to protect the adjacent land during construction. In order to address flooding issues, a complete Stormwater Management System has been proposed with separate compensatory flood storage for a 100-year storm event. The improved stormwater management system will work to improve the site's existing conditions by providing infiltrative treatment of run-off for the majority of rainfall volume in the annual cycle. The details of the existing and proposed conditions are provided in the *Plans to Accompany Permit Documents for Fells Hardware Redevelopment*, prepared by Beals Associates, Inc., and dated August 18, 2020. Further details of the stormwater management design, compensatory flood storage, and a detailed Operation & Maintenance Manual can be found in the *Stormwater Management Report* (Appendix D) and on the *C3.0 Grading and Drainage Plan – Fells Hardware Redevelopment* of the complete plan set (Appendix C).

2.0 GENERAL SITE DESCRIPTION

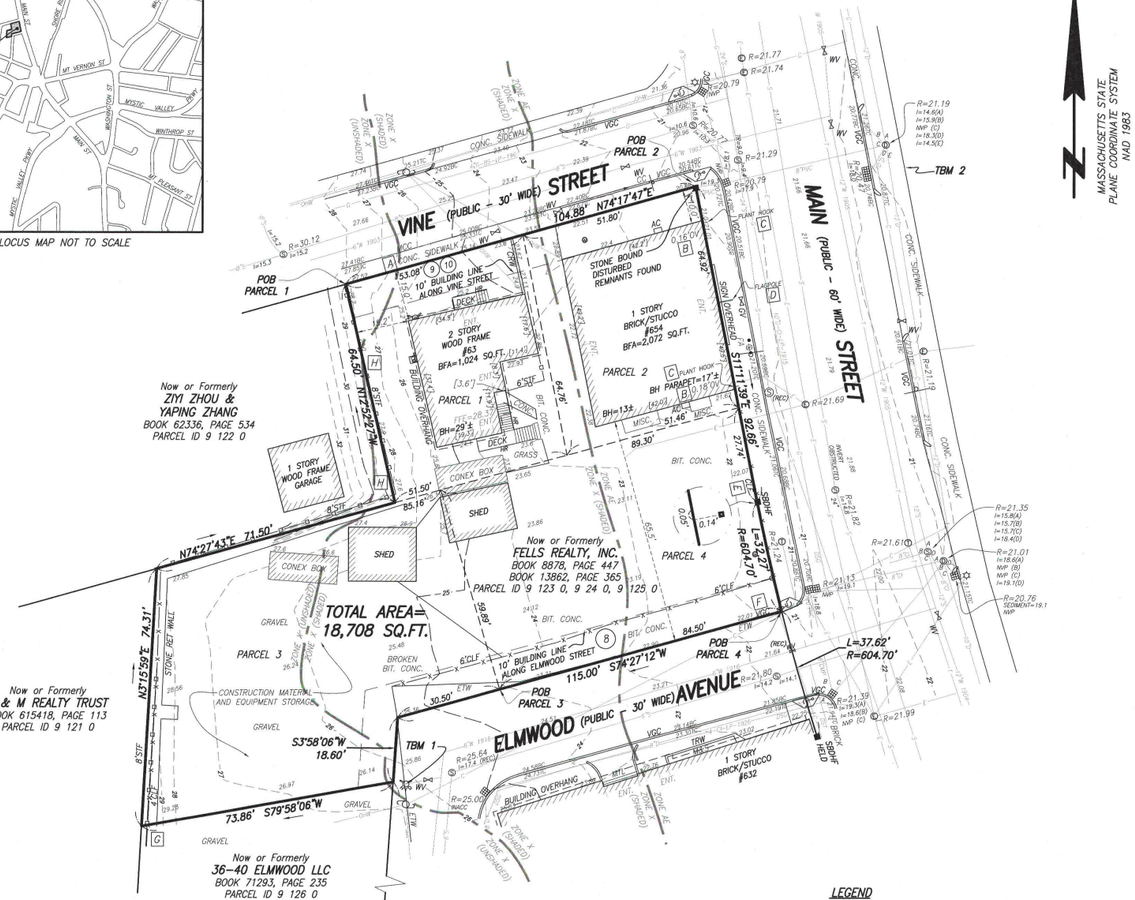
The 18,708 square foot property includes three parcels located west of Main Street and situated between Vine Street to the north and Elmwood Avenue to the south, in close proximity to Wedge Pond in Winchester, Massachusetts. Existing conditions of the property include a retail building, occupied by *Fells True Value Hardware*, with a footprint of 2,072 square feet on the corner of Main Street and Vine Street with associated parking, outdoor storage, two free-standing sheds, and two Conex boxes to the south and extending to the west and southwest along Elmwood Avenue. This parking and storage area is covered almost entirely by an impervious surface and is accessed by vehicles to the west of the retail building via Vine Street and by pedestrians via a fence opening south of the retail building on Main Street. North of the retail building along Vine Street, a grass landscaped area exists. To the east, the retail building abuts a historically-registered, two-story dwelling located at 63 Vine Street with a footprint of 1,024 square feet. This property contains a 15-foot landscaped front and side yard, with grass extending from the rear of the dwelling to the property line, approximately 10-feet. The topography of the entire property can be generally described as level with no significant changes in elevation, ranging from 28-feet in the southwestern corner to 22-feet along the eastern boundary at Main Street. As it exists today, the three parcels are under the same ownership and shall be considered as a single property for the purpose of this application.

Portions of the property include Bordering Lands Subject to Flooding and are located within a FEMA 100-Year Floodplain. This area totals approximately 5,645 square feet and occupies the eastern portion of the site, from Vine Street to Elmwood Avenue along Main Street. Furthermore, the 100-Year Floodplain extends along the eastern and western edges of Main Street abutting the property. The floodplain Is noted as an AE Zone on the FEMA maps with an associated elevation of 23.6.

Additional details regarding the existing conditions are illustrated on the following ALTA plan prepared by Feldman Surveyors in October 2019. The plan shows property lines, property ownership, easements, curb cuts, existing utilities, 2-foot topography, 100-year floodplain, existing plant vegetation, existing structures, and existing pavement. This plan, along with accompanying photographs of the existing conditions provided by Touloukian Touloukian Inc., is also provided in Appendix B.



LOCUS MAP NOT TO SCALE



REFERENCES

MIDDLESEX COUNTY SOUTH REGISTRY OF DEEDS
BOOK 8878 PAGE 447
BOOK 13862 PAGE 365

PLAN NO. 65 OF 1933
PLAN NO. 335 OF 1942
PLAN NO. 438 OF 1954
PLAN NO. 1556 OF 1973
PLAN BOOK 126 PLAN 47

TOWN OF WINCHESTER ENGINEERING DEPARTMENT

PLAN NO. 17-07
PLAN NO. 223
PLAN NO. 583
PLAN NO. 597

TO: _____

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 3, 4, 5, 6(A), 7(A), 7(B)(1), 7(C), 8, 9, 11, 13, 14, 16, 17, 19 AND 20 OF TABLE A THEREOF. THE FIELDWORK WAS COMPLETED ON JUNE 18, 2019.

FELDMAN LAND SURVEYORS

KEVIN ARSENAULT, PLS (MA# 45286) — DATE 10/23/19
KARSENAULT@FELDMANSURVEYORS.COM

LEGEND

(S)	SEWER MANHOLE
(D)	DRAIN MANHOLE
(E)	ELECTRIC MANHOLE
(T)	TELEPHONE MANHOLE
GV	GAS VALVE
WV	WATER VALVE
WSO	WATER SHUT OFF/WATER GATE
GSO	GAS SHUT OFF/GAS GATE
	CATCH BASIN
	UTILITY POLE
	LIGHT POLE
MAIL	MAIL BOX
	SIGN
RD	ROOF DRAIN
	BOUND FOUND
	BOUND FOUND WITH DRILL HOLE
	OBSERVATION WELL
	FLOOD LIGHT
GM	GAS METER
EM	ELECTRIC METER
AC	AIR CONDITIONING UNIT
TR	TRASH RECEPTACLE
	HANDICAP RAMP
—C—	CABLE TELEVISION
—D—	DRAIN
—E—	ELECTRIC
—G—	GAS
—OHW—	OVERHEAD WIRES
—S—	SEWER
—T—	TELEPHONE
—W—	WATER
—CI—	CAST IRON
—PVC—	POLYVINYL CHLORIDE
—X—X—	METAL FENCE
	WOOD FENCE
—DSG—	DIGSAFE GAS
—DST—	DIGSAFE TELEPHONE
	FLOOD ZONE

BC	BOTTOM OF CURB
[X.X']	BUILDING DIMENSION
BFA	BUILDING FOOTPRINT AREA
BH	BUILDING HEIGHT
BIT	BITUMINOUS
CLF	CHAIN LINK FENCE
CONC	CONCRETE
CRW	CONCRETE RETAINING WALL
DH	DRILL HOLE
ENT	ENTRANCE
ETW	EDGE OF TRAVELED WAY
FND	FOUND
I=	INVERT ELEVATION
INACC.	INACCESSIBLE
L=	ARC LENGTH
LST	LANDSCAPE TIMBER
MCC	MONOLITHIC CONCRETE CURB
MTL	METAL
NTS	NOT TO SCALE
NVP	NO VISIBLE PIPES
OV	OVER
POB	POINT OF BEGINNING
R=	RADIUS OR RIM ELEVATION
REC	RECORD
RET	RETAINING
SB	STONE BOUND
SQ. FT.	SQUARE FEET
STF	STOCKADE FENCE
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TR=	CENTERLINE OF TROUGH
VGC	VERTICAL GRANITE CURB

BOUNDARY DESCRIPTIONS PER COMMITMENT NO. 1901850 ISSUED BY COMMONWEALTH LAND TITLE INSURANCE COMPANY HAVING AN EFFECTIVE DATE OF JUNE 20, 2019.

648-654 MAIN STREET, WINCHESTER, MA 01890

TWO CERTAIN PARCELS OF LAND WITH THE BUILDINGS THEREON, SITUATED IN WINCHESTER, MIDDLESEX COUNTY, MASSACHUSETTS, BEING SHOWN AS LOTS A AND B ON PLAN OF LAND, WINCHESTER, MASSACHUSETTS, DATED JANUARY 17, 1933, PARKER HOLBROOK, ENGINEER, RECORDED WITH MIDDLESEX SOUTH DISTRICT DEEDS, BOOK 5708, PAGE 63,

PARCEL 1:

FIRST PARCEL BEING SHOWN AS LOT B ON PLAN OF LAND; WINCHESTER, MASSACHUSETTS, BEING BOUNDED AND DESCRIBED AS FOLLOWS:

NORTHERLY BY VINE STREET, FIFTY-THREE AND 08/100 (53.08) FEET;
EASTERLY BY LOT A AS SHOWN ON SAID PLAN, SIXTY-FOUR AND 76/100 (64.76) FEET;

SOUTHERLY BY LAND NOW OR FORMERLY OF RICHARD A. WHITE, FIFTY-ONE AND 50/100 (51.50) FEET;

WESTERLY BY LAND NOW OR FORMERLY OF EMILY A. SCHOLL, AS SHOWN ON SAID PLAN, SIXTY- FOUR FEET AND 50/100 (64.50) FEET;

CONTAINING 3366 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

SUBJECT TO A BUILDING LINE ESTABLISHED BY THE TOWN OF WINCHESTER BY TAKING A DULY RECORDED WITH SAID DEEDS.

FOR TITLE SEE DEED FROM ELIZABETH S. WILDE TO THE FELLS PLUMBING, HEATING AND BUILDERS' SUPPLIES, INCORPORATED, DATED JUNE 2, 1944, RECORDED WITH MIDDLESEX SOUTH DISTRICT DEEDS, BOOK 6771, PAGE 169.

PARCEL 2:

SECOND PARCEL BEING SHOWN AS LOT A ON PLAN OF LAND, WINCHESTER, MASSACHUSETTS, BEING BOUNDED AND DESCRIBED AS FOLLOWS:

EASTERLY BY MAIN STREET, SIXTY- FOUR AND 92/100 (64.92) FEET;

SOUTHERLY BY LAND NOW OR FORMERLY OF RICHARD A. WHITE, FIFTY-ONE AND 46/100 (51.46)

WESTERLY BY LOT B ON SAID PLAN, SIXTY-FOUR AND 76/100 (64.76) FEET;

NORTHERLY BY VINE STREET, FIFTY-ONE AND 80/100 (51.80) FEET;

CONTAINING 3338 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

SAID PREMISES ARE CONVEYED SUBJECT TO A TEN-FOOT BUILDING LINE OF VINE STREET ESTABLISHED BY A TAKING BY THE TOWN OF WINCHESTER, DULY RECORDED WITH SAID DEEDS.

BEING THE SAME PREMISES CONVEYED TO FELLS REALTY, INC. BY DEED DATED DECEMBER 21, 1956, AND RECORDED WITH THE MIDDLESEX SOUTH REGISTRY OF DEEDS IN BOOK 8878, PAGE 447.

PARCEL 3:

THIRD PARCEL BEING SHOWN AS THE LAND IN WINCHESTER, MIDDLESEX COUNTY, MASSACHUSETTS AND BEING SHOWN AS LOTS 1 AND 2 ON A PLAN OF LOTS, WINCHESTER, MASSACHUSETTS, BELONGING TO PATRICK C. GARDNER, FREDERICK A. EWELL, REG. LAND SURVEYOR, DATED MARCH 6, 1954 AND RECORDED AT SAID DEEDS AT BOOK 8236, PAGE 238. SAID LOTS 1 AND 2 ARE MORE PARTICULARLY BOUNDED AND DESCRIBED AS FOLLOWS:

LOT 1

SOUTHERLY: BY ELMWOOD AVENUE, THIRTY AND 50/100 (30.50) FEET;

EASTERLY: BY ELMWOOD AVENUE, EIGHTEEN AND 60/100 (18.60) FEET;

SOUTHERLY: BY LAND OF COLGATE, AS SHOWN ON SAID PLAN, SEVENTY-THREE AND 86/100 (73.86) FEET;

WESTERLY: BY LAND OF REARDON, AS SHOWN ON SAID PLAN, SEVENTY-FOUR AND 31/100 (74.31) FEET;

NORTHERLY: PARTLY BY LAND OF SCHOLL AND PARTLY BY LAND OF D & R REAL ESTATE COMPANY OF WINCHESTER, INC. AS SHOWN ON SAID PLAN, EIGHTY- FIVE AND 16/100 (85.16) FEET; AND

EASTERLY: BY LOT 2 AS SHOWN ON SAID PLAN, FIFTY-NINE AND 89/100 (59.89) FEET.

SAID LOT 1 CONTAINS 6,800 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

PARCEL 4:

LOT 2

SOUTHERLY: BY ELMWOOD AVENUE, EIGHTY- FOUR AND 50/100 (84.50) FEET;

WESTERLY: BY LOT 1 ON SAID PLAN, FIFTY-NINE AND 89/100 (59.89) FEET;

NORTHERLY: BY D & R REAL ESTATE COMPANY OF WINCHESTER, INC., AS SHOWN ON SAID PLAN, EIGHTY-NINE AND 30/100 (89.30) FEET;

EASTERLY: (24.74) BY MAIN STREET, BY TWO COURSES, TWENTY-SEVEN AND 74/100 FEET AND THIRTY-TWO AND 27/100 (32.27) FEET.

SAID LOT CONTAINS 5,191 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

BEING THE SAME PREMISES CONVEYED TO FELLS REALTY, INC. BY DEED DATED DECEMBER 20, 1979, AND RECORDED WITH THE MIDDLESEX SOUTH REGISTRY OF DEEDS IN BOOK 13862, PAGE 365.

EXCEPTIONS FROM COVERAGE (SURVEY RELATED ONLY) SCHEDULE B, SECTION 2, LISTED IN TITLE COMMITMENT NO. 1901850 ISSUED BY COMMONWEALTH LAND TITLE INSURANCE COMPANY HAVING AN EFFECTIVE DATE OF JUNE 20, 2019

(8) TEN (10) FOOT BUILDING LINE ESTABLISHED ON ELMWOOD AVENUE BY THE TOWN OF WINCHESTER AS SET FORTH IN DEED RECORDED IN BOOK 8236, PAGE 238 AND PAGE 239. (AS SHOWN HEREON)

(9) BUILDING LINE ESTABLISHED BY TOWN AS SET FORTH IN DEED RECORDED IN BOOK 8878 AND PAGE 447. (AS SHOWN HEREON)

(10) 10' BUILDING LINE AS SHOWN ON THE PLAN OF LAND WINCHESTER MA, DATED JANUARY 17, 1933 RECORDED IN AS PLAN NUMBER 65 OF 1933. (AS SHOWN HEREON)

LIST OF VISIBLE ENCROACHMENTS

VINE STREET
[A] CONCRETE SIDEWALK CROSSES PROPERTY LINE
MAIN STREET
[B] BUILDING OVER PROPERTY LINE
[C] 2 PLANT HOOKS CROSS PROPERTY LINE
[D] FLAGPOLE CROSSES PROPERTY LINE
[E] CHAIN LINK FENCE IS OVER PROPERTY LINE
ELMWOOD AVENUE
[F] VERTICAL GRANITE CURB CROSSES PROPERTY LINE
SOUTH ABUTTER
[G] CHAIN LINK FENCE AND STOCKADE FENCE CROSS PROPERTY LINE
WEST ABUTTER
[H] STOCKADE FENCE CROSSES PROPERTY LINE IN 2 PLACES

NOTES:

1) BENCH MARK INFORMATION:

TEMPORARY BENCH MARKS SET:

TBM-1: XCUT ON RIGHT FRONT BONNET BOLT OVER MAIN OUTLET ON HYDRANT ON ELMWOOD AVENUE, AS SHOWN HEREON. ELEV.=28.79'

TBM-2: LEFT OUTER CORNER OF SIGN BASE AT MOBIL GAS STATION ACROSS FROM LOCUS PARCEL, AS SHOWN HEREON. ELEV.=21.66''

2) ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 AND WERE ESTABLISHED BY RTK GPS OBSERVATIONS.

3) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

4) BY GRAPHIC PLOTTING ONLY, THE PARCEL SHOWN HEREON LIES WITHIN A ZONE AE, A SPECIAL FLOOD HAZARD AREA SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD, ZONE "X" (SHADED), AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREA 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, AND ZONE X (UNSHADED), AREAS OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD, AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (F.E.M.A) FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR MIDDLESEX COUNTY, MASSACHUSETTS, MAP NUMBER 25017C0409E, TOWN OF WINCHESTER COMMUNITY NUMBER 250228, PANEL NUMBER 0409E, HAVING AN EFFECTIVE DATE OF JUNE 4, 2010.

5) ZONING INFORMATION WAS NOT PROVIDED BY THE TITLE INSURER AS REQUIRED BY ITEM 6 (A OR B) OF TABLE "A" IN THE 2016 ALTA SURVEY REQUIREMENTS.

6) THE PROPERTY SHOWN HEREON IS THE SAME PROPERTY DESCRIBED IN THE TITLE COMMITMENT.

7) BUILDING HEIGHT SHOWN HEREON IS CALCULATED FROM THE MEAN GRADE OF THE EXISTING GROUND LEVEL ADJOINING THE BUILDING AT EACH EXTERIOR WALL TO THE HIGHEST POINT ON THE ROOF.

8) UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. WE CANNOT ASSUME RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES THAT ARE OMITTED OR INACCURATELY SHOWN ON SAID RECORD PLANS, SINCE SUBSURFACE UTILITIES CANNOT BE VISIBLY VERIFIED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUBSURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO EXCAVATION.

9) THERE WAS NO OBSERVED EVIDENCE OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS.

10) TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO PROPOSED CHANGES IN STREET RIGHT OF WAY LINES.

11) THERE WERE NO PAINTED PARKING SPACES OBSERVED ON SUBJECT PROPERTY.

ALTA/NSPS LAND TITLE SURVEY
648-654 MAIN STREET
63 VINE STREET
WINCHESTER, MASS.

FELDMAN LAND SURVEYORS
152 HAMPDEN STREET
BOSTON, MASS. 02119

JUNE 26, 2018
PHONE: (617)357-9740
www.feldmansurveyors.com

FELDMAN LAND SURVEYORS

20 0 10 20 40 80
SCALE: 1"=20'

RESEARCH KDA	FIELD CHIEF SW	PROJ MGR SMD	APPROVED	SHEET NO. 1 OF 1
CALC KDA	CADD SC	FIELD CHECKED SC	CRD FILE 16805	JOB NO. 16805

FILENAME: S:\PROJECTS\16800s\16805\DWG\16805-ALTA-C3D.dwg

2.1 SOILS

The NRCS Soil Survey for Middlesex County identifies the entire site as Charlton-Urban land-Hollis complex with 3% to 15% slopes and a rocky characteristic. Of the entire soil composition, 45% are Charlton soils (Hydrologic Soil Group A), which can be described as a well-drained, fine to gravelly sandy loam soil with a depth to restrictive feature and water table of more than 80 inches. These soils typically do not have a frequency of flooding or ponding and have a moderate available water storage at about 7.3 inches.

Approximately 35% of the remaining soil composition is comprised of Urban Land. Urban Land soils are the result of excavated and filled land and primarily found in previously developed sites.

The remaining 20% of the soil composition is comprised of 10% Hollis soils and 10% minor components. Hollis soils (Hydrologic Souls Group D) can be described as a well-drained, fine sandy loam soil with unweathered bedrock at about 14 – 18 inches below grade. These soils have a depth to restrictive feature of 8 – 20 inches to lithic bedrock and a depth to water table of more than 80 inches with a very low available water table at about 2 inches.

A complete NRCS Soil Survey and associated Soil Survey Map is provided in the *Stormwater Management Report* in Appendix D.

2.2 NATURAL RESOURCE AREAS

WETLANDS

The property does not contain, or abut, any Department of Environmental Protection (DEP) Bordering Vegetated Wetlands or wetland resource areas. Similarly, the property does not contain any associated resource area buffer zones.

NATURAL HERITAGE AREAS

According to the *Massachusetts Natural Heritage Atlas* (2017), there are no areas of Estimated Habitats or Priority Habitats of Rare or Endangered Species present on the site. Additionally, there are no Certified Vernal Pools, Potential Vernal Pools, or Areas of Critical Environmental Concern located on or proximate to the site (Appendix A).

FLOOD PLAINS

According to the June 4, 2010 FEMA Flood Insurance Rate Map (FEMA FIRM) for Middlesex County (Map Number: 25017C0409E) (Appendix A) and described in detail below in *Section 3.0* of this application, portions of the property are located within a 100-Year Floodplain. Portions that lie below elevation 23.6 are considered to be within this area.

3.0 BORDERING LANDS SUBJECT TO FLOODING

Approximately 5,645 square feet of the property along the eastern portion of this site, from Vine Street to Elmwood Avenue at Main Street is within a FEMA 100-Year Floodplain and thus characterized as Bordering Lands Subject to Flooding. This floodplain extends further to the east, along the eastern edge and western edges of Main Street, as confirmed by the June 4, 2010 FEMA FIRM for Middlesex County, Massachusetts (Map Number: 25017C0409E) (Appendix A) and is characterized as Zone AE with a base flood elevation of 23-feet and a 1% annual chance of flooding. Directly to the west of Zone AE, a portion of the site is located within Zone X (shaded), which has a 0.2% annual chance of flooding.

FEMA FIRM Map: 25017C0409E (6/4/2010) showing the subject property and surrounding area in Winchester, MA

While Bordering Lands Subject to Flooding are not defined in the *Winchester Wetlands Bylaws,* according to the *Wetlands Protection Act Regulations* [310 CMR 10.57 2(a)], a Bordering Land Subject to Flooding is defined as:

> An area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds or lakes. It extends from the banks of these waterways and water bodies.

In order to mitigate the potential issues caused by developing and building upon lands that are subject to flooding, the Applicant has proposed various erosion control measures during and after construction, as well as a complete Stormwater Management System that separate compensatory flood storage. Detailed information regarding the proposed erosion control measures and stormwater management design can be found in *Section 5.0* of this application and Appendix C.

4.0 PROPOSED CONSTRUCTION ACTIVITIES

4.1 MIXED-USE DEVELOPMENT

The Applicant proposes to raze the existing building on the corner of Main Street and Vine Street, currently occupied by Fells True Value Hardware, and construct a four-story mixed-use building. The constructed building will have a footprint of approximately 12,000 square feet and will be located on the 648-654 Main Street parcels. It will consist of two (2) ground level commercial spaces with a total of approximately 6,168 net square feet, and thirty-six (36) residential dwelling units distributed among all four floors with a total of approximately 31,252 net square feet of rentable residential living space. Other building features include central amenity spaces adjacent to the courtyard and basement garage parking featuring forty-one (41) parking spaces accessible by two automated car lifts, with an ingress and egress on Elmwood Avenue.

The interior courtyard, located centrally to the parcel, will contain a detention system with a primary and secondary overflow drain. This area will be covered by special pavers and compensatory storage overflow grids, and will feature trees in raised planters per the landscaping plan (C2.1 *Landscape Plan* of the *Plans to Accompany Permit Documents for Fells Hardware Redevelopment*). Similarly, infiltrations systems will be installed north of the building along Vine Street and encompassing the southwestern corners of the building, and will be covered by special pavers and other landscaping features, such as trees and planters.

The proposed commercial spaces are situated facing Main Street and are located within the FEMA 100-Year Floodplain and on Bordering Lands Subject to Flooding. The finished floor of these spaces will be raised above the sidewalk elevation in order to elevate it from the flood plain and to provide compensatory flood storage within the site.

4.2 63 VINE STREET

The existing building located at 63 Vine Street, the Tenney – Swan House, is a historically-registered building and will be maintained for reconstruction and renovation during the overall redevelopment. The building will be slightly relocated during construction to be parallel to Vine Street at the northwestern corner of the property, acting as a buffer between the mixed-use building, courtyard, and the residential neighborhood along Vine Street. Following the relocation, the building will remain outside of the FEMA 100-Year Floodplain. The newly renovated building will serve as a proposed amenity space for the mixed-use building.

5.0 MITIGATION MEASURES

The Applicants intent to implement erosion control measures and install a complete stormwater management system to improve the existing site conditions. A description of each mitigating measure is provided below.

5.1 EROSION AND SEDIMENTATION CONTROL

The Erosion and Sedimentation Control Plan was prepared by Beals Associates, Inc. and is sheet C5.0 of the *Plans to Accompany Permit Documents for Fells Hardware Redevelopment* in Appendix C. The erosion control program will be implemented to protect the abutting areas and flood plain from sedimentation run-off during construction activities. All existing catch basins adjacent to the property on Vine Street, Main Street, and Elmwood Avenue will be retrofitted with inlet protection and will be maintained throughout the construction process by monitoring and cleaning when necessary. A silt fence and straw bale or silt sock barrier will be installed along the perimeter of the property at Vine Street, Main Street, and Elmwood Avenue to mitigate any potential sedimentation run-off from exiting the site and entering the abutting properties and streets. Once all subsurface detention and infiltration systems are installed onsite, no stormwater will be discharged to them until the tributary areas are stabilized. In addition, no staging or stockpiling of materials may occur above the location of the stormwater management systems. Additionally, the contractor will sweep all abutting areas on Vine Street, Main Street, and Elmwood Avenue as needed to control the tracking of mud and debris.

5.2 STORMWATER MANAGEMENT

The Stormwater Management Plan was prepared by Beals Associates, Inc. and is part of the *Grading and Drainage Plan*, which is sheet C3.0 of the *Plans to Accompany Permit Documents for Fells Hardware Redevelopment* in Appendix C. The overall design prioritizes infiltration with the installation of a detention system under the interior courtyard. Stormwater is detained within the detention system before stormwater is slowly released into the infiltration systems. The entire Stormwater Management System has been designed to meet or exceed all of the Standards set forth in the Massachusetts Department of Environmental Protection Stormwater Handbook and Standards. All of the stormwater management features have been designed to be entirely separate from the compensatory flood storage described in *Section 5.*3. The stormwater management system will infiltrate stormwater up to, and including, the 25-year storm event.

In addition to the Stormwater Management Plan, a detailed Stormwater Operation and Maintenance Manual has been included with the Stormwater Management Report, and is provided in Appendix D.

5.3 COMPENSATORY FLOOD STORAGE

The proposed project will include compensatory flood storage to offset the loss of existing flood storage within the Land Subject to Flooding onsite as defined previously. Appendix D contains calculations for the existing flood storage onsite, the proposed flood storage onsite and the incremental volume comparisons. An analysis of the proposed openings along Vine Street has also been provided to ensure that there is an unrestricted hydraulic connection between the floodplain and the compensatory storage volume and that flood waters will be able to flow freely to and from the provided storage area.

The proposed storage area will be located between sections of the building, above the underground garage roof and below the first-floor slab. This storage volume is separate and distinct from all stormwater management systems that are designed only to collect, treat and dispose of surface run-off. By maintaining a separate and distinct compensatory flood storage volume, the effectiveness of the system will not be diminished by larger storm events from onsite surface or rooftop run-off.

6.0 SUMMARY

On behalf of the Applicant, 654 Main Street LLC, c/o Ad Meliora, and the property owner, Fells Realty, Inc., Beals Associates, Inc. is filing the enclosed NOI Application and accompanying plans and documents with the Winchester Conservation Commission to construct a four-story mixed-use building comprised of commercial space and residential dwelling units, as well as reconstruct and renovate the existing, historically-registered building at 63 Vine Street. Portions of the proposed activities are located within a FEMA 100-Year Floodplain and are subject to the jurisdiction of the *Massachusetts Wetlands Protection Act*, its associated regulations, and the *Winchester Wetlands Bylaw.*

A subsurface detention system will be installed central to the property within the interior courtyard of the building, with infiltration systems being installed to the rear of the property adjacent to Elmwood Avenue and north of the building on Vine Street. These proposed systems will infiltrate stormwater run-off in areas across the site within and adjacent to the Bordering Lands Subject to Flooding. Additionally, erosion control measures are proposed to protect the abutting areas and flood plain during construction.

Compensatory flood storage will be provided that will exceed the incremental volumes that currently exist on the site. The redevelopment of the property will result in the existing area within the Land Subject to Flooding being filled, and the compensatory volumes will be created to offset the loss of existing volume.

The proposed project, including all proposed mitigating measures, meets all performance standards as detailed in the *Massachusetts Wetlands Protection Act*, its associated regulations, and the *Winchester Wetlands Bylaw.* As a result, the Applicant requests that the Commission issue an Order of Conditions approving the project presented within this NOI Application.

LITERATURE CITED

Custom Soil Resource Report for Middlesex County, Massachusetts. United States Department of Agriculture, Natural Resources Conservation Service. July 28, 2020.

Massachusetts Natural Heritage and Endangered Species Program Atlas of Estimated Habitat of State-listed Rare Wetlands Wildlife. Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, Route 135, Westborough, MA 01581, www.mass.gov/orgs/masswildlifes-natural-heritage-endangered-species-program

Massachusetts Wetlands Protection Act (M.G.L. c. 131, s. 40), www.state.ma.us/dep

Massachusetts Wetlands Protection Regulations (310 CMR 10.00), www.state.ma.us/dep

National Flood Insurance Program, Federal Emergency Management Agency Flood Insurance Rate Map (Map Number: 25017C0409E), Middlesex County, Massachusetts, June 4, 2010.

Winchester Conservation Commission, *Town of Winchester Wetlands Bylaw* (Chapter 13, the *Bylaw*). Town of Winchester, Massachusetts

APPENDIX A: FIGURES

REFERENCES:
PROPERTY LINE INFORMATION OBTAINED FROM MASS GIS. AERIAL PHOTOGRAPHY OBTAINED FROM GOOGLE IMAGERY.

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654 Main Street LLC.

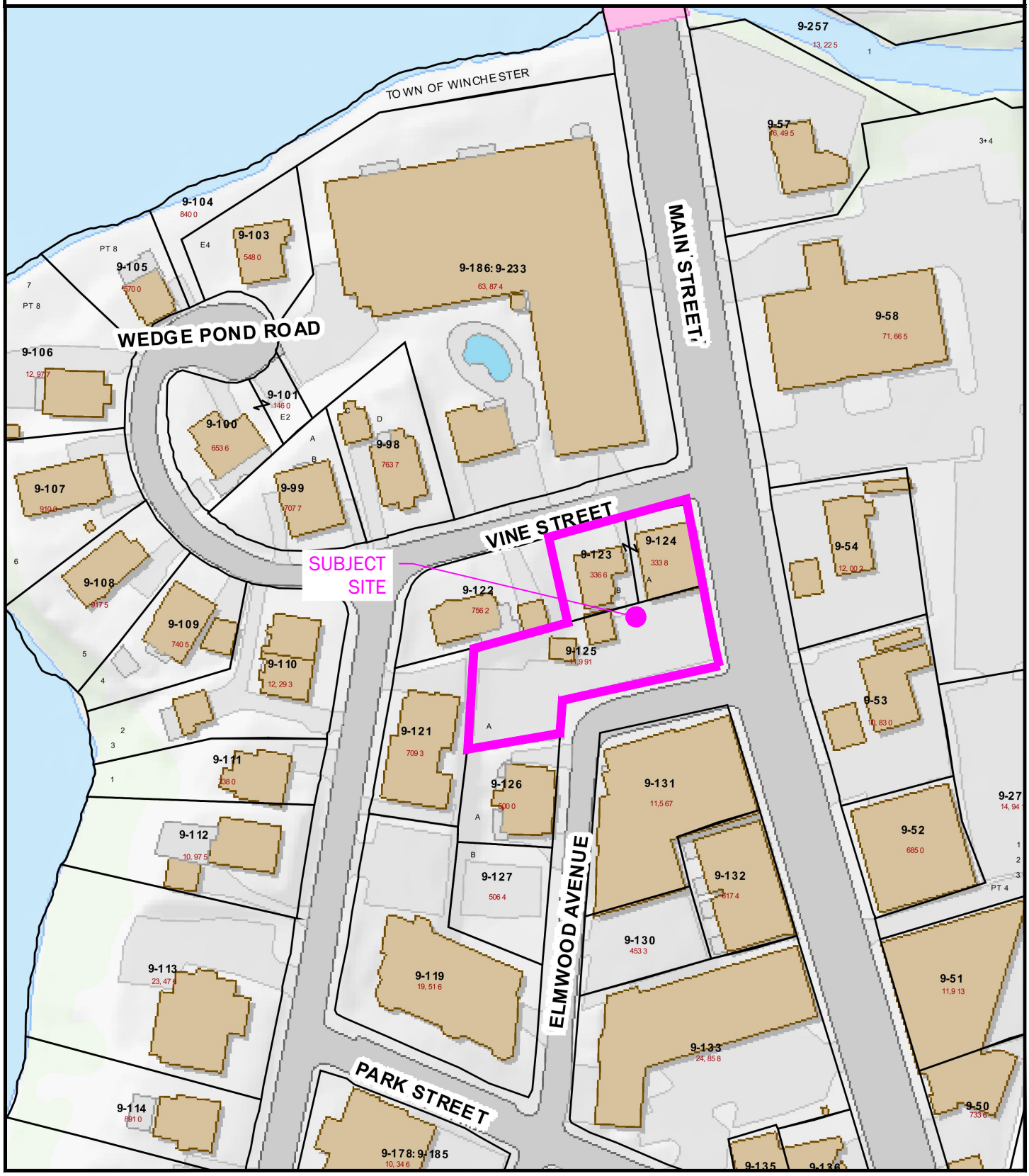
Aerial Photo

Winchester
Massachusetts

Figure 1
August 2020

SCALE: 1"=100'
0 50 100

REFERENCES:
PROPERTY LINE INFORMATION OBTAINED FROM MASS GIS. TAX MAP OBTAINED FROM TOWN OF WINCHESTER ASSESSOR'S DATABASE



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654 Main Street LLC.

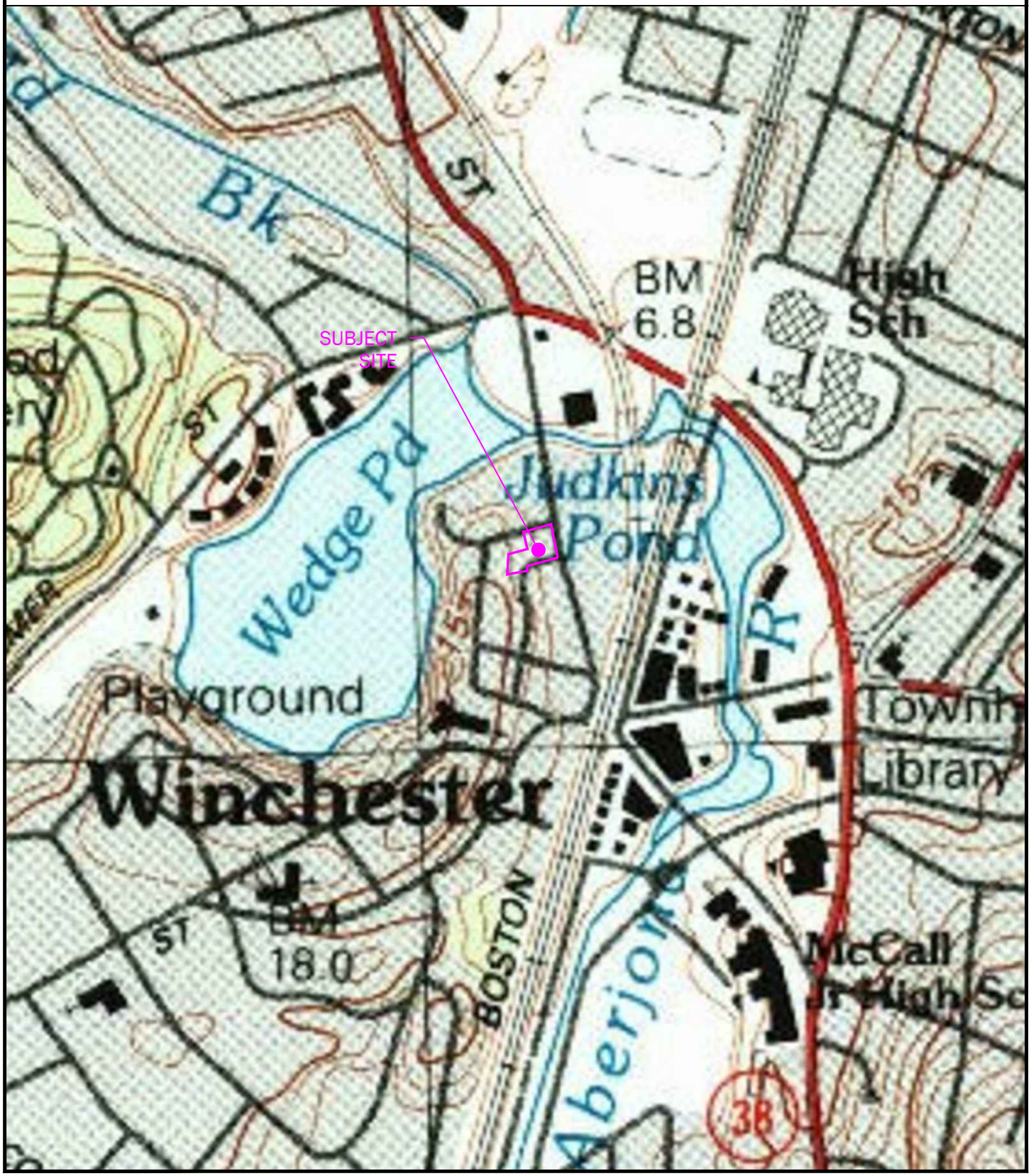
Tax Map

Winchester
Massachusetts

Figure 2
August 2020

SCALE: 1"=100'
50 100

REFERENCES: PROPERTY LINE INFORMATION WAS OBTAINED FROM MASS GIS. USGS MAP WAS OBTAINED FROM USGS BOSTON NORTH MASSACHUSETTS TOPOGRAPHIC MAP DATED 1985.



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654 Main Street LLC.

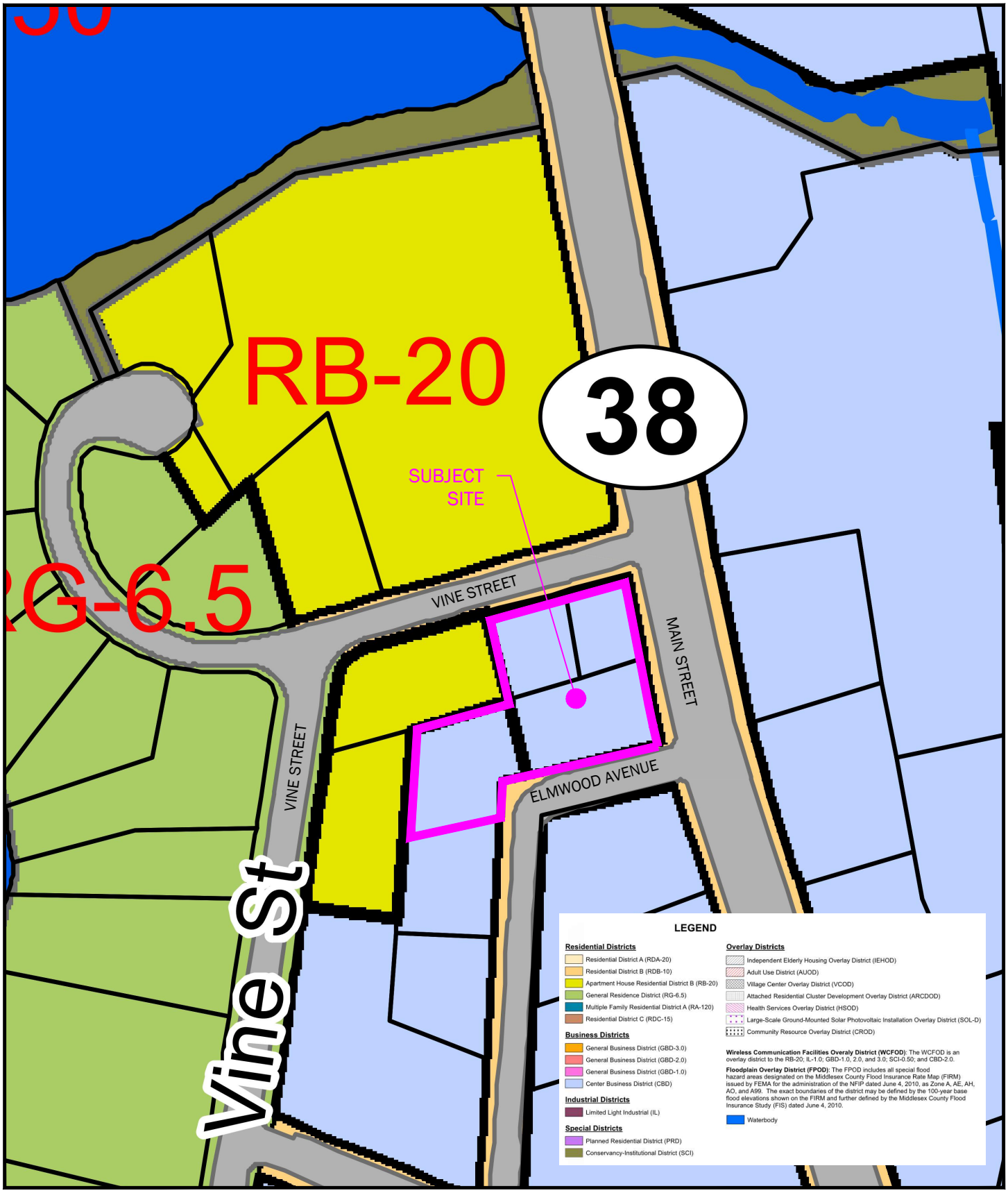
USGS Map

Winchester
Massachusetts

Figure 3
August 2020

SCALE: 1"=500'
0 250 500

REFERENCES:
PROPERTY LINE INFORMATION OBTAINED FROM MASS GIS. ZONING MAP WAS OBTAINED FROM TOWN OF WINCHESTER MAPSONLINE



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654 Main Street LLC.

Zoning Map

Winchester
Massachusetts

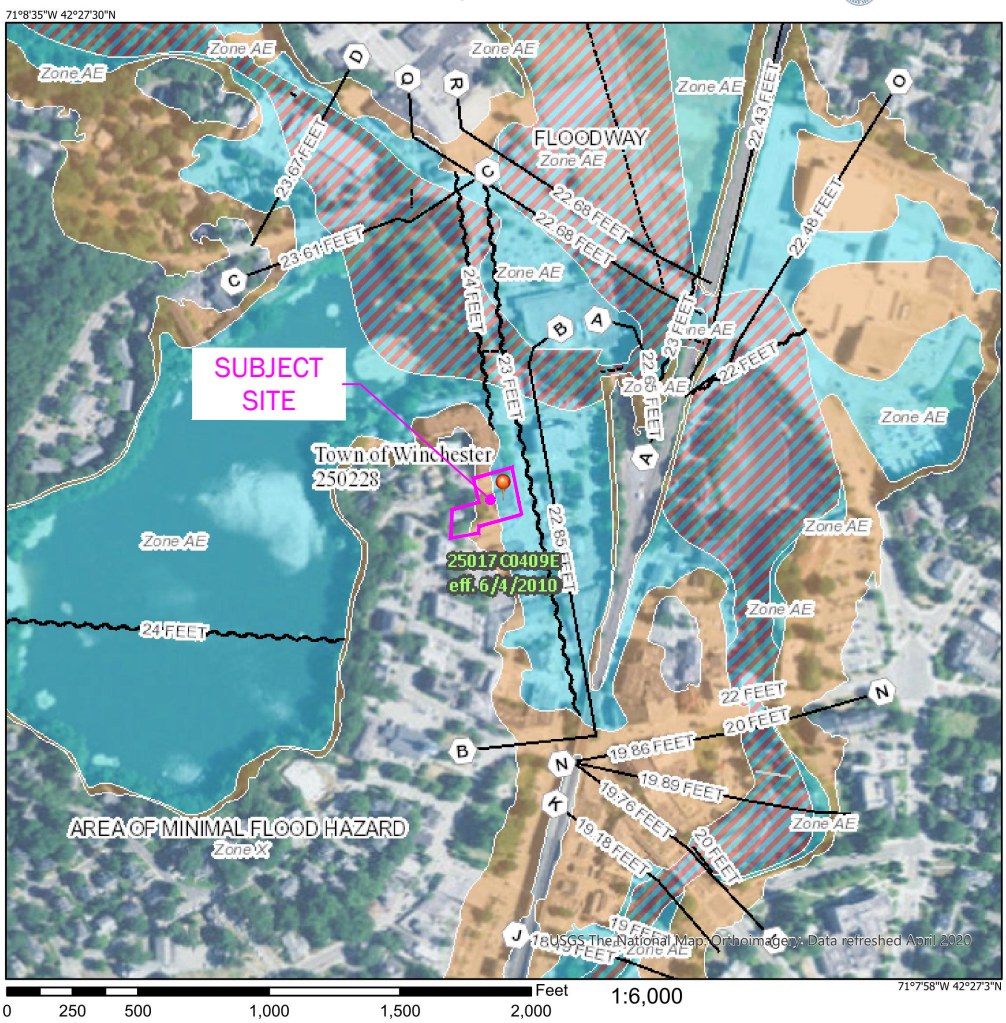
Figure 4
August 2020

SCALE: 1"=100'
0 50 100

REFERENCES:
PROPERTY LINE INFORMATION OBTAINED FROM MASS GIS. FEMA WAS OBTAINED FROM FEMA FLOOD MAP SERVICE CENTER.

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/18/2020 at 11:20 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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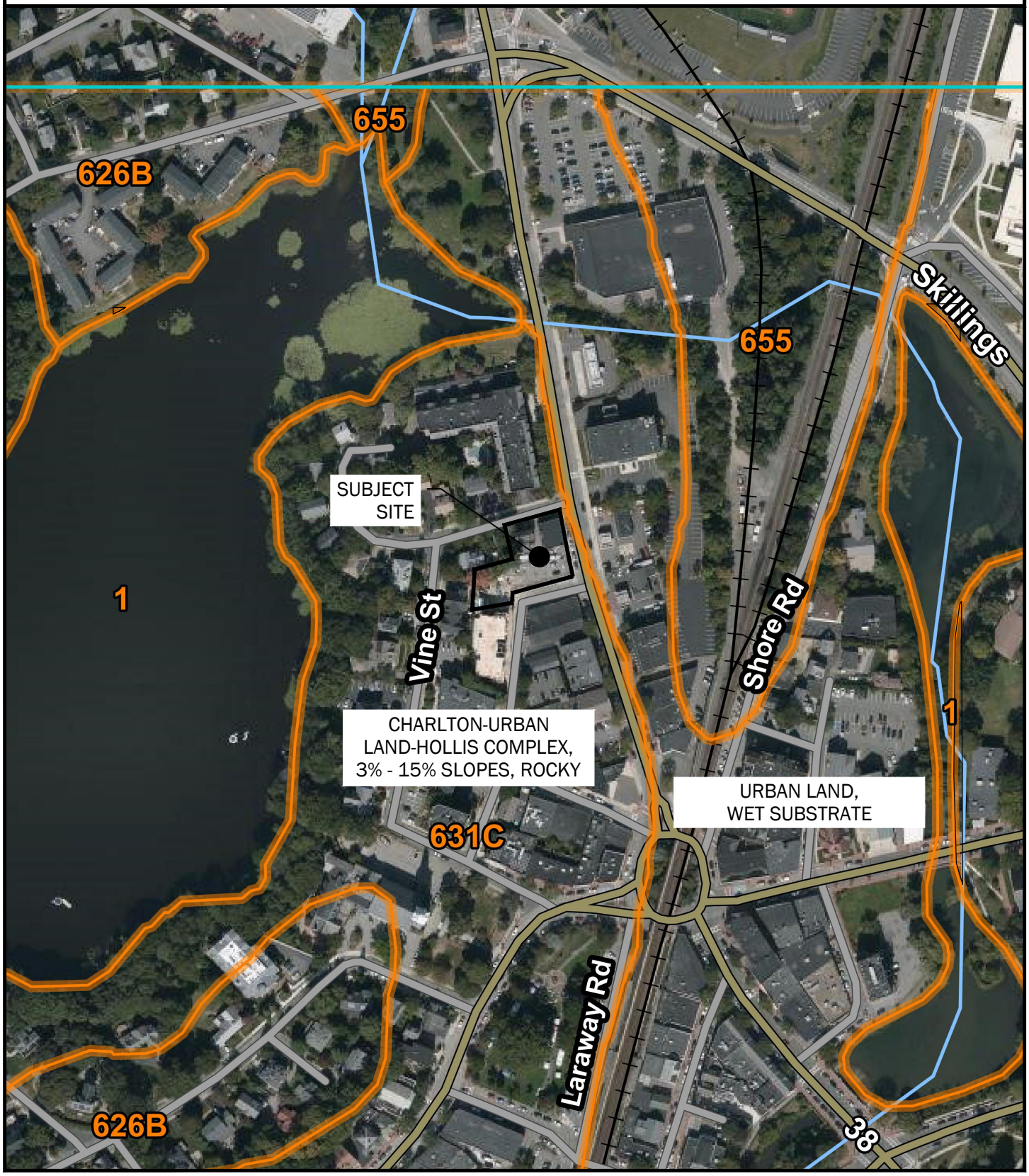
FEMA Map

Winchester
Massachusetts

Figure 5
August 2020

SCALE: AS NOTED

REFERENCES:
PROPERTY LINE INFORMATION WAS OBTAINED FROM MASS GIS. SOIL MAP AND MAP UNITS WERE OBTAINED FROM NRCS WEB SOIL SURVEY.



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654 Main Street LLC.

NorthBridge Partners, LLC
101 Salem Street, Suite 101
Wakefield, MA 01880

NCRS Map

Winchester
Massachusetts

Figure 6
August 2020

SCALE: 1"=250'
0 125 250

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	27.4	19.2%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	6.6	4.6%
602	Urban land	5.4	3.8%
603	Urban land, wet substratum	43.1	30.2%
622C	Paxton-Urban land complex, 3 to 15 percent slopes	1.1	0.7%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	12.6	8.9%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	11.5	8.0%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	24.7	17.3%
655	Udorthents, wet substratum	10.0	7.0%
656	Udorthents-Urban land complex	0.4	0.3%
Totals for Area of Interest		**142.7**	**100.0%**

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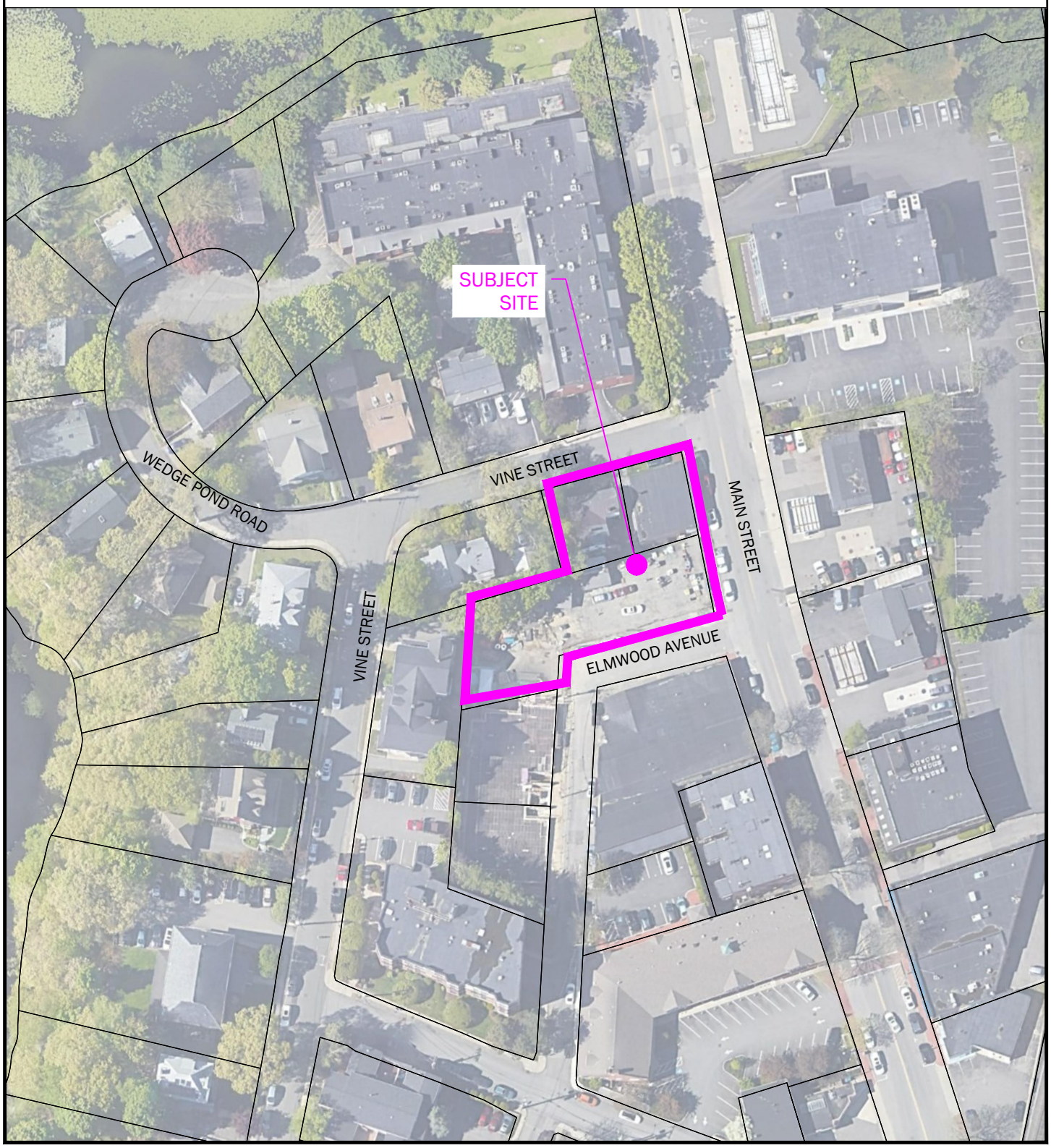
654 Main Street LLC.

NRCS Map Legend

Winchester
Massachusetts

Figure 6A
August 2020

REFERENCES:
PROPERTY LINE INFORMATION AND AERIAL PHOTOGRAPH WERE OBTAINED FROM MASSGIS.
NOTE:
THERE ARE NO NHESP PRIORITY HABITATS OF RARE SPECIES, ESTIMATED HABITATS OF RARE WILDLIFE, CERTIFIED VERNAL POOL LOCATIONS, NOR POTENTIAL VERNAL POOL LOCATIONS WITHIN THE PROJECT VICINITY.



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BEALS · ASSOCIATES INC.
2 PARK PLAZA SUITE 200 BOSTON, MA 02116
PHONE: 617-242-1120
•PLANNING •ENGINEERING •PERMITTING •MANAGEMENT

654 Main Street LLC.

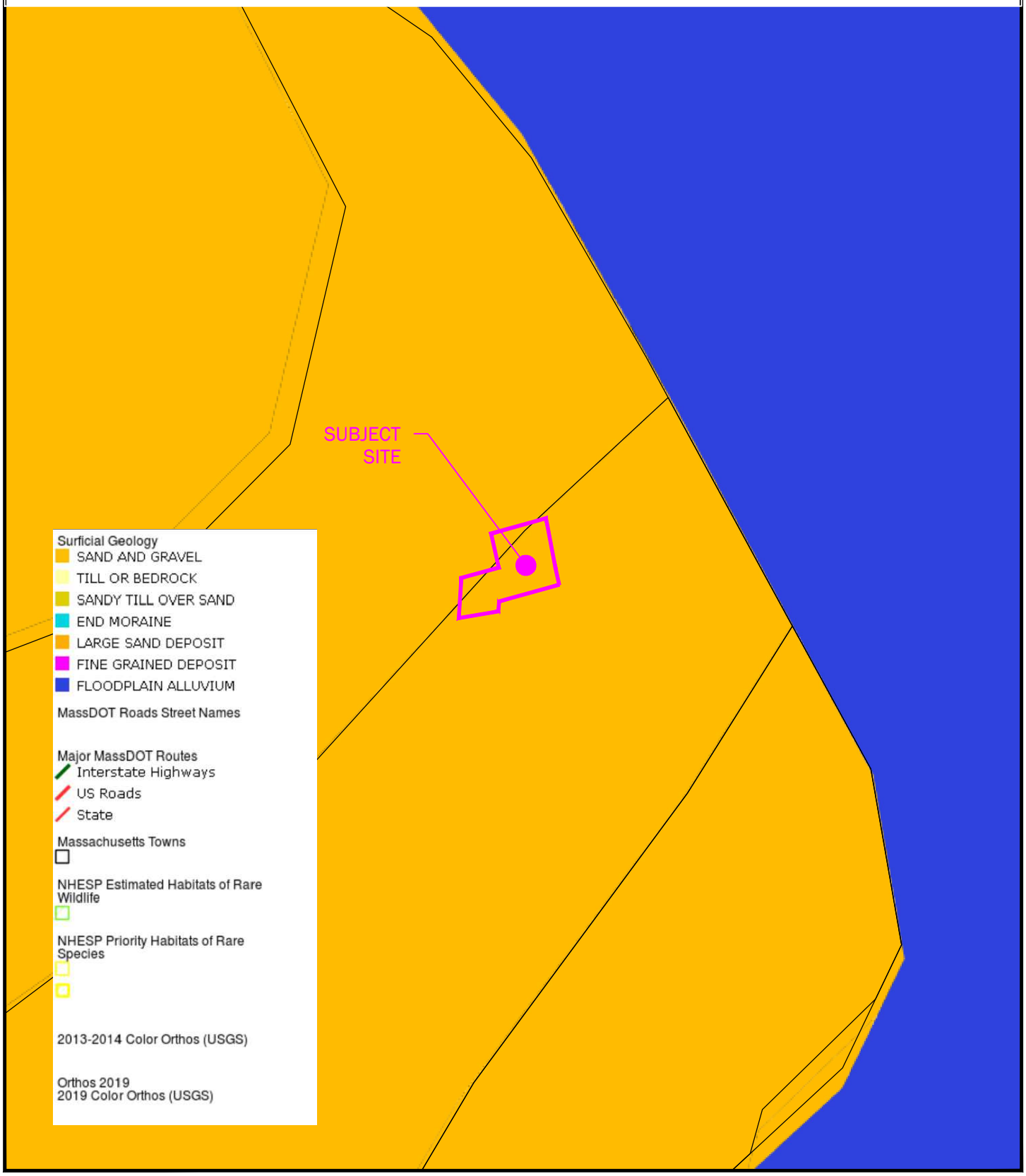
NHESP Map

Winchester
Massachusetts

Figure 7
August 2020

SCALE: 1"=100'
0 50 100

REFERENCES:
PROPERTY LINE INFORMATION WAS OBTAINED FROM MASS GIS. SURFICIAL GEOLOGY INFORMATION WAS OBTAINED FROM MASS GIS SURFICIAL GEOLOGIC MAP



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654 Main Street LLC.

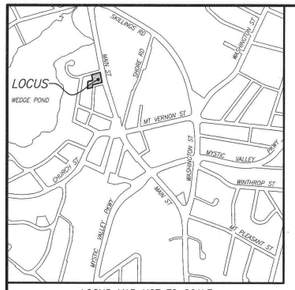
Surficial Geology

Winchester
Massachusetts

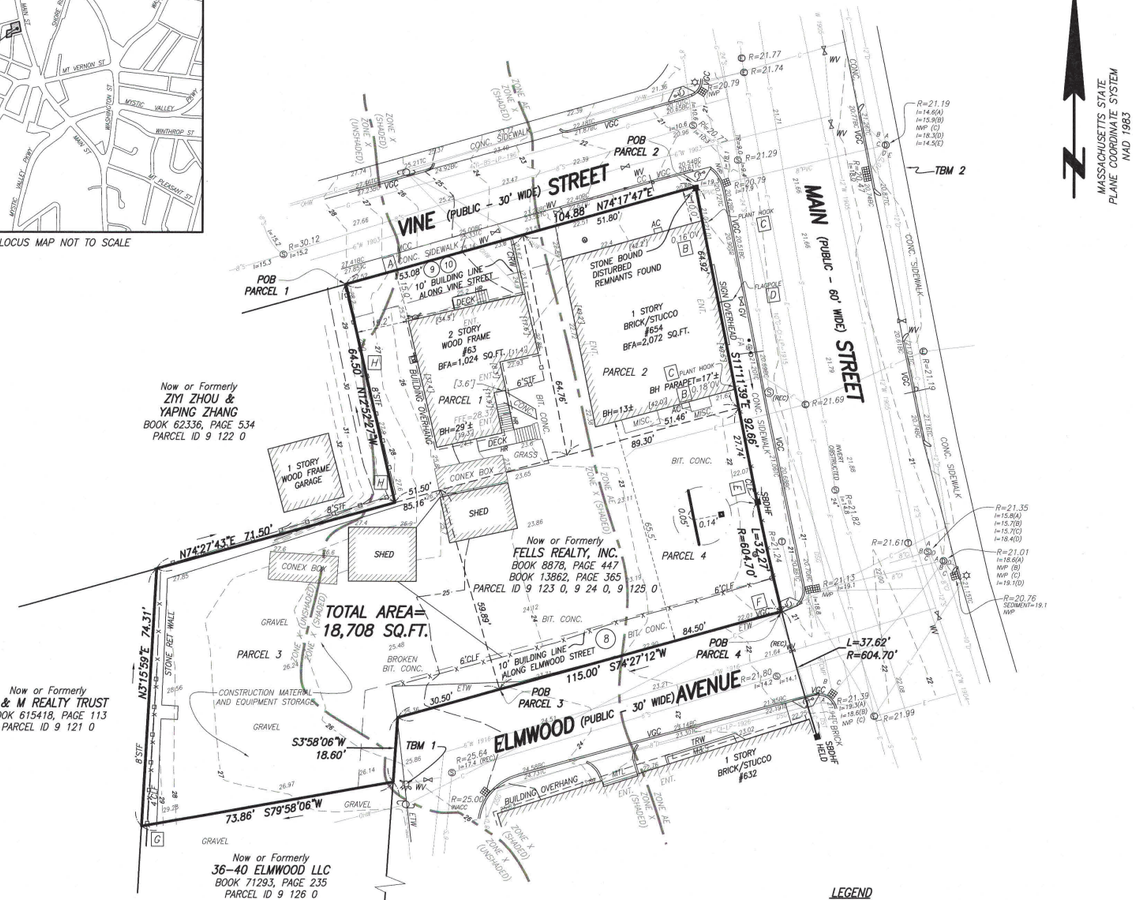
Figure 8
AUGUST 2020

SCALE: 1"=250'
0 125 250

APPENDIX B: EXISTING CONDITIONS AND SITE PHOTOGRAPHS



LOCUS MAP NOT TO SCALE



REFERENCES

MIDDLESEX COUNTY SOUTH REGISTRY OF DEEDS
BOOK 8878 PAGE 447
BOOK 13862 PAGE 365

PLAN NO. 65 OF 1933
PLAN NO. 335 OF 1942
PLAN NO. 438 OF 1954
PLAN NO. 1556 OF 1973
PLAN BOOK 126 PLAN 47

TOWN OF WINCHESTER ENGINEERING DEPARTMENT

PLAN NO. 17-07
PLAN NO. 223
PLAN NO. 583
PLAN NO. 597

TO: _____

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2016 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 3, 4, 5, 6(A), 7(A), 7(B)(1), 7(C), 8, 9, 11, 13, 14, 16, 17, 19 AND 20 OF TABLE A THEREOF. THE FIELDWORK WAS COMPLETED ON JUNE 18, 2019.

FELDMAN LAND SURVEYORS

KEVIN ARSENAULT, PLS (MA# 45286) — DATE 10/23/19
KARSENAULT@FELDMANSURVEYORS.COM

LEGEND

(S)	SEWER MANHOLE
(D)	DRAIN MANHOLE
(E)	ELECTRIC MANHOLE
(T)	TELEPHONE MANHOLE
GV	GAS VALVE
WV	WATER VALVE
WSO	WATER SHUT OFF/WATER GATE
GSO	GAS SHUT OFF/GAS GATE
	CATCH BASIN
	UTILITY POLE
	LIGHT POLE
MAIL	MAIL BOX
	SIGN
RD	ROOF DRAIN
	BOUND FOUND
	BOUND FOUND WITH DRILL HOLE
	OBSERVATION WELL
	FLOOD LIGHT
GM	GAS METER
EM	ELECTRIC METER
AC	AIR CONDITIONING UNIT
TR	TRASH RECEPTACLE
	HANDICAP RAMP
—C—	CABLE TELEVISION
—D—	DRAIN
—E—	ELECTRIC
—G—	GAS
—OHW—	OVERHEAD WIRES
—S—	SEWER
—T—	TELEPHONE
—W—	WATER
—CI—	CAST IRON
—PVC—	POLYVINYL CHLORIDE
—X—X—	METAL FENCE
	WOOD FENCE
—DSG—	DIGSAFE GAS
—DST—	DIGSAFE TELEPHONE
	FLOOD ZONE

BC	BOTTOM OF CURB
[X.X']	BUILDING DIMENSION
BFA	BUILDING FOOTPRINT AREA
BH	BUILDING HEIGHT
BIT	BITUMINOUS
CLF	CHAIN LINK FENCE
CONC	CONCRETE
CRW	CONCRETE RETAINING WALL
DH	DRILL HOLE
ENT	ENTRANCE
ETW	EDGE OF TRAVELED WAY
FND	FOUND
I=	INVERT ELEVATION
INACC.	INACCESSIBLE
L=	ARC LENGTH
LST	LANDSCAPE TIMBER
MCC	MONOLITHIC CONCRETE CURB
MTL	METAL
NTS	NOT TO SCALE
NVP	NO VISIBLE PIPES
OV	OVER
POB	POINT OF BEGINNING
R=	RADIUS OR RIM ELEVATION
REC	RECORD
RET	RETAINING
SB	STONE BOUND
SQ. FT.	SQUARE FEET
STF	STOCKADE FENCE
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TR=	CENTERLINE OF TROUGH
VGC	VERTICAL GRANITE CURB

BOUNDARY DESCRIPTIONS PER COMMITMENT NO. 1901850 ISSUED BY COMMONWEALTH LAND TITLE INSURANCE COMPANY HAVING AN EFFECTIVE DATE OF JUNE 20, 2019.

648-654 MAIN STREET, WINCHESTER, MA 01890

TWO CERTAIN PARCELS OF LAND WITH THE BUILDINGS THEREON, SITUATED IN WINCHESTER, MIDDLESEX COUNTY, MASSACHUSETTS, BEING SHOWN AS LOTS A AND B ON PLAN OF LAND, WINCHESTER, MASSACHUSETTS, DATED JANUARY 17, 1933, PARKER HOLBROOK, ENGINEER, RECORDED WITH MIDDLESEX SOUTH DISTRICT DEEDS, BOOK 5708, PAGE 63,

PARCEL 1:

FIRST PARCEL BEING SHOWN AS LOT B ON PLAN OF LAND; WINCHESTER, MASSACHUSETTS, BEING BOUNDED AND DESCRIBED AS FOLLOWS:

NORTHERLY BY VINE STREET, FIFTY-THREE AND 08/100 (53.08) FEET;
EASTERLY BY LOT A AS SHOWN ON SAID PLAN, SIXTY-FOUR AND 76/100 (64.76) FEET;

SOUTHERLY BY LAND NOW OR FORMERLY OF RICHARD A. WHITE, FIFTY-ONE AND 50/100 (51.50) FEET;

WESTERLY BY LAND NOW OR FORMERLY OF EMILY A. SCHOLL, AS SHOWN ON SAID PLAN, SIXTY- FOUR FEET AND 50/100 (64.50) FEET;

CONTAINING 3366 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

SUBJECT TO A BUILDING LINE ESTABLISHED BY THE TOWN OF WINCHESTER BY TAKING A DULY RECORDED WITH SAID DEEDS.

FOR TITLE SEE DEED FROM ELIZABETH S. WILDE TO THE FELLS PLUMBING, HEATING AND BUILDERS' SUPPLIES, INCORPORATED, DATED JUNE 2, 1944, RECORDED WITH MIDDLESEX SOUTH DISTRICT DEEDS, BOOK 6771, PAGE 169.

PARCEL 2:

SECOND PARCEL BEING SHOWN AS LOT A ON PLAN OF LAND, WINCHESTER, MASSACHUSETTS, BEING BOUNDED AND DESCRIBED AS FOLLOWS:

EASTERLY BY MAIN STREET, SIXTY- FOUR AND 92/100 (64.92) FEET;

SOUTHERLY BY LAND NOW OR FORMERLY OF RICHARD A. WHITE, FIFTY-ONE AND 46/100 (51.46)

WESTERLY BY LOT B ON SAID PLAN, SIXTY-FOUR AND 76/100 (64.76) FEET;

NORTHERLY BY VINE STREET, FIFTY-ONE AND 80/100 (51.80) FEET;

CONTAINING 3338 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

SAID PREMISES ARE CONVEYED SUBJECT TO A TEN-FOOT BUILDING LINE OF VINE STREET ESTABLISHED BY A TAKING BY THE TOWN OF WINCHESTER, DULY RECORDED WITH SAID DEEDS.

BEING THE SAME PREMISES CONVEYED TO FELLS REALTY, INC. BY DEED DATED DECEMBER 21, 1956, AND RECORDED WITH THE MIDDLESEX SOUTH REGISTRY OF DEEDS IN BOOK 8878, PAGE 447.

PARCEL 3:

THIRD PARCEL BEING SHOWN AS THE LAND IN WINCHESTER, MIDDLESEX COUNTY, MASSACHUSETTS AND BEING SHOWN AS LOTS 1 AND 2 ON A PLAN OF LOTS, WINCHESTER, MASSACHUSETTS, BELONGING TO PATRICK C. GARDNER, FREDERICK A. EWELL, REG. LAND SURVEYOR, DATED MARCH 6, 1954 AND RECORDED AT SAID DEEDS AT BOOK 8236, PAGE 238. SAID LOTS 1 AND 2 ARE MORE PARTICULARLY BOUNDED AND DESCRIBED AS FOLLOWS:

LOT 1

SOUTHERLY: BY ELMWOOD AVENUE, THIRTY AND 50/100 (30.50) FEET;

EASTERLY: BY ELMWOOD AVENUE, EIGHTEEN AND 60/100 (18.60) FEET;

SOUTHERLY: BY LAND OF COLGATE, AS SHOWN ON SAID PLAN, SEVENTY-THREE AND 86/100 (73.86) FEET;

WESTERLY: BY LAND OF REARDON, AS SHOWN ON SAID PLAN, SEVENTY-FOUR AND 31/100 (74.31) FEET;

NORTHERLY: PARTLY BY LAND OF SCHOLL AND PARTLY BY LAND OF D & R REAL ESTATE COMPANY OF WINCHESTER, INC. AS SHOWN ON SAID PLAN, EIGHTY- FIVE AND 16/100 (85.16) FEET; AND

EASTERLY: BY LOT 2 AS SHOWN ON SAID PLAN, FIFTY-NINE AND 89/100 (59.89) FEET.

SAID LOT 1 CONTAINS 6,800 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

PARCEL 4:

LOT 2

SOUTHERLY: BY ELMWOOD AVENUE, EIGHTY- FOUR AND 50/100 (84.50) FEET;

WESTERLY: BY LOT 1 ON SAID PLAN, FIFTY-NINE AND 89/100 (59.89) FEET;

NORTHERLY: BY D & R REAL ESTATE COMPANY OF WINCHESTER, INC., AS SHOWN ON SAID PLAN, EIGHTY-NINE AND 30/100 (89.30) FEET;

EASTERLY: (24.74) BY MAIN STREET, BY TWO COURSES, TWENTY-SEVEN AND 74/100 FEET AND THIRTY-TWO AND 27/100 (32.27) FEET.

SAID LOT CONTAINS 5,191 SQUARE FEET OF LAND ACCORDING TO SAID PLAN.

BEING THE SAME PREMISES CONVEYED TO FELLS REALTY, INC. BY DEED DATED DECEMBER 20, 1979, AND RECORDED WITH THE MIDDLESEX SOUTH REGISTRY OF DEEDS IN BOOK 13862, PAGE 365.

EXCEPTIONS FROM COVERAGE (SURVEY RELATED ONLY) SCHEDULE B, SECTION 2, LISTED IN TITLE COMMITMENT NO. 1901850 ISSUED BY COMMONWEALTH LAND TITLE INSURANCE COMPANY HAVING AN EFFECTIVE DATE OF JUNE 20, 2019

(8) TEN (10) FOOT BUILDING LINE ESTABLISHED ON ELMWOOD AVENUE BY THE TOWN OF WINCHESTER AS SET FORTH IN DEED RECORDED IN BOOK 8236, PAGE 238 AND PAGE 239. (AS SHOWN HEREON)

(9) BUILDING LINE ESTABLISHED BY TOWN AS SET FORTH IN DEED RECORDED IN BOOK 8878 AND PAGE 447. (AS SHOWN HEREON)

(10) 10' BUILDING LINE AS SHOWN ON THE PLAN OF LAND WINCHESTER MA, DATED JANUARY 17, 1933 RECORDED IN AS PLAN NUMBER 65 OF 1933. (AS SHOWN HEREON)

LIST OF VISIBLE ENCROACHMENTS

VINE STREET
[A] CONCRETE SIDEWALK CROSSES PROPERTY LINE
MAIN STREET
[B] BUILDING OVER PROPERTY LINE
[C] 2 PLANT HOOKS CROSS PROPERTY LINE
[D] FLAGPOLE CROSSES PROPERTY LINE
[E] CHAIN LINK FENCE IS OVER PROPERTY LINE
ELMWOOD AVENUE
[F] VERTICAL GRANITE CURB CROSSES PROPERTY LINE
SOUTH ABUTTER
[G] CHAIN LINK FENCE AND STOCKADE FENCE CROSS PROPERTY LINE
WEST ABUTTER
[H] STOCKADE FENCE CROSSES PROPERTY LINE IN 2 PLACES

NOTES:

1) BENCH MARK INFORMATION:

TEMPORARY BENCH MARKS SET:

TBM-1: XCUT ON RIGHT FRONT BONNET BOLT OVER MAIN OUTLET ON HYDRANT ON ELMWOOD AVENUE, AS SHOWN HEREON. ELEV.=28.79'

TBM-2: LEFT OUTER CORNER OF SIGN BASE AT MOBIL GAS STATION ACROSS FROM LOCUS PARCEL, AS SHOWN HEREON. ELEV.=21.66''

2) ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988 AND WERE ESTABLISHED BY RTK GPS OBSERVATIONS.

3) CONTOUR INTERVAL EQUALS ONE (1) FOOT.

4) BY GRAPHIC PLOTTING ONLY, THE PARCEL SHOWN HEREON LIES WITHIN A ZONE AE, A SPECIAL FLOOD HAZARD AREA SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD, ZONE "X" (SHADED), AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREA 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, AND ZONE X (UNSHADED), AREAS OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD, AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY (F.E.M.A) FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR MIDDLESEX COUNTY, MASSACHUSETTS, MAP NUMBER 25017C0409E, TOWN OF WINCHESTER COMMUNITY NUMBER 250228, PANEL NUMBER 0409E, HAVING AN EFFECTIVE DATE OF JUNE 4, 2010.

5) ZONING INFORMATION WAS NOT PROVIDED BY THE TITLE INSURER AS REQUIRED BY ITEM 6 (A OR B) OF TABLE "A" IN THE 2016 ALTA SURVEY REQUIREMENTS.

6) THE PROPERTY SHOWN HEREON IS THE SAME PROPERTY DESCRIBED IN THE TITLE COMMITMENT.

7) BUILDING HEIGHT SHOWN HEREON IS CALCULATED FROM THE MEAN GRADE OF THE EXISTING GROUND LEVEL ADJOINING THE BUILDING AT EACH EXTERIOR WALL TO THE HIGHEST POINT ON THE ROOF.

8) UTILITY INFORMATION SHOWN IS BASED ON BOTH A FIELD SURVEY AND PLANS OF RECORD. THE LOCATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE AFOREMENTIONED RECORD PLANS AND ARE APPROXIMATE ONLY. WE CANNOT ASSUME RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES THAT ARE OMITTED OR INACCURATELY SHOWN ON SAID RECORD PLANS, SINCE SUBSURFACE UTILITIES CANNOT BE VISIBLY VERIFIED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY ENGINEERING DEPARTMENT SHOULD BE CONSULTED AND THE ACTUAL LOCATION OF SUBSURFACE STRUCTURES SHOULD BE DETERMINED IN THE FIELD. CALL, TOLL FREE, THE DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO EXCAVATION.

9) THERE WAS NO OBSERVED EVIDENCE OF CURRENT EARTH MOVING WORK, BUILDING CONSTRUCTION OR BUILDING ADDITIONS.

10) TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO PROPOSED CHANGES IN STREET RIGHT OF WAY LINES.

11) THERE WERE NO PAINTED PARKING SPACES OBSERVED ON SUBJECT PROPERTY.

ALTA/NSPS LAND TITLE SURVEY
648-654 MAIN STREET
63 VINE STREET
WINCHESTER, MASS.

FELDMAN LAND SURVEYORS
152 HAMPDEN STREET
BOSTON, MASS. 02119

JUNE 26, 2018
PHONE: (617)357-9740
www.feldmansurveyors.com

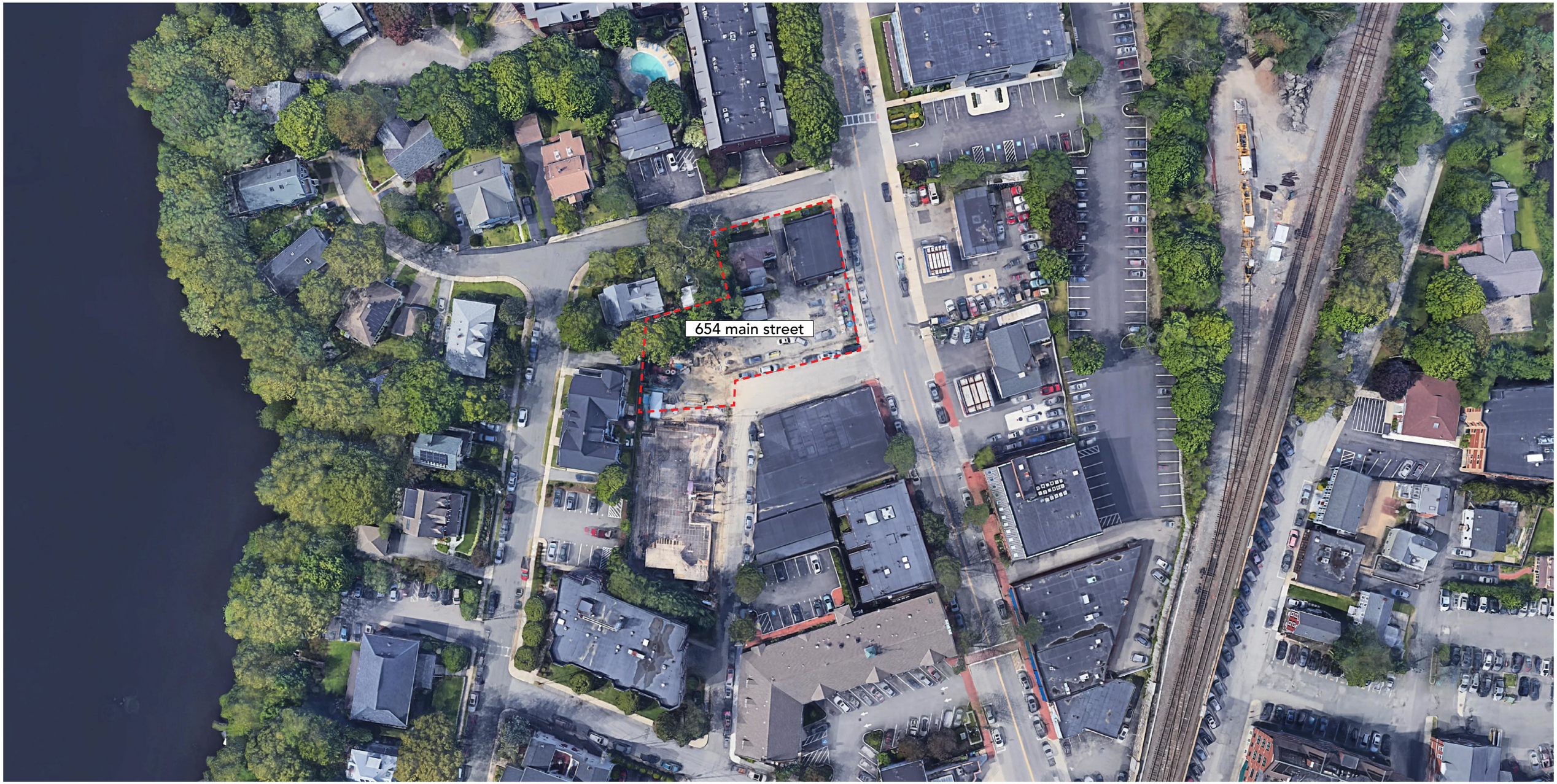
FELDMAN LAND SURVEYORS

20 0 10 20 40 80
SCALE: 1"=20'

RESEARCH KDA	FIELD CHIEF SW	PROJ MGR SMD	APPROVED	SHEET NO. 1 OF 1
CALC KDA	CADD SC	FIELD CHECKED SC	CRD FILE 16805	JOB NO. 16805

FILENAME: S:\PROJECTS\16800s\16805\DWG\16805-ALTA-C3D.dwg

Existing Conditions



Existing Conditions

Existing Conditions

Touloukian Touloukian Inc.
Architecture + Urban Design
ttarch.com

Existing Conditions

Touloukian Touloukian Inc.
Architecture + Urban Design
ttarch.com

Existing Conditions

612 - 626 Main Street

Existing Conditions

Existing Conditions

Existing Conditions

Existing Conditions

Existing Conditions

Existing Conditions

Existing Conditions

Existing Conditions

Existing Conditions

Existing Conditions

Touloukian Touloukian Inc.
Architecture + Urban Design
ttarch.com

Existing Conditions

Touloukian Touloukian Inc.
Architecture + Urban Design
ttarch.com

Existing Conditions

Existing Conditions

63 Vine Street - Exterior

Existing Conditions

63 Vine Street - Exterior

Existing Conditions

63 Vine Street - Exterior

Existing Conditions

63 Vine Street - Exterior

Existing Conditions

63 Vine Street - Interior

Existing Conditions

63 Vine Street - Interior

APPENDIX C: BEALS ASSOCIATES, INC. PLAN SET

PROJECT PARCEL SITE
TOWN OF WINCHESTER ASSESSOR'S MAP DATA

TAX MAP	PARCELS
9	123, 124, 125

PLANS TO ACCOMPANY PERMIT DOCUMENTS

FOR

FELLS HARDWARE REDEVELOPMENT

654 MAIN STREET

WINCHESTER, MASSACHUSETTS

ORIGINAL ISSUE DATE: AUGUST 18, 2020

LOCATION MAP
1"=800'

INDEX

SHEET I.D.	TITLE	LAST REVISED
C0.0	COVER SHEET	2020.08.20
C0.1	GENERAL NOTES	2020.08.18
C1.0	EXISTING CONDITIONS	2020.08.18
C2.0	SITE LAYOUT AND MATERIALS PLAN	2020.08.18
C2.1	LANDSCAPE PLAN	2020.08.18
C3.0	GRADING AND DRAINAGE PLAN	2020.08.18
C4.0	UTILITY PLAN	2020.08.18
C5.0	EROSION AND SEDIMENTATION CONTROL PLAN	2020.08.18
C5.1	EROSION CONTROL NOTES	2020.08.18
C6.0	DETAILS	2020.08.18
C6.1	DETAILS	2020.08.18
C6.2	DETAILS	2020.08.18
C6.3	DETAILS	2020.08.18

UTILITY CONTACTS

WATER
WINCHESTER WATER DEPARTMENT
WINCHESTER DPW
15LAKE STREET
WINCHESTER, MA 01890
T.781.721.7100

SANITARY SEWER
WINCHESTER WATER DEPARTMENT
WINCHESTER DPW
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T.781.721.7100

NATURAL GAS
NATIONAL GRID GAS
40 SYLVAN ROAD
WALTHAM, MA 02451
T.781.907.2845

ELECTRIC
EVERSOURCE ELECTRIC "A"
1165 MASSACHUSETTS AVENUE
DORCHESTER, MA 02125
T.617.541.5714

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385 MYLES STANDISH BLVD.
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WINCHESTER, MA 01890
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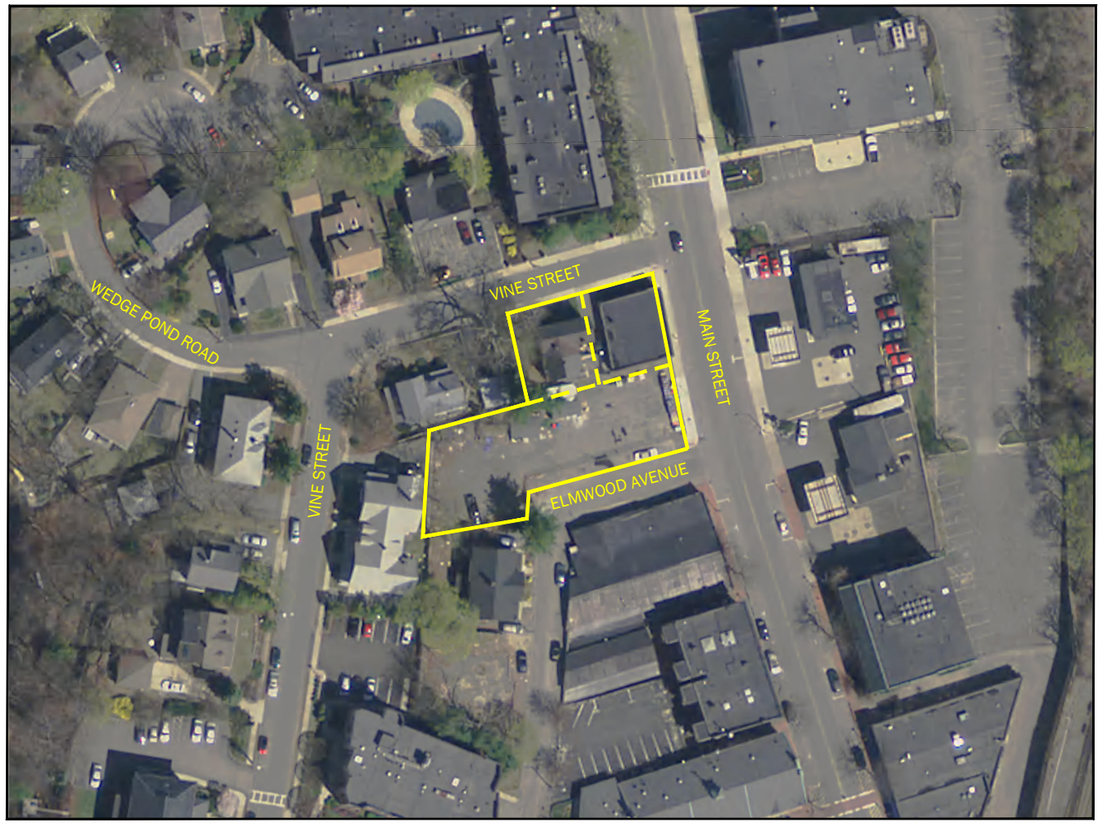

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LANDSCAPE ARCHITECT
COPLEY WOLFF DESIGN GROUP
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SUITE 1315
BOSTON, MA 02109
T.617.654.9000

APPLICANT
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10 CONVERSE PLACE
WINCHESTER, MA 01890
T.617.448.3827

OWNER
FELLS REALTY, INC.
654 MAIN STREET
WINCHESTER, MA 01890

TODD P. MOREY, P.E. 48865 CIVIL

I HEREBY ACKNOWLEDGE THAT THESE PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECT SUPERVISION AND THAT I AM REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS TO PRACTICE AS A PROFESSIONAL ENGINEER.

COMMONWEALTH OF MASSACHUSETTS
TODD P. MOREY
CIVIL
No. 48865
REGISTERED PROFESSIONAL ENGINEER

Project No. C-942
Original Issue Date:
August 18, 2020

BEALS · ASSOCIATES INC.
2 PARK PLAZA SUITE 200 BOSTON, MA 02116
PHONE: 617-242-1120
•PLANNING •ENGINEERING •PERMITTING •MANAGEMENT

REVISION	DATE

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PATH:H:\C-942 Winchester\Autocad\Permitting Submission Sets\Permit Documents 2020.08.18\Cover Notes & Legend.dwg

Plotted by Devin Howe on August 17, 2020

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GENERAL NOTES

1. THE CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF PUBLIC WORKS AT LEAST FORTY-EIGHT (48) HOURS IN ADVANCE OF ANY ROADWORK OR MUNICIPAL CONSTRUCTION.

2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR THE ELEVATION OF THE EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, SURVEY INFORMATION BY THE PROJECT SURVEYOR, AND MEASUREMENTS TAKEN IN THE FIELD WHERE POSSIBLE. THIS INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AND DIGSAFE (1-888-DIG-SAFE) AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. THE CONTRACTOR SHALL CONTACT THE DEPARTMENT OF PUBLIC WORKS TO MARK OUT ALL TOWN OWNED UTILITIES 72 HOURS PRIOR TO ANY CONSTRUCTION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLAN. THE CONTRACTOR SHALL NOT RELOCATE ANY TOWN OWNED UTILITY WITHOUT PRIOR APPROVAL OF THE DEPARTMENT OF PUBLIC WORKS. ALL UTILITY WORK WITHIN THE RIGHT OF WAY SHALL BE PERFORMED BY A LICENSED DRAIN LAYER UNDER THE SUPERVISION OF THE DEPARTMENT OF PUBLIC WORKS.

3. MAINTENANCE OF EROSION CONTROL MEASURES IS OF PARAMOUNT IMPORTANCE, AND THE CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL EROSION CONTROL MEASURES SHOWN ON THE PLANS. ADDITIONAL EROSION CONTROL MEASURES SHALL BE INSTALLED AS DEEMED NECESSARY BY ONSITE INSPECTIONS BY THE OWNER OR THEIR REPRESENTATIVES AND THE MUNICIPAL CODE ENFORCEMENT OFFICER AT NO ADDITIONAL COST TO THE OWNER.

4. ALL MATERIAL SCHEDULES SHOWN ON THE PLANS ARE FOR GENERAL INFORMATION ONLY. THE CONTRACTOR SHALL PREPARE HIS OWN MATERIAL SCHEDULES BASED ON HIS PLAN REVIEW. ALL SCHEDULES SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS OR PERFORMING WORK.

5. ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO THE TOWN SPECIFICATIONS, MASSACHUSETTS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION STANDARDS, AWWA STANDARDS AND OTHER RELATED INDUSTRY STANDARDS.

6. THIS PROJECT IS SUBJECT TO ALL TERMS AND CONDITIONS OF ALL REGULATIONS ADMINISTERED BY THE MASSACHUSETTS ENVIRONMENTAL POLICY ACT, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, MASSACHUSETTS DEPARTMENT OF TRANSPORTATION, HIGHWAY DIVISION, LOCAL UTILITY COMPANIES AND MUNICIPAL OFFICIALS.

7. THE CONTRACTOR SHALL REVIEW ALL RELEVANT FEDERAL, STATE AND MUNICIPAL PERMITS ASSOCIATED WITH THIS PROJECT. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO CERTIFY THAT ALL RELEVANT REQUIREMENTS REGARDING CONSTRUCTION, TESTING, AND REPORTING OF THE PERMITS HAVE BEEN MET AND THE PROJECT HAS BEEN CONSTRUCTED IN COMPLIANCE WITH THESE PORTIONS OF THE PERMITS.

8. ALL SIGNAGE SHALL CONFORM TO THE STANDARDS FOR SIZE, HEIGHT, LOCATION, AND REFLECTIVITY SET FORTH IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), LATEST EDITION.

9. ALL CURB SHALL CONFORM TO THE SPECIFICATIONS OR THE MORE STRINGENT OF THE DEPARTMENT OF PUBLIC WORKS OR THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION, HIGHWAY DIVISION.

10. ALL DIMENSIONING UNLESS OTHERWISE NOTED IS TO THE FACE OF CURB, EDGE OF PAVEMENT OR FACE OF BUILDING.

11. THE PROJECT IS TO BE SERVED BY PUBLIC WATER, PRIVATE SEWER, AND UNDERGROUND CABLE, TELEPHONE, AND ELECTRIC UTILITIES.

12. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE.

13. ANY DAMAGE TO PUBLIC OR PRIVATE PROPERTY RESULTING FROM CONSTRUCTION ACTIVITIES SHALL BE REPAIRED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.

14. PROPERTY MARKERS AND STREET LINE MONUMENTS SHALL BE PROPERLY PROTECTED AT ALL TIMES DURING CONSTRUCTION TO ENSURE INTEGRITY. IF DISTURBED, THEY SHALL BE REPLACED BY A REGISTERED SURVEYOR AT THE CONTRACTOR'S EXPENSE.

15. ADA ACCESSIBLE RAMPS SHALL BE PROVIDED ALONG SIDEWALKS AND AT ALL ROADWAY CROSSINGS. ALL ADA RAMPS SHALL CONFORM TO MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) STANDARDS AS WELL AS MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS.

GRADING & DRAINAGE NOTES

1. ALL STORM DRAIN PIPE SHALL BE HIGH DENSITY POLYETHYLENE PIPE (HDPE), SMOOTH BORE INTERIOR, PROVIDING A MANNING'S ROUGHNESS COEFFICIENT OF 0.010 OR LESS UNLESS OTHERWISE NOTED.

2. THE PROJECT ELEVATIONS ARE BASED ON NGVD 1988 VERTICAL DATUM. THE HORIZONTAL AND VERTICAL CONTROL FOR THE PROJECT WAS PERFORMED BY THE PROJECT SURVEYOR. THE SITE BENCHMARK(S) ARE NOTED ON THE EXISTING CONDITIONS PLANS.

3. ALL EXCESS SOIL EXCAVATED FROM THE PROJECT SITE SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

4. ALL DISTURBED AREAS NOT TO BE PAVED, SODDED, OR OTHERWISE TREATED SHALL RECEIVE 6" LOAM, FERTILIZER, SEED AND MULCH.

5. COMPACTION REQUIREMENTS:

LOCATION	MINIMUM COMPACTION
SUBBASE AND BASE GRAVEL BELOW PAVED AREAS	95%
SUBGRADE FILL BELOW PAVED AREAS	92%
TRENCH BEDDING MATERIAL	95%
LOAM AND SEED AREAS	90%

ALL PERCENTAGES OF COMPACTION SHALL BE OF THE MAXIMUM DRY DENSITY AT THE OPTIMUM MOISTURE CONTENT AS DETERMINED AND CONTROLLED IN ACCORDANCE WITH ASTM D-1557

6. ADJUST ALL MANHOLE COVERS, CURB BOXES, ETC. WITHIN LIMITS OF WORK TO FINISHED GRADE.

7. CONTRACTOR SHALL PROVIDE A FINISH PAVEMENT SURFACE FREE OF LOW SPOTS AND PONDING AREAS.

8. ALL SUBGRADE SURFACES SHALL BE SLOPED AT NO LESS THAN 1% TO PROMOTE ADEQUATE DRAINAGE TOWARDS DRAINAGE AREAS.

9. PROVIDE STABILIZATION OR SEPARATION GEOTEXTILE FABRIC OVER UNSTABLE SOILS AS DIRECTED BY THE OWNERS REPRESENTATIVE OR ENGINEER.

10. CATCH BASINS SHALL BE INSPECTED IN THE SPRING AND FALL. ANY STRUCTURES WHICH ARE INSPECTED AND HAVE AN ACCUMULATED SEDIMENT DEPTH OF 12" SHALL BE CLEANED. DISPOSAL OF ACCUMULATED SEDIMENT SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, INSTALLATION, OPERATION AND REMOVAL OF APPROPRIATE EXCAVATION DEWATERING SYSTEMS AS WELL AS THE PROTECTION OF EXPOSED SUBGRADE SOILS AT NO ADDITIONAL COST TO THE OWNER. WATER ENTERING EXCAVATIONS SHALL BE CONTROLLED AND PROMPTLY REMOVED TO AVOID SUBGRADE DISTURBANCE. SURFACE WATER RUNOFF SHALL BE DIRECTED AWAY FROM EXPOSED SOIL SURFACES.

12. ALL EXISTING STRUCTURES, FENCES, TREES, ETC. WITHIN THE CONSTRUCTION AREA, UNLESS SPECIFICALLY NOTED TO REMAIN, SHALL BE REMOVED.

13. ALL DRAINAGE STRUCTURES SHALL BE PRECAST UNLESS OTHERWISE NOTED.

14. ALL DRAINAGE STRUCTURES AND STORM SEWER PIPE SHALL MEET HEAVY DUTY TRAFFIC (H-20) LOADING AND BE INSTALLED ACCORDINGLY.

EROSION CONTROL NOTES

1. LAND DISTURBING ACTIVITIES SHALL BE ACCOMPLISHED IN A MANNER AND SEQUENCE THAT CAUSES THE LEAST PRACTICAL DISTURBANCE OF THE SITE.

2. PRIOR TO BEGINNING ANY CLEARING OR LAND DISTURBING ACTIVITIES, THE CONTRACTOR SHALL INSTALL THE PERIMETER SILT FENCE OR EROSION CONTROL BARRIERS AND THE STABILIZED CONSTRUCTION ENTRANCES.

3. ALL GROUND AREAS GRADED FOR CONSTRUCTION SHALL BE GRADED, LOAMED AND SEEDED AS SOON AS POSSIBLE. PERMANENT SEED MIXTURE SHALL CONFORM TO THE SEEDING PLAN CONTAINED IN EROSION AND SEDIMENT CONTROL NOTES AND DETAILS ON THIS SET.

4. PRIOR TO PAVING, THE CONTRACTOR SHALL FLUSH SILT FROM ALL STORM DRAIN LINES.

5. SILT FENCES SHALL BE INSPECTED, REPAIRED AND CLEANED AS NOTED IN THE EROSION CONTROL NOTES AND DETAILS FOR THIS PROJECT.

6. THE CONTRACTOR SHALL REPAIR AND ADD STONE TO THE CONSTRUCTION ENTRANCES AS THEY BECOME SATURATED WITH MUD TO ENSURE THAT THEY FUNCTION AS INTENDED DURING CONSTRUCTION. ALL PUBLIC STREETS SHALL BE SWEPT AS NECESSARY.

7. SILT REMOVED FROM AROUND INLETS AND BEHIND THE SILT FENCES SHALL BE PLACED ON A TOPSOIL STOCKPILE AND MIXED INTO IT FOR LATER USE IN LANDSCAPING OPERATIONS.

8. THE CONTRACTOR IS CAUTIONED THAT FAILURE TO COMPLY WITH THE SEQUENCE OF CONSTRUCTION, EROSION/SEDIMENT CONTROL PLAN, AND OTHER PERMIT REQUIREMENTS MAY RESULT IN MONETARY PENALTIES. THE CONTRACTOR SHALL BE ASSESSED ALL SUCH PENALTIES AT NO COST TO THE OWNER.

UTILITY NOTES

1. ALL WATER UTILITY MATERIALS AND INSTALLATION METHODS SHALL CONFORM TO TOWN PUBLIC WORKS DEPARTMENT STANDARDS. ALL WATER DISTRIBUTION PIPING SHALL BE CLASS 52 DUCTILE IRON PIPE. DISINFECTION OF WATER LINES SHALL CONFORM TO AWWA STANDARDS. THE CONTRACTOR SHALL COORDINATE ALL CONNECTIONS TO THE MUNICIPAL SYSTEM WITH THE TOWN PUBLIC WORKS DEPARTMENT.

2. THE LOCATION OF THE ELECTRIC, TELEPHONE, AND CABLE SERVICES ARE APPROXIMATE. THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE UTILITY COMPANIES FOR EXACT LOCATIONS.

3. SANITARY SEWER PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PIPE MEETING THE REQUIREMENTS OF SDR-35 FOR GRAVITY PIPE AND SDR-11 FOR FORCEMAIN PIPE UNLESS OTHERWISE NOTED ON THE PLANS. ALL SEWER MATERIALS AND INSTALLATION METHODS SHALL CONFORM TO THE DEPARTMENT OF PUBLIC WORKS STANDARDS.

4. COORDINATE ALL UTILITY WORK WITH THE APPROPRIATE UTILITY COMPANY. ALL UTILITY WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE STANDARDS OF THAT UTILITY.

5. UNDERGROUND ELECTRICAL, TELEPHONE, AND CABLE CONDUIT SHALL CONFORM TO THE MATERIAL REQUIREMENTS OF THAT UTILITY.

6. ALL UNDERGROUND CONDUITS SHALL HAVE NYLON PULL ROPES TO FACILITATE PULLING CABLE.

7. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL BOXES, FITTINGS, CONNECTORS, COVER PLATES AND OTHER MISCELLANEOUS ITEMS NOT NECESSARILY DETAILED ON THE DRAWINGS TO RENDER INSTALLATION OF THE UTILITIES COMPLETE AND OPERATIONAL AT NO EXTRA EXPENSE TO THE OWNER.

8. A 10 FOOT MINIMUM EDGE TO EDGE HORIZONTAL SEPARATION SHALL BE PROVIDED BETWEEN ALL WATER AND SANITARY SEWER LINES. AN 18 INCH OUTSIDE TO OUTSIDE VERTICAL SEPARATION SHALL BE PROVIDED AT ALL WATER AND SANITARY SEWER CROSSINGS.

9. THRUST BLOCKS OR LOCKING RETAINER GLANDS SHALL BE PLACED ON THE WATER DISTRIBUTION LINES AT ALL BENDS, TEES, FIRE HYDRANTS, VALVES, CHANGES IN DIRECTION, ETC. THE THRUST BLOCKS OR LOCKING RETAINER GLANDS SHALL MEET THE REQUIREMENTS OF THE TOWN PUBLIC WORKS DEPARTMENT AND THE PROJECT SPECIFICATIONS.

10. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RECORD DRAWINGS THROUGHOUT THE PROJECT AND PROVIDING THE OWNER WITH A SET OF THE FINAL RECORD DRAWINGS WHEN THE PROJECT IS COMPLETE.

11. ALL TRENCHING, PIPE LAYING AND BACKFILLING SHALL BE IN ACCORDANCE WITH FEDERAL OSHA REGULATIONS.

12. ALL WATER VALVES AND APPURTENANCES SHALL OPEN LEFT.

13. FIRE HYDRANTS SHALL BE MUELLER CENTURION, PAINTED YELLOW.

DEMOLITION NOTES

1. THE SITE SHALL BE STRIPPED OF EXISTING IMPROVEMENTS WITHIN THE PERIMETER CITY SIDEWALKS AND OWNERS PROPERTY. ALL MATERIALS FROM DEMOLITION SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR UNLESS OTHERWISE NOTED BY THE OWNER, ENGINEER, OR GOVERNING AGENCIES. REFER TO THE BUILDING AND SITE DEMOLITION PLANS FOR THE PROJECT.

2. REMOVAL OF EXISTING IMPROVEMENTS SHALL BE AS REQUIRED FOR THIS PROJECT. THE MATERIALS REMOVED FROM THE SITE SHALL BE DISPOSED OF IN A PROPER AND LEGAL MANNER PER FEDERAL, STATE, AND OR LOCAL LAWS AND ORDINANCES.

3. IF ANY HAZARDOUS MATERIALS ARE ENCOUNTERED THE OWNER SHALL BE NOTIFIED. THOSE MATERIALS SHALL BE REMOVED AND DISPOSED OF IN A MANNER AS APPROVED BY ALL GOVERNING AGENCIES AND IN A LANDFILL OR DISPOSAL FACILITY LICENSED TO ACCEPT HAZARDOUS MATERIALS.

4. PREDEMOLITION PHOTOGRAPHS SHALL BE TAKEN THAT SHOW THE EXISTING CONDITIONS OF THE SITE AND ADJOINING BUILDINGS TO REMAIN. PHOTOS SHALL INCLUDE DAMAGE TO FINISH SURFACES THAT MIGHT BE MISCONSTRUED AS DAMAGE CAUSED BY DEMOLITION OPERATIONS.

5. EXISTING BUILDING ADDITIONS, PAVEMENTS, SIDEWALKS, CURBS, DRIVEWAYS, ELECTRICAL TRANSFORMERS, DITCHES, DRAINAGE PIPES AND STRUCTURES, FENCES, LAWNS, TREES, BUSHES, MAILBOXES, SIGNS, POWER POLES, ETC. TO REMAIN SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. ANY DAMAGE DURING CONSTRUCTION SHALL BE RESTORED, RECONSTRUCTED OR REPLACED TO AT LEAST THEIR ORIGINAL CONDITION OR AS REQUIRED OR DICTATED BY FEDERAL, STATE, COUNTY, CITY OR LOCAL GOVERNING AGENCIES. ANY UTILITIES REQUIRED TO REMAIN IN SERVICE FOR EXISTING BUILDING ADDITIONS TO REMAIN SHALL BE PROTECTED.

6. SAW CUT THE EDGES OF PAVED AREAS CLEAN, NEAT AND TRUE TO LINE SO NO UNWANTED CHIPPING OR BREAKING OF EXISTING PAVEMENT TO REMAIN WILL OCCUR.

7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSPECT EACH DAY AND REMOVE ALL MUD, DIRT, GRAVEL AND LOOSE MATERIALS TRACKED, DUMPED, SPILLED OR WIND BLOWN FROM THIS SITE ONTO OTHER SITES, RIGHT OF WAYS, PUBLIC OR PRIVATE STREETS OR ROADS, DRIVEWAYS, YARDS OR SIDEWALKS. THE CONTRACTOR SHALL REDUCE AIRBORNE DUST DURING THE ENTIRE DEMOLITION SCHEDULE. WATER MAY BE USED AS A REDUCER.

8. THE CONTRACTOR SHALL MAINTAIN EROSION CONTROL DEVICES AS REQUIRED DURING DEMOLITION.

9. IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE OWNER AND ALL THE UTILITY COMPANIES AND DEPARTMENTS 72 HOURS OR AS REQUIRED BEFORE DEMOLITION IS TO START TO VERIFY ANY UTILITIES THAT MAY BE PRESENT ON SITE. ALL VERIFICATIONS, LOCATIONS, SIZE AND DEPTHS SHALL BE MADE BY THE APPROPRIATE UTILITY COMPANIES OR DEPARTMENTS. WHEN EXCAVATING AROUND OR OVER EXISTING UTILITIES, THE CONTRACTOR MUST NOTIFY THE UTILITY COMPANY SO A REPRESENTATIVE OF THE UTILITY MAY BE PRESENT DURING THE EXCAVATION TO INSTRUCT AND OBSERVE DURING THE EXCAVATION. VERIFY THAT UTILITIES HAVE BEEN DISCONNECTED AND CAPPED BEFORE STARTING BUILDING DEMOLITION OPERATIONS.

10. IT IS THE RESPONSIBILITY OF THE CONTRACTOR OR CONTRACTORS TO OBTAIN ALL FEDERAL, STATE, COUNTY, CITY, AND LOCAL PERMITS FOR ANY AND ALL WORK REQUIRED UNLESS OTHERWISE NOTED. THIS SHALL INCLUDE ALL SUBMITTALS AS REQUIRED INCLUDING STORMWATER RUNOFF CONTROL. THE CONTRACTOR OR CONTRACTORS ARE RESPONSIBLE TO PAY FOR ALL REQUIRED PERMITS BY ANY OR ALL AGENCIES MENTIONED ABOVE UNLESS OTHERWISE NOTED BY THE CONTRACT OR SPECIFICATIONS.

11. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY WITH EACH UTILITY COMPANY AND OR AGENT WHO IS RESPONSIBLE TO REMOVE OR RELOCATE EACH EXISTING UTILITY. IT FURTHER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BEAR THE COST FOR THE REMOVAL, TERMINATION OR RELOCATION OF THE UTILITIES IF THE RESPONSIBILITY IS NOT COVERED BY THE UTILITY COMPANY.

12. ALL CONTRACTORS SHALL TAKE PARTICULAR CARE WHEN EXCAVATING IN AND AROUND EXISTING UTILITY LINES AND EQUIPMENT. ACTUAL FIELD LOCATIONS OF ALL THE EXISTING UTILITIES ARE THE CONTRACTORS RESPONSIBILITY AND MUST BE LOCATED EITHER BY THE REPRESENTATIVE OF THE UTILITY COMPANY OR BY A PRIVATE UNDERGROUND UTILITY LOCATING COMPANY PRIOR TO THE START OF DEMOLITION ACTIVITIES.

13. REMOVAL OF EXISTING CONCRETE OR OTHER PAVED AREAS SHALL INCLUDE ALL AGGREGATE BASE MATERIALS. AREAS TO BE REMOVED SHALL BE SAW CUT LEAN, NEAT AND TRUE TO LINE. REMOVE ALL NONORGANIC MATTER THAT WOULD INTERFERE WITH THE GROWTH OF TURF OR PLANT MATERIAL.

14. THE CONTRACTOR SHALL NOTIFY THE OWNER PRIOR TO COMMENCEMENT OF DEMOLITION OPERATIONS. NO DEMOLITION, GRADING OR OTHER WORK SHALL COMMENCE WITHIN EASEMENTS ON ADJACENT PROPERTIES UNTIL A COORDINATION MEETING HAS BEEN HELD BETWEEN THE CONTRACTOR, OWNER, HIS REPRESENTATIVES AND OTHER STIPULATED PARTIES.

15. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AT HIS EXPENSE ALL VEHICULAR AND PEDESTRIAN TRAFFIC CONTROL DEVICES REQUIRED BY FEDERAL, STATE, COUNTY, CITY AND LOCAL AGENCIES.

16. EXISTING BUILDINGS TO BE DEMOLISHED SHALL BE REMOVED IN THEIR ENTIRETY INCLUDING BASEMENT WALLS, SLABS, AND FOUNDATIONS.

17. RECYCLED CRUSHED OR PULVERIZED CONCRETE OR MASONRY MAY BE USED AS BACKFILL OR IN NEW CONSTRUCTION ONLY IF APPROVED BY THE ENVIRONMENTAL, GEOTECHNICAL, AND STRUCTURAL ENGINEERS.

18. PERFORM CLEARING, GRUBBING, STUMP REMOVAL, TOPSOIL STOCKPILE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS INCLUDING REMOVAL OF TREES, SHRUBS, STUMPS AND ROOT SYSTEMS TO A MINIMUM DEPTH TO ERADICATE THEM FROM SUB-GRADE, A MINIMUM DEPTH OF 42".

19. THE CONTRACTOR MUST VISIT THE SITE AND STUDY EXISTING PHYSICAL CONDITIONS, REVIEW DRAWINGS, AND REACH THEIR OWN CONCLUSIONS ON WORK NECESSARY TO ACCOMPLISH INTENDED RESULTS DESCRIED BY THE PROJECT DOCUMENTS.

20. INSTALL ORANGE SAFETY FENCE OR TEMPORARY CHAIN LINK FENCE AROUND THE PERIMETER OF THE DEMOLITION AREA. NO DEMOLITION EQUIPMENT OR DEMOLITION OPERATIONS SHALL OCCUR OUTSIDE OF THIS PERIMETER FENCING.

21. INSTALL SILT FENCE BARRIER ADJACENT TO SAFETY FENCE ALONG DOWNGRADIENT SIDE OF SITE IN ACCORDANCE WITH STANDARD BMP MEASURES.

22. KEEP PUBLIC STREETS CLEAR OF DUST, MUD AND DEBRIS. SURFACE MUST BE SWEPT AT THE CLOSE OF EACH WORK DAY AND AT OTHER INTERVALS AS NECESSARY TO AVOID TRACKING OF MUD OR CREATION OF DUST. INSTALL A STONE STABILIZED CONSTRUCTION ENTRANCE AT PRIMARY ACCESS ROUTE INTO WORK ZONE. MAINTAIN AND REPLACE AS NECESSARY.

23. THE OWNER MAKES NO REPRESENTATION AS TO THE VOLUME OF MATERIALS ATTENDANT WITH DEMOLITION. UPON COMPLETION OF THE BUILDING/FOUNDATION AND UTILITY DEMOLITION WORK, THE ENTIRE DISTURBED AREA SHALL BE REFILLED TO EXISTING SUBGRADE ELEVATION IN LIFTS (MAXIMUM THICKNESS 8 INCHES) COMPACTED TO 95% OPTIMUM DRY DENSITY (ASTM D-1557) WITH MATERIAL MEETING THE FOLLOWING GRADATION:

SIEVE SIZE	PERCENT FINER BY WEIGHT
6 INCH	100
NO. 1/4"	25 - 100
NO. 40	0 - 50
NO. 200	0 - 0.7

24. CONTACT DIGSAFE AT LEAST 72 HOURS, NOT INCLUDING SATURDAYS, SUNDAYS, AND LEGAL MASSACHUSETTS HOLIDAYS, BUT NOT MORE THAN 20 CALENDAR DAYS PRIOR TO THE COMMENCEMENT OF EXCAVATION.

25. THE CONTRACTOR SHALL REMOVE ALL EXISTING UNDERGROUND UTILITIES AS ENCOUNTERED DURING BUILDING DEMOLITION.

ACCESSIBILITY NOTES

GENERAL NOTES:

1. SPECIAL ATTENTION SHALL BE GIVEN TO COMPLIANCE WITH THE MASSACHUSETTS ARCHITECTURAL ACCESS BOARD (AAB) RULES AND REGULATIONS AND THE AMERICANS DISABILITIES ACT STANDARDS FOR ACCESSIBLE DESIGN (ADAAG).
2. IT IS ESSENTIAL THAT CONTRACTORS BE AWARE OF THE SITE ACCESSIBILITY REQUIREMENTS. THESE NOTES AND DETAILS ARE INTENDED TO ASSURE THAT CONTRACTORS ARE AWARE OF THE REQUIREMENTS AT THE TIME WHEN THEY ARE BIDDING THE PROJECT. IF SLOPES / GRADES AND DIMENSIONS ARE NOT ACHIEVABLE, THE CONTRACTOR IS REQUIRED TO CONTACT THE OWNER IMMEDIATELY, BEFORE MOVING FORWARD WITH THE WORK.
3. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND CIVIL ENGINEER IMMEDIATELY OF ANY CONFLICT BETWEEN THESE NOTES AND DETAILS AND OTHER PROJECT DRAWINGS, WHETHER BY BEALS ASSOCIATES, INC. OR OTHERS. THE CONTRACTOR SHALL NOT PROCEED WITH THE WORK FOR WHICH THE ALLEGED CONFLICT HAS BEEN DISCOVERED UNTIL SUCH ALLEGED CONFLICT HAS BEEN RESOLVED. NO CLAIM SHALL BE MADE BY THE CONTRACTOR FOR DELAY DAMAGES AS A RESULT OF RESOLUTION OF ANY SUCH CONFLICT(S).
4. AAB REGULATIONS DO NOT ALLOW ANY TOLERANCE ON SLOPE REQUIREMENTS AND THE MAXIMUM SLOPES LISTED BELOW CAN NOT BE EXCEEDED.
5. IT IS RECOMMENDED THAT THE CONTRACTOR USE A 2-FOOT DIGITAL LEVEL TO VERIFY SLOPES PRIOR TO PLACING THE FINSHED SURFACE. IT IS FURTHER RECOMMENDED THAT FORMS BE CHECKED PRIOR TO PLACING CONCRETE OR ASPAHLT.
6. THESE ACCESSIBILITY NOTES AND DETAILS ARE INTENDED TO DEPICT SLOPE AND DIMENSIONAL REQUIREMENTS ONLY. REFER TO SIDEWALK, CURBING, AND PAVEMENT DETAILS FOR ADDITIONAL INFORMATION.

ACCESSIBLE ROUTE NOTES:

1. AT LEAST ONE ACCESSIBLE ROUTE SHALL BE PROVIDED WITHIN THE SITE FROM ACCESSIBLE PARKING SPACES AND ACCESSIBLE PASSENGER LOADING ZONES; PUBLIC STREETS OR SIDEWALKS; AND PUBLIC TRANSPORTATION STOPS TO THE ACCESSIBLE BUILDING OR FACILITY THEY SERVE.
2. AT LEAST ONE ACCESSIBLE ROUTE SHALL CONNECT ACCESSIBLE BUILDINGS, ACCESSIBLE FACILITIES, ACCESSIBLE ELEMENTS, AND ACCESSIBLE SPACES THAT ARE ON THE SAME SITE.
3. DIRECTIONAL SIGNAGE INDICATING THE ROUTE TO THE NEAREST ACCESSIBLE BUILDING ENTRANCE SHALL BE PROVIDED AT INACCESSIBLE BUILDING ENTRANCES.
4. TRANSITIONS BETWEEN RAMPS, WALKS, LANDINGS, GUTTERS OR STREETS SHALL BE FLUSH AND FREE OF ABRUPT VERTICAL CHANGES (1/4 INCH MAXIMUM VERTICAL CHANGE).

WALKWAYS:

1. WIDTH OF WALKWAYS SHALL NOT BE LESS THAN 48 INCHES, EXCLUDING CURB STONES.
2. WALKWAYS SHALL PROVIDE A MINIMUM OF 36 INCHES CLEAR, UNOBSTRUCTED PATH OF TRAVEL PAST ALL OBSTRUCTIONS. (I.E. UTILITY POLES, SIGNS, FIRE HYDRANTS, ETC.)
3. WALKING SURFACES SHALL HAVE A MAXIMUM RUNNING SLOPE OF 5.0% AND A MAXIMUM CROSS SLOPE OF 2.0%.
4. AT THE INTERSECTION OF TWO SIDEWALKS, THERE SHALL BE A LEVEL LANDING WITH NO SLOPE GREATER THAN 2% IN ANY DIRECTION.
5. ANY WALKING SURFACE WITH A RUNNING SLOPE GREATER THAN 5.0% IS CONSIDERED A RAMP AND SHALL COMPLY WITH THE GUIDELINES FOR RAMPS OR CURB CUT RAMPS.
6. ACCESSIBLE ROUTE SURFACES SHALL BE STABLE, FIRM AND SLIP RESISTANT.
7. IF CATCH BASINS OR OTHER GRATINGS ARE LOCATED WITHIN AN ACCESSIBLE ROUTE, THEN AN ADA GRATE SHALL BE USED WITH SPACES NO GREATER THAN ½ INCH WIDE IN THE DIRECTION OF TRAVEL.

RAMPS:

1. ANY PART OF AN ACCESSIBLE ROUTE WITH A RUNNING SLOPE GREATER THAN 5% SHALL BE CONSIDERED A RAMP OR A CURB CUT RAMP.
2. THE MAXIMUM RUNNING SLOPE FOR A RAMP SHALL BE 7.5% AND THE MAXIMUM CROSS SLOPE SHALL BE 1.5%
3. THE CLEAR WIDTH OF A RAMP SHALL BE 48 INCHES MINIMUM AS MEASURED BETWEEN THE HANDRAILS.
4. THE MAXIMUM RISE FOR ANY RAMP RUN SHALL BE 30 INCHES.
5. LANDINGS SHALL BE PROVIDED AT THE TOP AND BOTTOM OF RAMPS. LANDINGS SHALL HAVE A SLOPE NOT STEEPER THAN 2.0% IN ANY DIRECTION. THE LANDING CLEAR WIDTH SHALL BE AT LEAST AS WIDE AS THE WIDEST RAMP RUN LEADING TO THE LANDING. THE LANDING CLEAR LENGTH SHALL BE SIXTY (60) INCHES LONG MINIMUM. RAMPS THAT CHANGE DIRECTIONS BETWEEN RUNS AT LANDINGS SHALL HAVE A CLEAR LANDING OR SIXTY (60) INCHES BY SIXTY (60) INCHES MINIMUM.
6. EDGE PROTECTION COMPLYING WITH AAB AND ADAAG REQUIREMENTS SHALL BE PROVIDED ON EACH SIDE OF RAMP RUNS AND ON EACH SIDE OF RAMP LANDINGS.
7. WHERE DOORWAYS ARE LOCATED ADJACENT TO A RAMP LANDING, MANEUVERING CLEARANCES REQUIRED BY 521 CMR FIGURES 26d AND 26e SHALL BE COMPLIED WITH.

CURB CUT RAMPS:

1. CURB CUT RAMPS ARE REQUIRED AT THE CORNER OF EACH INTERSECTION AND WHERE A PEDESTRIAN PATH OF TRAVEL CROSSES A ROAD, DRIVEWAY OR OTHER VEHICULAR WAY.
2. THE MAXIMUM RUNNING SLOPE OF A CURB CUT RAMP SHALL BE 7.5% AND THE MAXIMUM CROSS SLOPE SHALL BE 1.5%.
3. CURB CUT RAMPS MAY EXTEND UP TO 15 FEET IN LENGTH.
4. MAXIMUM SLOPES OF ADJOINING GUTTERS AND ROAD SURFACES IMMEDIATELY ADJACENT TO THE CURB CUT RAMP SHALL NOT BE STEEPER THAN 5%. THE ADJACENT SURFACES AT TRANSITIONS AT CURB CUT RAMPS TO WALKS, CUTTERS AND STREETS SHALL BE AT THE SAME LEVEL.
5. THE MINIMUM CLEAR WIDTH OF A CURB CUT RAMP SHALL BE 36 INCHES, EXCLUSIVE OF FLARED SIDES, IF PROVIDED.
6. LANDINGS SHALL BE PROVIDED AT THE TOP OF CURB CUT RAMPS. THE CLEAR LENGTH OF THE LANDING SHALL BE 48 INCHES MINIMUM. THE CLEAR WIDTH OF THE LANDING SHALL BE AT LEAST AS WIDE AS THE CURB CUT RAMP, EXCLUDING FLARED SIDES, LEADING TO THE LANDING. LANDINGS SHALL HAVE A SLOPE NOT STEEPER THAN 2% IN ANY DIRECTION.
7. IF A CURB CUT RAMP IS LOCATED WHERE PEDESTRIANS MUST WALK ACROSS THE RAMP, OR WHERE IT IS NOT PROTECTED BY HANDRAILS OR GUARDRAILS, IT SHALL HAVE FLARED SIDES.
8. WHERE PROVIDED, CURB CUT RAMP FLARES SHALL NOT EXCEED 10%. IF THE CLEAR LENGTH OF THE LANDING IS LESS THAN FORTY-EIGHT (48) INCHES THAN THE SLOPE OF THE FLARED SIDES SHALL NOT EXCEED 8.33%.
9. CURB CUT RAMPS AND THE FLARED SIDES OF CURB CUT RAMPS SHALL BE LOCATED SO THAT THEY DO NOT PROJECT INTO VEHICULAR TRAFFIC LANES PARKING SPACES OR PARKING ACCESS AISLES. CURBS AT MARKED CROSSINGS SHALL BE WHOLLY CONTAINED WITHIN THE MARKINGS, EXCLUDING ANY FLARED SIDES.
10. CURB CUT RAMPS SHALL BE LOCATED OR PROTECTED TO PREVENT THEIR OBSTRUCTION BY PARKED VEHICLES.
11. CURB CUT RAMPS SHALL HAVE A TWENTY-FOUR (24) INCH DEEP DETECTABLE WARNING PANEL COMPLYING WITH ADAAG, EXTENDING THE FULL WIDTH OF THE RAMP. REFER TO DETECTABLE WARNING DETAILS AND NOTES FOR PLACEMENT.
12. WHERE PROVIDED, STOP LINES SHALL BE LOCATED IN ADVANCE OF CURB CUT RAMP.
13. WHERE PROVIDED, DRAINAGE INLETS SHALL BE LOCATED UPSTREAM OF CURB RAMPS AND NOT IN THE RAMP AREA.
14. CURB CUT RAMP TYPE AND LOCATION ARE SHOWN ON PLAN.

ACCESSIBLE PARKING SPACES:

1. ACCESSIBLE PARKING SPACES SHALL BE LOCATED ON THE SHORTEST ACCESSIBLE ROUTES OF TRAVEL FROM ADJACENT PARKING TO AN ACCESSIBLE BUILDING ENTRANCE.
2. ACCESSIBLE PARKING SPACES AND ACCESS AISLES SHALL BE AT LEAST 8 FEET WIDE. WHERE PARKING SPACES AND ACCESS AISLES ARE MARKED WITH LINES THE WIDTH MEASUREMENTS SHALL BE MADE FROM CENTERLINE OF THE MARKINGS.
3. PARKING ACCESS AISLES SHALL BE PART OF AN ACCESSIBLE ROUTE TO THE BUILDING OR FACILITY ENTRANCE AND SHALL COMPLY WITH PROVISIONS FOR ACCESSIBLE ROUTES.
4. TWO (2) ACCESSIBLE PARKING SPACES MAY SHARE A COMMON ACCESS AISLE.
5. ACCESS AISLES SHALL EXTEND THE FULL LENGTH OF THE PARKING SPACE THEY SERVE.
6. ACCESS AISLES SHALL NOT OVERLAP THE VEHICULAR WAY. ACCESS AISLES SHALL BE PERMITTED TO BE PLACED ON EITHER SIDE OF THE PARKING SPACE EXCEPT FOR ANGLED VAN PARKING SPACES WHICH SHALL HAVE ACCESS AISLES LOCATED ON THE PASSENGER SIDE OF THE PARKING SPACES.
7. SURFACES OF PARKING SPACES AND ACCESS AISLES SERVING THEM SHALL BE STABLE, FIRM AND SLIP RESISTANT. ACCESS AISLES SHALL BE AT THE SAME LEVEL AS THE PARKING SPACES THEY SERVE.
8. PARKING SPACES AND ACCESS AISLES SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 2.0% IN ANY DIRECTIONS.
9. PARKED VEHICLE OVERHANGS SHALL NOT REDUCE THE REQUIRED CLEAR WIDTH OF AN ACCESSIBLE ROUTE.
10. PARKING SPACES FOR VANS AND ACCESS AISLES AND VEHICULAR ROUTES SERVING THEM SHALL PROVIDE A VERTICAL CLEARANCE OF 8 FEET 2 INCHES (8'2") MINIMUM. SIGNS SHALL BE PROVIDED AT ENTRANCES TO PARKING FACILITIES INFORMING DRIVERS OF CLEARANCES AND THE LOCATION OF VAN ACCESSIBLE PARKING SPACES.
11. EACH ACCESSIBLE PARKING SPACE SHALL BE PROVIDED WITH SIGNAGE DISPLAYING THE INTERNATIONAL SYMBOL OF ACCESSIBILITY. EACH ACCESS AISLE SHALL BE CLEARLY MARKED BY MEANS OF DIAGONAL STRIPES. SIGNS SHALL BE INSTALLED AT A CLEAR HEIGHT OF BETWEEN 5 FEET AND 8 FEET TO THE TOP OF THE SIGN AND SHALL NOT INTERFERE WITH AN ACCESSIBLE ROUTE FROM AN ACCESS AISLE. SIGNS LOCATED WHERE THEY MAY BE HIT BY VEHICLES BEING PARKED SHALL BE INSTALLED WITH BOLLARD PROTECTION.
12. ACCESSIBLE PARKING SPACE, ACCESS AISLE STRIPING, AND INTERNATIONAL SYMBOL OF ACCESSIBILITY SHALL BE PAINTED BLUE.

PASSENGER LOADING ZONES:

1. PASSENGER LOADING ZONES SHALL PROVIDE VEHICULAR PULL-UP SPACE 8 FEET WIDE MINIMUM AND 20 FEET LONG MINIMUM.
2. PASSENGER LOADING ZONES SHALL PROVIDE A CLEARLY MARKED ACCESS AISLE THAT IS 5 FEET WIDE MINIMUM AND EXTENDS THE FULL LENGTH OF THE VEHICLE PULL-UP SPACE THEY SERVE.
3. ACCESS AISLE SHALL ADJOIN AND ACCESSIBLE ROUTE AND NOT OVERLAP THE VEHICULAR WAY.
4. VEHICLE PULL-UP SPACES AND ACCESS AISLES SERVING THEM SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 2.0% IN ANY DIRECTION. ACCESS AISLES SHALL BE AT THE SAME LEVEL AS THE VEHICLE PULL-UP SPACE THEY SERVE.
5. SURFACES OF VEHICLE PULL-UP SPACES AND ACCESS AISLES SERVING THEM SHALL BE STABLE, FIRM AND SLIP RESISTANT.
6. VEHICLE PULL-UP SPACES, ACCESS AISLES SERVING THEM AND A VEHICULAR ROUTE FROM AN ENTRANCE TO THE PASSENGER LOADING ZONE, AND FROM THE PASSENGER LOADING ZONE TO A VEHICULAR EXIT SERVING THEM, SHALL PROVIDE A VERTICAL CLEARANCE OF 9 FEET 6 INCHES (9'6") MINIMUM.

BUILDING ENTRANCES:

1. ALL PUBLIC ENTRANCES SHALL BE ACCESSIBLE.
2. THE APPROACH TO AN ACCESSIBLE ENTRANCE SHALL BE A PAVED WALK OR RAMP WITH A SLIP RESISTANT SURFACE, UNINTERRUPTED BY STEPS.
3. THE EXTERIOR LANDING AT THE ENTRANCE DOOR SHALL HAVE A LEVEL LANDING MEASURING AT LEAST 5 FEET BY 5 FEET AND SHALL NOT SLOPE MORE THAN 2% IN ANY DIRECTION.
4. THE LEVEL LANDING SHALL EXTEND A MINIMUM OR 18 INCHES WIDER THAN THE LATCH ON THE PULL SIDE OF THE DOOR.

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54 Main Street
Winchester, MA

No.	Revision	Date

COMMONWEALTH OF MASSACHUSETTS
TODD P. MOREY
CIVIL
No. 48865
REGISTERED PROFESSIONAL ENGINEER

8.17.2020

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Sheet Title
GENERAL NOTES

Sheet Number
C0.1

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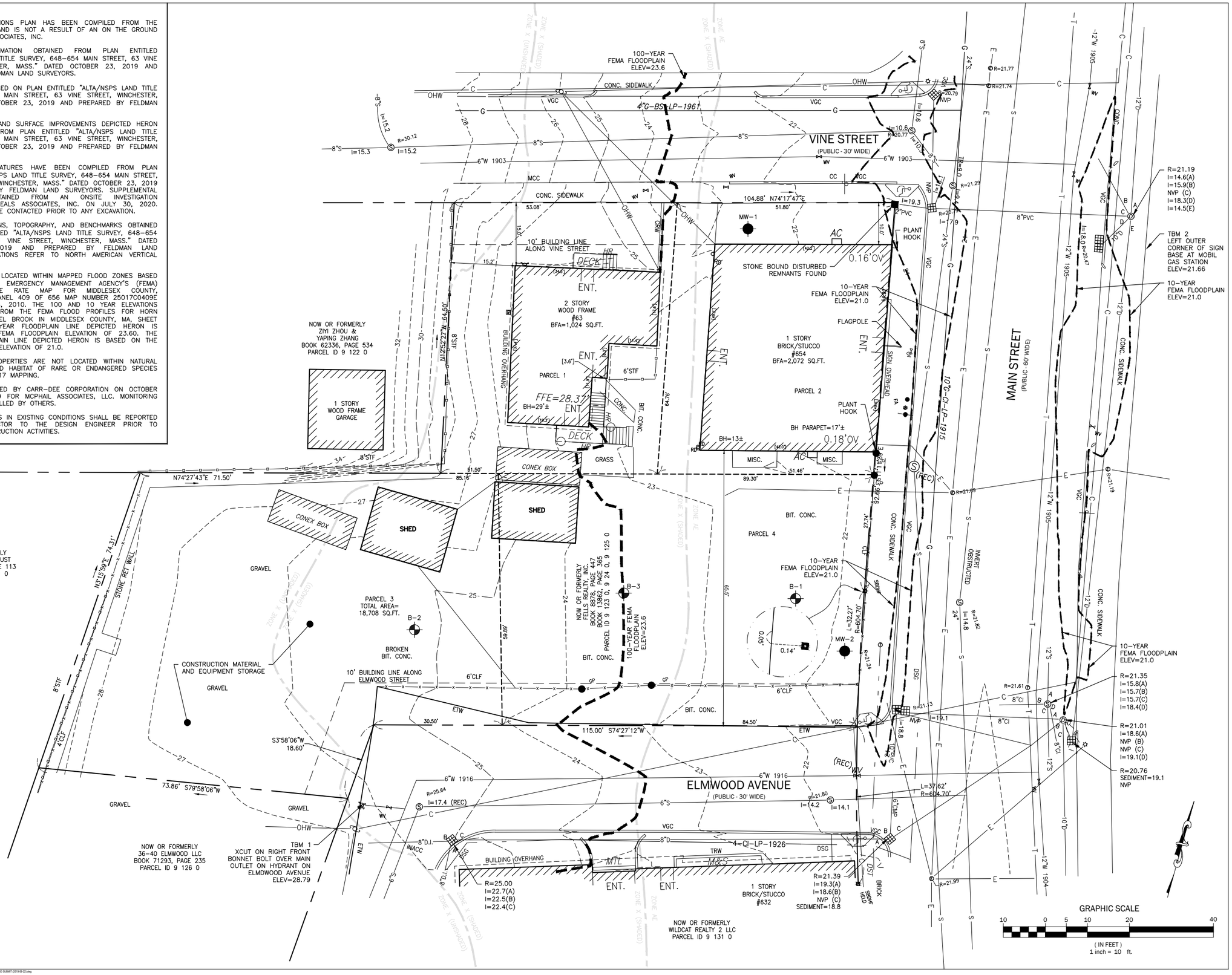
NOTES:
THE EXISTING CONDITIONS PLAN HAS BEEN COMPILED FROM THE FOLLOWING SOURCES AND IS NOT A RESULT OF AN ON THE GROUND SURVEY BY BEALS ASSOCIATES, INC.

1. BOUNDARY INFORMATION OBTAINED FROM PLAN ENTITLED "ALTA/NSPS LAND TITLE SURVEY, 648–654 MAIN STREET, 63 VINE STREET, WINCHESTER, MASS." DATED OCTOBER 23, 2019 AND PREPARED BY FELDMAN LAND SURVEYORS.
2. NORTH ARROW BASED ON PLAN ENTITLED "ALTA/NSPS LAND TITLE SURVEY, 648–654 MAIN STREET, 63 VINE STREET, WINCHESTER, MASS." DATED OCTOBER 23, 2019 AND PREPARED BY FELDMAN LAND SURVEYORS.
3. THE SITE DETAIL AND SURFACE IMPROVEMENTS DEPICTED HERON WERE OBTAINED FROM PLAN ENTITLED "ALTA/NSPS LAND TITLE SURVEY, 648–654 MAIN STREET, 63 VINE STREET, WINCHESTER, MASS." DATED OCTOBER 23, 2019 AND PREPARED BY FELDMAN LAND SURVEYORS.
4. UNDERGROUND FEATURES HAVE BEEN COMPILED FROM PLAN ENTITLED "ALTA/NSPS LAND TITLE SURVEY, 648–654 MAIN STREET, 63 VINE STREET, WINCHESTER, MASS." DATED OCTOBER 23, 2019 AND PREPARED BY FELDMAN LAND SURVEYORS. SUPPLEMENTAL INFORMATION OBTAINED FROM AN ONSITE INVESTIGATION PERFORMED BY BEALS ASSOCIATES, INC. ON JULY 30, 2020. DIG–SAFE SHALL BE CONTACTED PRIOR TO ANY EXCAVATION.
5. EXISTING ELEVATIONS, TOPOGRAPHY, AND BENCHMARKS OBTAINED FROM PLAN ENTITLED "ALTA/NSPS LAND TITLE SURVEY, 648–654 MAIN STREET, 63 VINE STREET, WINCHESTER, MASS." DATED OCTOBER 23, 2019 AND PREPARED BY FELDMAN LAND SURVEYORS. ELEVATIONS REFER TO NORTH AMERICAN VERTICAL DATUM OF 1988.
6. THE PROPERTY IS LOCATED WITHIN MAPPED FLOOD ZONES BASED ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY'S (FEMA) FLOOD INSURANCE RATE MAP FOR MIDDLESEX COUNTY, MASSACHUSETTS PANEL 409 OF 656 MAP NUMBER 25017C0409E EFFECTIVE JUNE 4, 2010. THE 100 AND 10 YEAR ELEVATIONS WERE OBTAINED FROM THE FEMA FLOOD PROFILES FOR HORN POND BROOK/FOWEL BROOK IN MIDDLESEX COUNTY, MA, SHEET 261P. THE 100–YEAR FLOODPLAIN LINE DEPICTED HERON IS BASED ON THE FEMA FLOODPLAIN ELEVATION OF 23.60. THE 10–YEAR FLOODPLAIN LINE DEPICTED HERON IS BASED ON THE FEMA FLOODPLAIN ELEVATION OF 21.0.
7. THE SUBJECT PROPERTIES ARE NOT LOCATED WITHIN NATURAL HERITAGE ESTIMATED HABITAT OF RARE OR ENDANGERED SPECIES BASED ON THE 2017 MAPPING.
8. BORINGS PERFORMED BY CARR–DEE CORPORATION ON OCTOBER 23 AND 24, 2019 FOR MCPHAIL ASSOCIATES, LLC. MONITORING WELLS WERE INSTALLED BY OTHERS.
9. ANY DISCREPANCIES IN EXISTING CONDITIONS SHALL BE REPORTED BY THE CONTRACTOR TO THE DESIGN ENGINEER PRIOR TO ADDITIONAL CONSTRUCTION ACTIVITIES.



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COMMONWEALTH OF MASSACHUSETTS
TODD P. MOROTY
CIVIL
No. 48055
REGISTERED PROFESSIONAL ENGINEER
8.17.2020

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Sheet Title
EXISTING CONDITIONS PLAN

Sheet Number
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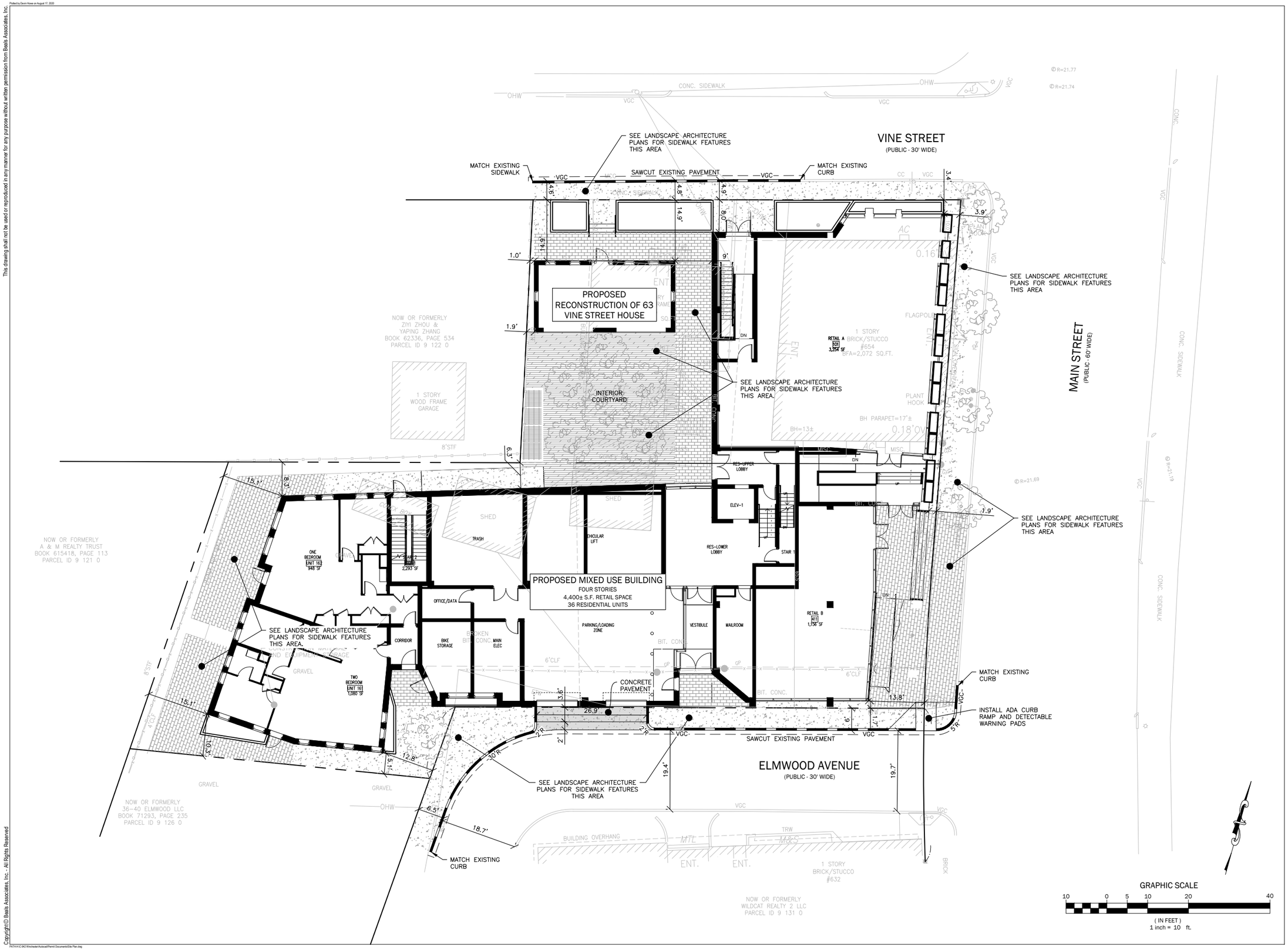

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Sheet Title
SITE LAYOUT AND MATERIALS PLAN

Sheet Number
C2.0

654 MAIN STREET - WINCHESTER, MASSACHUSETTS
18 August, 2020

C2.1 Landscaping Plan

SCALE 1" = 20'-0"
10' 5' 0' 10' 20'

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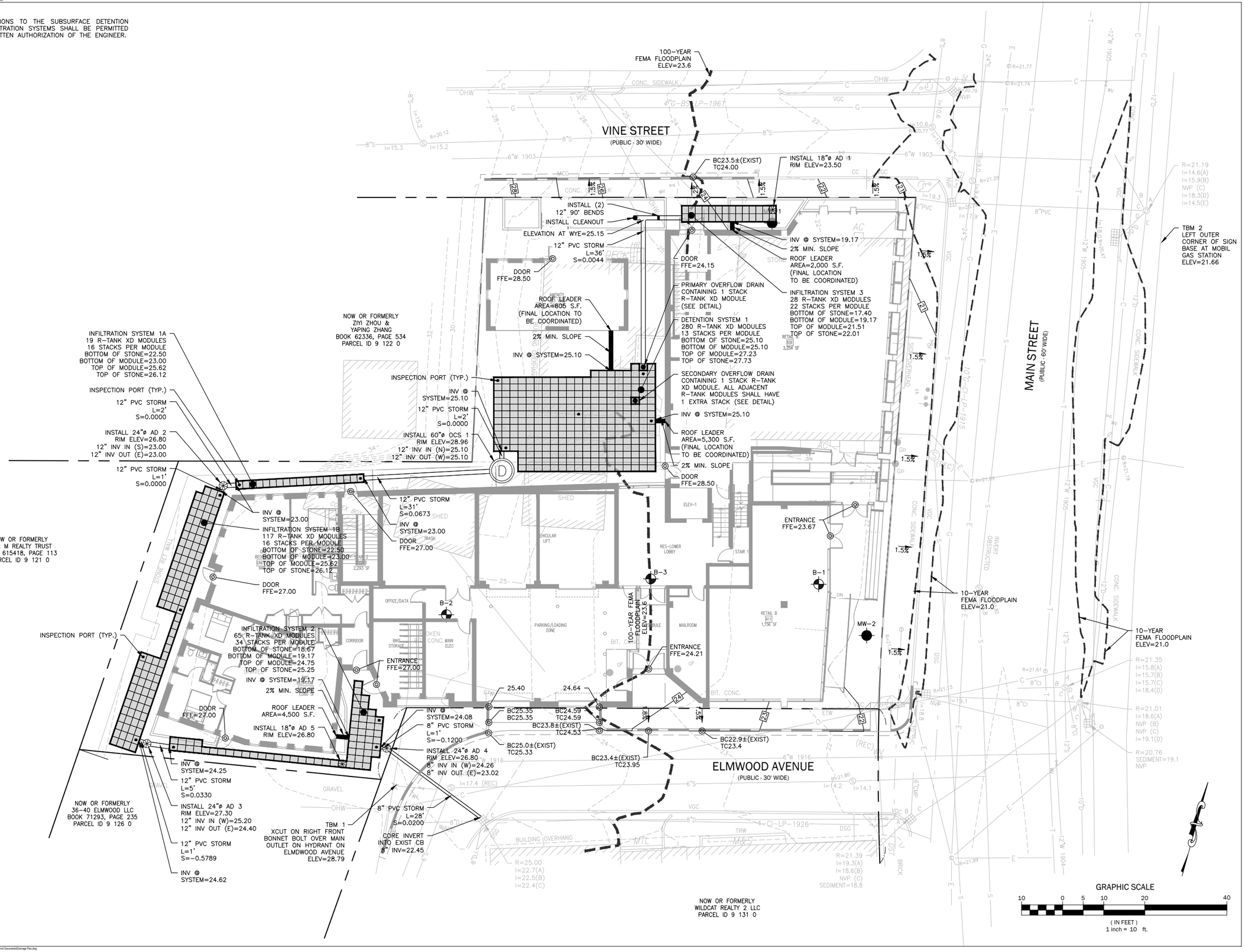
NOTE:
SUBSTITUTIONS TO THE SUBSURFACE DETENTION AND INFILTRATION SYSTEMS SHALL BE PERMITTED UPON WRITTEN AUTHORIZATION OF THE ENGINEER.



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Sheet Title
GRADING AND DRAINAGE PLAN

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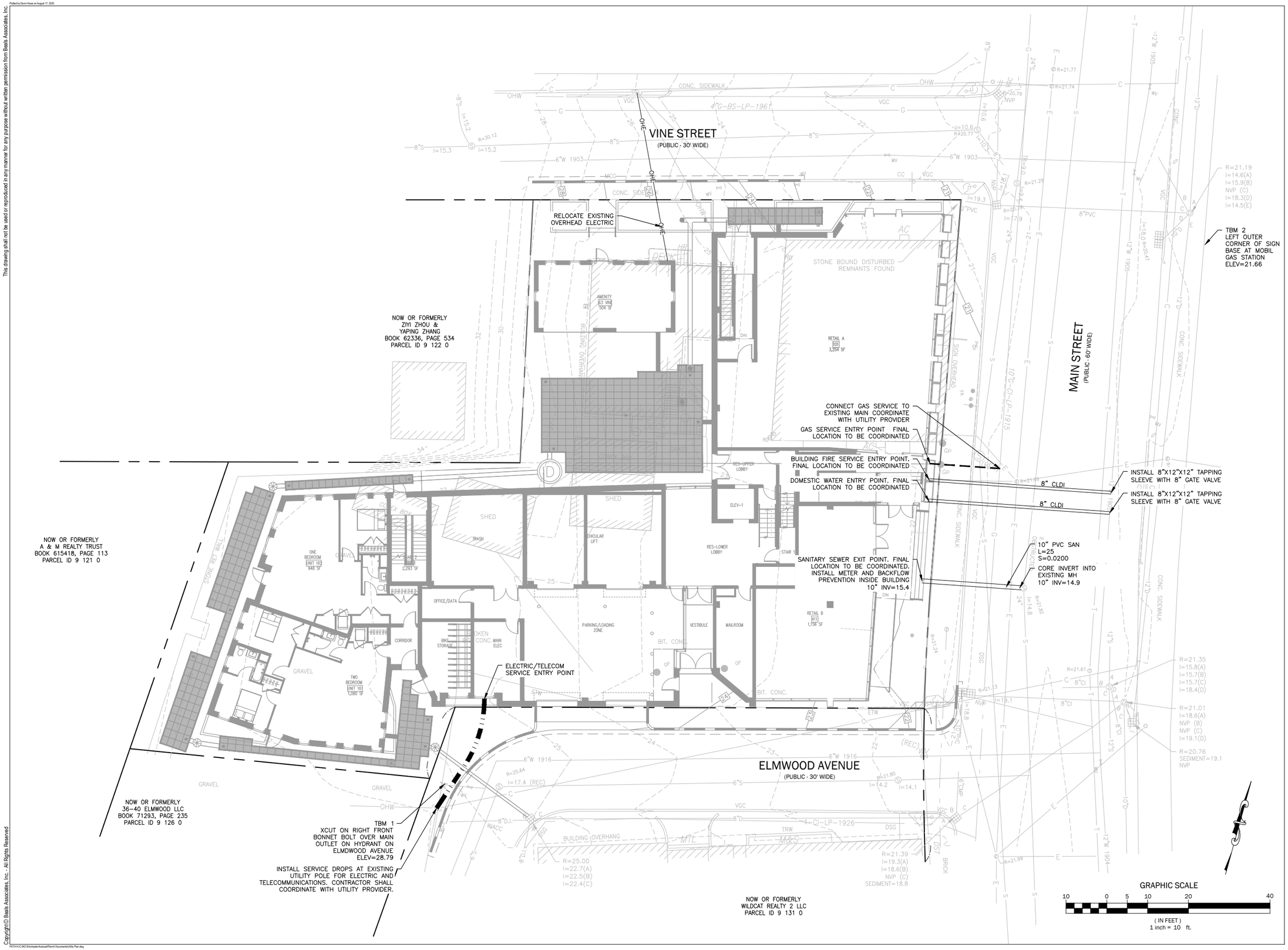

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Sheet Title
UTILITY PLAN

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C4.0

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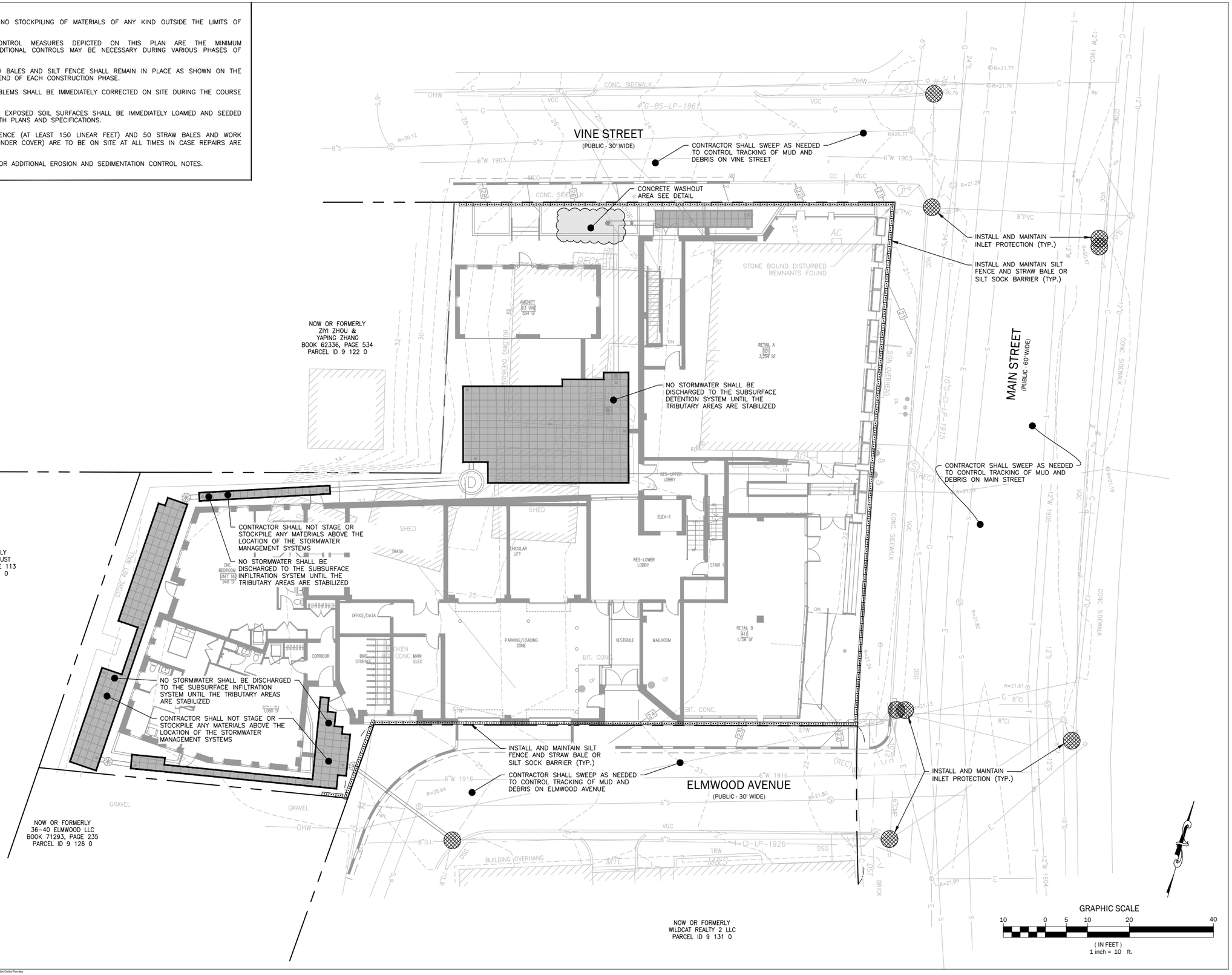
NOTES:

1. THERE SHALL BE NO STOCKPILING OF MATERIALS OF ANY KIND OUTSIDE THE LIMITS OF WORK.
2. THE EROSION CONTROL MEASURES DEPICTED ON THIS PLAN ARE THE MINIMUM REQUIREMENTS. ADDITIONAL CONTROLS MAY BE NECESSARY DURING VARIOUS PHASES OF CONSTRUCTION.
3. ALL STAKED STRAW BALES AND SILT FENCE SHALL REMAIN IN PLACE AS SHOWN ON THE PLANS UNTIL THE END OF EACH CONSTRUCTION PHASE.
4. ANY EROSION PROBLEMS SHALL BE IMMEDIATELY CORRECTED ON SITE DURING THE COURSE OF CONSTRUCTION.
5. ALL DISTURBED OR EXPOSED SOIL SURFACES SHALL BE IMMEDIATELY LOAMED AND SEEDED IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.
6. ADDITIONAL SILT FENCE (AT LEAST 150 LINEAR FEET) AND 50 STRAW BALES AND WORK STAKES (STORED UNDER COVER) ARE TO BE ON SITE AT ALL TIMES IN CASE REPAIRS ARE NECESSARY.
7. SEE SHEET C5.1 FOR ADDITIONAL EROSION AND SEDIMENTATION CONTROL NOTES.



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Sheet Title
EROSION AND SEDIMENTATION CONTROL PLAN

Sheet Number
C5.0

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3. EROSION CONTROL NARRATIVE

a. OVERVIEW OF SOIL EROSION AND SEDIMENTATION CONCERNS

THE GENERAL GOALS OF THE EROSION AND SEDIMENT CONTROL PLAN ARE:

- PLAN THE PROJECT TO BE CONSTRUCTED FROM AREAS OF FLATTER GRADES AND AWAY FROM RESOURCES OR THE PROPERTY BOUNDARIES TO THE EXTENT PRACTICAL.
- DEVELOP A CAREFUL CONSTRUCTION SEQUENCE.
- RAPID STABILIZATION OF DENUDED AREAS TO MINIMIZE THE PERIOD OF SOIL EXPOSURE.
- RAPID STABILIZATION OF DRAINAGE PATHS TO AVOID RILL AND GULLY EROSION.
- THE USE OF ONSITE MEASURES TO CAPTURE SEDIMENT (STRAW BALES, SILT FENCE, ETC.,)
- PROTECTION OF NATURAL RESOURCE AREAS AND DRAINAGE COURSES THROUGH BUFFERING AND THE USE OF BEST MANAGEMENT PRACTICES.
- THE IMPLEMENTATION OF LONG-TERM MEASURES FOR EROSION/SEDIMENT POLLUTION TREATMENT THROUGH THE CONSTRUCTION OF PERMANENT WATER QUALITY MEASURES.

THE CONTRACTOR IS RESPONSIBLE FOR ALL EROSION CONTROL MEANS AND METHODS ON THE SITE. THE NARRATIVES AND PLANS WITHIN THE CONTRACT DOCUMENTS ARE ANTICIPATED TO BE THE MINIMUM AMOUNT OF EROSION CONTROL NECESSARY, AND ADJUSTMENTS MAY NEED TO BE MADE DURING THE CONSTRUCTION PHASE IN RESPONSE TO WEATHER, UNFORESEEN CONDITIONS OR OTHER FACTORS WHICH COULD IMPACT SOIL EROSION.

b. EROSION AND SEDIMENT CONTROL DEVICES

PRIOR TO AND DURING THE DEVELOPMENT OF THE CONSTRUCTION ACTIVITIES, THE SITE CONTRACTOR SHALL IMPLEMENT AT A MINIMUM THE FOLLOWING EROSION AND SEDIMENTATION CONTROL MEASURES.

SILTATION FENCE

SILTATION FENCE SHALL BE INSTALLED DOWNSTREAM OF ANY DISTURBED AREAS TO TRAP RUNOFF BORNE SEDIMENTS UNTIL THE SITE HAS BEEN STABILIZED. THE SILT FENCE SHALL BE INSTALLED PER THE DETAILS ON THE CONSTRUCTION PLANS AND INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. REPAIRS SHALL BE MADE IMMEDIATELY BY THE CONTRACTOR IF THERE ARE ANY SIGNS OF EROSION OR SEDIMENTATION BELOW THE SILT FENCE LINE. IF SUCH EROSION IS OBSERVED, THE CONTRACTOR SHALL TAKE PROACTIVE ACTION TO IDENTIFY THE CAUSE OF THE EROSION AND TAKE ACTION TO AVOID ITS REOCCURRENCE. TYPICALLY, THIS REQUIRES THAT STABILIZATION MEASURES BE TAKEN TO THE DISTURBED TRIBUTARY AREA. PROPER PLACEMENT OF STAKES AND KEYING THE BOTTOM OF THE FABRIC INTO THE GROUND IS CRITICAL FOR THE FILTER'S EFFECTIVENESS. IF THERE ARE SIGNS OF UNDERCUTTING AT THE CENTER OR THE EDGES, OR IMPOUNDING OF LARGE VOLUMES OF WATER BEHIND THE FENCE, THE BARRIER SHALL BE REPLACED WITH A STONE CHECK DAM AND MEASURES TAKEN TO AVOID THE CONCENTRATION OF FLOWS NOT INTENDED TO BE DIRECTED TO THE SILT FENCE.

STRAW MULCH

STRAW MULCH INCLUDING HYDRO SEEDING IS INTENDED TO PROVIDE COVER FOR DENUDED OR SEEDED AREAS UNTIL REVEGETATION IS ESTABLISHED. MULCHING SHOULD BE OCCURRING SEVERAL TIMES PER WEEK WHEN THE SITE CONSTRUCTION ACTIVITY IS HIGH AND AT SUFFICIENT INTERVALS TO REDUCE THE PERIOD OF EXPOSURE OF BARE SOILS TO THE TIME LIMITS SET FORTH IN THIS PLAN. MULCH PLACED ON SLOPES OF LESS THAN 10 PERCENT SHALL BE ANCHORED BY APPLYING WATER; MULCH PLACED ON SLOPES STEEPER THAN 10 PERCENT SHALL BE COVERED WITH FABRIC NETTING AS IMMEDIATELY AFTER MULCHING AS PRACTICABLE AND ANCHORED WITH STAPLES IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. PROPOSED DRAINAGE CHANNELS, WHICH ARE TO BE REVEGETATED, SHALL RECEIVE CURLEX BLANKETS BY AMERICAN EXCELSIOR OR NORTH AMERICAN GREEN SELECTED FOR THE SLOPE, VELOCITY, AND WHETHER THE MEASURE IS TEMPORARY OR INTENDED TO BE IN PLACE FOR A SUSTAINED PERIOD. STRAW MULCH SHALL BE AVAILABLE ON SITE AT ALL TIMES IN ORDER TO PROVIDE IMMEDIATE TEMPORARY STABILIZATION WHEN NECESSARY.

TEMPORARY STORMWATER SETTLEMENT BASINS

TEMPORARY STORMWATER SETTLEMENT BASINS MAY BE CONSTRUCTED TO PROVIDE SEDIMENTATION CONTROL FOR STORMWATER RUNOFF FROM THE INDIVIDUAL SITE AREAS DURING CONSTRUCTION. THESE BASINS MAY BECOME NECESSARY WHERE OTHER EROSION CONTROL MEASURES ARE NOT ADEQUATE TO PREVENT OFFSITE SEDIMENTATION. THE BASIN SHOULD ONLY BE USED WHERE THERE IS SUFFICIENT SPACE AND APPROPRIATE TOPOGRAPHY. THE BASIN SHOULD BE LARGE ENOUGH TO HANDLE THE MAXIMUM AMOUNT OF EXPECTED SITE DRAINAGE. THE BASIN MAY BE CONSTRUCTED BY EXCAVATION, CONSTRUCTION OF A COMPACTED EMBANKMENT OR A COMBINATION OF BOTH. IT MAY HAVE ONE OR MORE INFLOW POINTS CARRYING POLLUTED RUNOFF. TO IMPROVE TRAP EFFICIENCY, THE BASIN SHOULD HAVE THE MAXIMUM SURFACE AREA POSSIBLE AND SEDIMENT SHOULD ENTER THE BASIN AS FAR FROM THE OUTLET AS POSSIBLE. THIS PROPOSED INFILTRATION MAY BE USED AS A TEMPORARY SEDIMENT BASIN DURING CONSTRUCTION. CONTRACTOR SHALL INSTALL FILTER FABRIC (MIRAFI 140n OR EQUAL) ON THE BOTTOM OF BASIN PRIOR TO DISCHARGE TO BASIN TO PROTECT SOILS FOR FUTURE INFILTRATION. FABRIC SHALL COVER THE ENTIRE BOTTOM AND EXTEND A MINIMUM THREE FEET UP SIDESLOPES. FABRIC SHALL REMAIN IN PLACE UNTIL SITE HAS BEEN PAVED AND/OR STABILIZED. ENGINEER SHALL INSPECT BOTTOM OF BASIN UPON REMOVAL OF FABRIC TO DETERMINE SUITABILITY OF BASIN FOR INFILTRATION.

RIPRAP SLOPES AND DITCH LININGS

RIPRAP CAN BE USED AS A TEMPORARY (OR PERMANENT) METHOD TO PROTECT DENUDED GROUND FROM RUNOFF WITH EROSIVE VELOCITIES BY DISSIPATING ENERGY AND SLOWING DOWN SURFACE WATER RUNOFF. WELL GRADED RIPRAP FORMS A DENSE, FLEXIBLE, SELF-HEALING COVER THAT ADAPTS WELL TO UNEVEN SURFACES. RIPRAP SHOULD BE PLACED ON A PROPER FILTER MATERIAL OF SAND, GRAVEL OR FABRIC TO PREVENT SOIL FROM PIPING THROUGH THE STONE. FOR MOST APPLICATIONS, GRADED RIPRAP IS PREFERRED TO UNIFORM RIPRAP. GRADED RIPRAP FORMS A FLEXIBLE SELF-HEALING COVER WHILE UNIFORM RIPRAP IS MORE RIGID AND CANNOT WITHSTAND THE MOVEMENT OF THE STONES. GRADED RIPRAP IS CHEAPER TO INSTALL, REQUIRING ONLY THAT THE STONES BE DUMPED SO THAT THEY REMAIN IN A WELL-GRADED MASS. HAND OR MECHANICAL PLACEMENT OF INDIVIDUAL STONES IS LIMITED TO THAT NECESSARY TO ACHIEVE THE PROPER THICKNESS AND LINE. UNIFORM RIPRAP REQUIRES PLACEMENT IN A MORE OR LESS UNIFORM PATTERN, REQUIRING MORE HAND OR MECHANICAL LABOR.

STONE CHECK DAMS

A CHECK DAM IS A SMALL DAM CONSTRUCTED ACROSS A DRAINAGE DITCH, SWALE OR CHANNEL TO REDUCE THE VELOCITY OF THE SURFACE RUNOFF. REDUCED RUNOFF VELOCITY REDUCES EROSION AND GULLYING IN THE CHANNEL AND ALLOWS THE SEDIMENT TO SETTLE OUT. WHERE TEMPORARY CHANNELS OR PERMANENT CHANNELS ARE NOT YET VEGETATED, CHANNEL LINING IS INFEASIBLE AND VELOCITY CHECKS ARE REQUIRED. THIS PRACTICE MAY BE USED AS A TEMPORARY OR EMERGENCY MEASURE TO LIMIT EROSION BY REDUCING FLOW IN SMALL OPEN CHANNELS.

STRAW BALE BARRIERS

STRAW BALE BARRIERS ARE USED SIMILARLY TO SILT FENCE SPECIFICALLY WHERE THE AREA BELOW THE BARRIER IS UNDISTURBED AND VEGETATED. STRAW BALE BARRIERS REQUIRE MORE MAINTENANCE THAN SILT FENCE BARRIERS AND PERMEABILITY THROUGH BALE BARRIERS IS SLOWER THAN SILT FENCE. STRAW BALE BARRIERS SHOULD BE LOCATED WHERE THEY WILL TRAP SEDIMENT. STRAW BALES LOCATED ALONG THE TOP OF A RIDGE SERVE NO USEFUL PURPOSE. STRAW BALE BARRIERS SHALL BE REPLACED WHEN THEY HAVE REACHED THEIR USEFUL LIFE AND THE UPSLOPE AREAS UNSTABILIZED.

CULVERT OUTLET APRONS

OUTLET PROTECTION SHOULD BE INSTALLED AT ALL PIPE, CULVERT OR SWALE OUTLETS WHERE VELOCITY OF FLOW MAY CAUSE EROSION AT THE PIPE OUTLET AND IN THE RECEIVING CHANNEL. EROSION AT THESE LOCATIONS IS COMMON AND CAN CAUSE STRUCTURAL FAILURE WITH SERIOUS DOWNSTREAM PROBLEMS. A RIPRAP LINED APRON IS THE MOST COMMONLY USED STRUCTURE FOR THIS PURPOSE BECAUSE IT HAS RELATIVELY LOW COST AND CAN BE INSTALLED EASILY ON MOST SITES.

CONSTRUCTION ENTRANCE

A CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED AT ALL ACCESS POINTS ONTO THE SITE TO PREVENT TRACKING OF SOIL ONTO ADJACENT LOCAL ROADS. PROPOSED CONSTRUCTION ENTRANCES ARE SHOWN ON THE EROSION AND SEDIMENTATION CONTROL PLAN. CONSTRUCTION ENTRANCES PROVIDE AN AREA WHERE MUD CAN BE REMOVED FROM VEHICLE TIRES BEFORE THEY ENTER A PUBLIC ROAD. IF THE ACTION OF THE VEHICLE TRAVELING OVER THE GRAVEL PAD IS NOT SUFFICIENT TO REMOVE THE MAJORITY OF THE MUD, THEN TIRES MUST BE WASHED BEFORE THE VEHICLE ENTERS A PUBLIC ROAD.

INLET PROTECTION

STORM DRAIN CATCH BASIN INLET PROTECTION SHALL BE PROVIDED THROUGH THE USE OF STONE SEDIMENT BARRIERS OR A PREMANUFACTURED SILTSACK AS DISTRIBUTED BY A.H. HARRIS OR AN EQUAL APPROVED EQUAL. THE BARRIERS SHALL BE INSPECTED AFTER EACH RAINFALL AND REPAIRS OR REPLACEMENT MADE AS NECESSARY. SEDIMENT SHALL BE REMOVED AND THE BARRIER RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO 1/3 THE DESIGN DEPTH OF THE BARRIER. THE BARRIER OR SILTSACK SHALL BE REMOVED WHEN THE TRIBUTARY DRAINAGE AREA HAS BEEN STABILIZED.

FILTER BAGS

FILTER BAGS WILL BE REQUIRED TO BE ONSITE AND AVAILABLE FOR CONSTRUCTION DEWATERING. THE USE OF FILTER BAGS SHALL BE REQUIRED IN THE EVENT THAT TRENCH DEWATERING ACTIVITIES CANNOT BE DISCHARGED THROUGH A NATURAL BUFFER AREA AT LEAST 100 FEET IN LENGTH OR AT ANY SIGNS OF ANY TURBID DISCHARGE FROM THE SITE.

SLOPE PROTECTION

ADDITIONAL SLOPE PROTECTION WILL BE REQUIRED IN AREAS OF STEEP SLOPES AND WHERE PROPOSED GRADES MEET EXISTING GRADES AT ACUTE ANGLES THAT COULD CAUSE GULLY EROSION. THIS PROTECTION WILL BE MAINLY IN THE FORM OF THE INSTALLATION OF EROSION CONTROL BLANKETS IN AREAS WHERE SLOPES EXCEED 3:1, H:V, UP TO 2:1, H:V. AREAS WHERE SLOPES EXCEED 2:1, H:V, SHOULD BE STABILIZED WITH RIPRAP SLOPE PROTECTION.

LOAM AND SEED

LOAM AND SEED IS INTENDED TO SERVE AS THE PRIMARY PERMANENT REVEGETATIVE MEASURE FOR ALL DENUDED AREAS NOT PROVIDED WITH OTHER EROSION CONTROL MEASURES, SUCH AS RIPRAP OR PERMANENTLY COVERED WITH ROADWAY GRAVEL, PAVEMENT OR BUILDING AREA.

f. TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES

THE FOLLOWING ARE PLANNED AS TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES DURING CONSTRUCTION:

- A CRUSHED STONE-STABILIZED CONSTRUCTION ENTRANCE SHALL BE PLACED AT ANY CONSTRUCTION ACCESS POINTS INTO THE SITE. THE LOCATIONS OF THE CONSTRUCTION ENTRANCES SHOWN ON THE DRAWINGS SHOULD BE CONSIDERED ILLUSTRATIVE AND ADJUSTED AS APPROPRIATE AND LOCATED AT ANY AREA WHERE TRACKING OF MUD AND DEBRIS ONTO EXISTING ROADS, PREVIOUSLY PAVED AREAS WITHIN THE PROJECT, OR STREETS IS A POTENTIAL. STONE STABILIZED CONSTRUCTION ENTRANCES WILL REQUIRE THE STONE TO BE REMOVED AND REPLACED AS IT BECOMES COVERED OR FILLED WITH MUD AND MATERIAL TRACKED BY VEHICLES EXITING THE SITE.

- SILTATION FENCE OR AN EQUIVALENT SEDIMENT BARRIER SHALL BE INSTALLED ALONG THE DOWNGRADIENT SIDE OF THE PROPOSED IMPROVEMENT AREAS. THE SILTATION FENCE WILL REMAIN IN PLACE AND PROPERLY MAINTAINED UNTIL THE SITE IS ACCEPTABLY REVEGETATED. SILTATION FENCE IS TO BE USED ALONG THE CONTOUR OF SIGNIFICANT FILL SLOPES AS ILLUSTRATED ON THE EROSION CONTROL PLAN SITE DRAWINGS. SILTATION FENCE NEEDS TO BE CHECKED TO INSURE THE BOTTOM IS PROPERLY KEYED IN AND INSPECTED AFTER SIGNIFICANT RAINS. WOOD CHIPS FROM CLEARING ARE OFTEN USED ON THE CONSTRUCTION SITE IN FRONT OF THE SILT FENCE TO PROVIDE AN EXTRA MARGIN OF SAFETY AND SECURITY FOR THE SILT FENCE. THIS PRACTICE IS ENCOURAGED, PROVIDED THE CHIPS ARE REMOVED OR DISPERSED INTO FORESTED AREAS WHEN THE FENCE IS REMOVED.

- FILTER BAGS SHALL BE INSTALLED IN ACCORDANCE WITH THE DETAILS IN THE PLAN SET. THE FILTER BAG'S FUNCTION ON THE PROJECT IS TO RECEIVE ANY WATER PUMPED FROM EXCAVATIONS DURING CONSTRUCTION. A FILTER BAG SHALL BE INSTALLED AND PREPARED FOR OPERATION PRIOR TO ANY TRENCHING ON SITE. WHEN FILTER BAGS ARE OBSERVED TO BE AT 50% CAPACITY, THEY SHALL BE CLEANED OR REPLACED. STONE UNDER THE FILTER BAGS SHALL BE REMOVED AND REPLACED CONCURRENTLY.

- TEMPORARY STOCKPILES OF COMMON EXCAVATION WILL BE PROTECTED AS FOLLOWS:
  - •• TEMPORARY STOCKPILES SHALL NOT BE LOCATED WITHIN 100 FEET OF CRITICAL AREAS AND AT LEAST 50 FEET UPGRADIENT OF THE PERIMETER SILT FENCE.
  - •• INACTIVE STOCKPILES SHALL BE STABILIZED WITHIN 5 DAYS BY EITHER TEMPORARILY SEEDING THE STOCKPILE WITH A HYDRO SEED METHOD CONTAINING AN EMULSIFIED MULCH TACKIFIER OR BY COVERING THE STOCKPILE WITH MULCH. IF NECESSARY, MESH SHALL BE INSTALLED TO PREVENT WIND FROM REMOVING THE MULCH.

- OPEN AREAS OF THE SITE SHALL BE LIMITED TO 5 ACRES. ALL DENUDED AREAS WHICH HAVE BEEN ROUGH GRADED SHALL RECEIVE MULCH OR EROSION CONTROL MESH FABRIC WITHIN 7 DAYS OF INITIAL DISTURBANCE OF SOIL. DISTURBED AREAS WITHIN 75' OF CRITICAL AREAS MUST RECEIVE TEMPORARY EROSION CONTROL MEASURES WITHIN 48 HOURS.

- BETWEEN NOVEMBER 1 AND APRIL 1, OPEN AREA SHALL BE LIMITED TO THREE ACRES, AND DISTURBED SOIL SHALL BE COVERED WITH MULCH WITHIN 5 DAYS OF DISTURBANCE, PRIOR TO ANY PREDICTED STORM EVENT OF THE EQUIVALENT OF ½" OF EQUIVALENT RAINFALL IN A 24-HOUR PERIOD, OR PRIOR TO ANY WORK SHUTDOWN LASTING MORE THAN 48 HOURS (INCLUDING WEEKENDS AND HOLIDAYS). THE MULCH RATE SHALL BE DOUBLE THE NORMAL RATE.
  - •• FOR WORK THAT IS CONDUCTED BETWEEN NOVEMBER 1 AND APRIL 15 OF ANY CALENDAR YEAR, ALL DENUDED AREAS WILL BE COVERED WITH HAY MULCH, APPLIED AT TWICE THE NORMAL APPLICATION RATE, AND (IN AREAS OVER 10% GRADE) ANCHORED WITH A FABRIC NETTING. THE TIME PERIOD FOR APPLYING MULCH SHALL BE LIMITED TO 5 DAYS FOR ALL AREAS OR IMMEDIATELY IN ADVANCE OF A PREDICTED RAINFALL EVENT.

- THE PAVED ACCESS ROADS SHALL BE SWEPT TO CONTROL MUD AND DUST AS NECESSARY. A STREET SWEEPER SHALL BE AVAILABLE FROM THE CONTRACTOR ON IMMEDIATE NOTICE OR AS REQUESTED BY THE OWNER OR REGULATORY AGENCY.

- STONE CHECK DAMS OR HAY BALE BARRIERS WILL BE INSTALLED AT ANY EVIDENT CONCENTRATED FLOW DISCHARGE POINTS DURING CONSTRUCTION AND EARTHWORK OPERATIONS.

- SILT FENCING WITH A MAXIMUM STAKE SPACING OF 8 FEET SHOULD BE USED, UNLESS THE FENCE IS SUPPORTED BY WIRE FENCE REINFORCEMENT OF MINIMUM 14 GAUGE AND WITH A MAXIMUM MESH SPACING OF 6 INCHES, IN WHICH CASE STAKES MAY BE SPACED A MAXIMUM OF 10 FEET APART. THE BOTTOM OF THE FENCE SHOULD BE PROPERLY ANCHORED A MINIMUM OF 6" PER THE PLAN DETAIL AND BACKFILLED. ANY SILT FENCE IDENTIFIED BY THE OWNER OR REVIEWING AGENCIES AS NOT BEING PROPERLY INSTALLED DURING CONSTRUCTION SHALL BE IMMEDIATELY REPAIRED IN ACCORDANCE WITH THE INSTALLATION DETAILS.

- STORM DRAIN CATCH BASIN INLET PROTECTION SHALL BE PROVIDED THROUGH THE USE OF STONE SEDIMENT BARRIERS OR A PREMANUFACTURED SILTSACK® AS DISTRIBUTED BY A.H. HARRIS COMPANY, PORTLAND, MAINE. STONE SEDIMENT BARRIER INSTALLATION DETAILS ARE PROVIDED IN THE PLAN SET. THE BARRIERS OR SILTSACKS® SHALL BE INSPECTED AFTER EACH RAINFALL AND REPAIRS MADE AS NECESSARY, INCLUDING THE REMOVAL OF SEDIMENT. SEDIMENT SHALL BE REMOVED AND THE BARRIER OR SILTSACK® RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ½ THE DESIGN DEPTH OF THE BARRIER. INLET PROTECTION SHALL BE REMOVED WHEN THE TRIBUTARY DRAINAGE AREA HAS BEEN STABILIZED.

- ALL SLOPES STEEPER THAN 3:1 SHALL RECEIVE EROSION CONTROL MESH.
- ALL AREAS WHICH FEATURE NARROW ANGLES OF SLOPE INTERFACE BETWEEN PROPOSED SURFACES AND EXISTING SURFACES SHALL RECEIVE EROSION CONTROL MESH TO PREVENT SCOURING.
- ADDITIONAL SILTATION FENCES OR SEDIMENT BARRIERS SHALL BE INSTALLED AS CONSTRUCTION PROGRESSES.
- AREAS OF VISIBLE EROSION SHALL BE STABILIZED WITH CRUSHED STONE OR EQUIVALENT MEASURES.

g. STANDARDS FOR STABILIZING SITES FOR WINTER CONDITIONS

THE CONSTRUCTION OF THE PROJECT WILL EXTEND INTO THE WINTER SEASON. THE CONTRACTOR SHALL SCHEDULE WORK TO AVOID CONSTRUCTION OF STORMWATER BASINS DURING THE WINTER MONTHS. FOR PERMITTED WINTER CONSTRUCTION, THE EROSION CONTROL MEASURES ARE SUBSTANTIALLY MORE STRINGENT DUE TO COLD TEMPERATURES AND LACK OF MOISTURE WHICH AIDS IN DRYING THE SUBGRADE SOILS THROUGH EVAPORATION.

THE WINTER CONSTRUCTION PERIOD IS FROM NOVEMBER 15TH THROUGH MARCH 15TH. IF THE CONSTRUCTION SITE IS NOT STABILIZED WITH PAVEMENT, AGGREGATE SUBBASE GRAVEL, 90% MATURE VEGETATION COVER OR RIPRAP PRIOR TO NOVEMBER 15TH, THEN THE SITE NEEDS TO BE PROTECTED WITH OVER-WINTER STABILIZATION. AN AREA CONSIDERED OPEN IS ANY AREA THAT IS NOT STABILIZED WITH PAVEMENT, VEGETATION, MULCHING, EROSION CONTROL MIX, EROSION CONTROL MATS, RIPRAP OR SUBBASE GRAVEL.

DURING THE WINTER CONSTRUCTION PERIOD THE CONTRACTOR SHALL INSTALL EROSION CONTROL MIX BERMS IN LIEU OF SILT FENCE.

DURING THE WINTER CONSTRUCTION PERIOD, A DOUBLE ROW OF SEDIMENT BARRIERS SHALL BE PLACED BETWEEN ANY DRAINAGE PATH AND THE DISTURBED AREA.

IN ADDITION, DURING THE WINTER CONSTRUCTION PERIOD THE AMOUNT OF EXPOSED AREA SHALL BE LIMITED TO THAT WHICH CAN BE MULCHED WITHIN ONE DAY IN THE EVENT OF A PREDICTED STORM AND SHALL NOT EXCEED A MAXIMUM OPEN AREA OF ONE ACRE.

STANDARD FOR THE TIMELY STABILIZATION OF DITCHES AND CHANNELS: THE CONTRACTOR SHALL CONSTRUCT AND STABILIZE ALL STONE-LINED DITCHES AND CHANNELS ON THE SITE BY NOVEMBER 15TH. THE CONTRACTOR SHALL CONSTRUCT AND STABILIZE ALL GRASS LINED DITCHES AND CHANNELS ON THE SITE BY SEPTEMBER 1ST. IF THE CONTRACTOR FAILS TO STABILIZE A DITCH OR CHANNEL TO BE GRASS LINED BY SEPTEMBER 1ST, THEN THE CONTRACTOR SHALL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE DITCH FOR LATE FALL AND WINTER.

i. INSTALL A SOD LINING IN THE DITCH. THE CONTRACTOR SHALL LINE THE DITCH WITH PROPERLY INSTALLED SOD BY OCTOBER 1ST. PROPER INSTALLATION INCLUDES THE APPLICANT PINNING THE SOD ONTO THE SOIL WITH WIRE PINS, ROLLING THE SOD TO GUARANTEE CONTACT BETWEEN THE SOD AND UNDERLYING SOIL, WATERING THE SOD TO PROMOTE ROOT GROWTH INTO THE DISTURBED SOIL, AND ANCHORING THE SOD WITH JUTE OR PLASTIC MESH TO PREVENT THE SOD STRIPS FROM SLOUGHING DURING FLOW CONDITIONS.

ii. INSTALL A STONE LINING IN THE DITCH. THE CONTRACTOR SHALL LINE THE DITCH WITH STONE RIPRAP BY NOVEMBER 1ST. THE CONTRACTOR SHALL HIRE A REGISTERED PROFESSIONAL ENGINEER TO DETERMINE THE STONE SIZE AND LINING THICKNESS NEEDED TO WITHSTAND THE ANTICIPATED FLOW VELOCITIES AND FLOW DEPTHS WITHIN THE DITCH. IF NECESSARY, THE CONTRACTOR SHALL REGRADE THE DITCH PRIOR TO PLACING THE STONE LINING SO AS TO PREVENT THE STONE LINING FROM REDUCING THE DITCH'S CROSS SECTIONAL AREA.

STANDARD FOR THE TIMELY STABILIZATION OF DISTURBED SLOPES: THE CONTRACTOR SHALL CONSTRUCT AND STABILIZE STONE COVERED SLOPES BY NOVEMBER 15TH. THE CONTRACTOR SHALL SEED AND MULCH ALL SLOPES TO BE VEGETATED BY SEPTEMBER 1ST. A SLOPE IS CONSIDERED ANY AREA HAVING A GRADE OF GREATER THAN 15% (10H:1V). IF THE CONTRACTOR FAILS TO STABILIZE ANY SLOPE TO BE VEGETATED BY SEPTEMBER 15TH, THEN THE CONTRACTOR SHALL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE SLOPE FOR LATE FALL AND WINTER:

i. STABILIZE THE SOIL WITH TEMPORARY VEGETATION AND EROSION CONTROL MESH. BY OCTOBER 1ST THE CONTRACTOR SHALL SEED THE DISTURBED SLOPE WITH WINTER RYE AT A SEEDING RATE OF 3 POUNDS PER 1000 SQUARE FEET AND APPLY EROSION CONTROL MATS OVER THE MULCHED SLOPE. THE CONTRACTOR SHALL MONITOR GROWTH OF THE RYE OVER THE NEXT 45 DAYS. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR FAILS TO COVER AT LEAST 75% OF THE DISTURBED SLOPE BY NOVEMBER 15TH, THEN THE CONTRACTOR SHALL COVER THE SLOPE WITH A LAYER OF WOOD WASTE COMPOST AS DESCRIBED IN ITEM III OF THIS STANDARD OR WITH STONE RIP RAP AS DESCRIBED IN ITEM IV OF THIS STANDARD.

ii. STABILIZE THE SLOPE WITH SOD. THE CONTRACTOR SHALL STABILIZE THE DISTURBED SLOPE WITH PROPERLY INSTALLED SOD BY OCTOBER 1ST. PROPER INSTALLATION INCLUDES THE CONTRACTOR PINNING THE SOD ONTO THE SLOPE WITH WIRE PINS, ROLLING THE SOD TO GUARANTEE CONTRACT BETWEEN THE SOD AND UNDERLYING SOIL, AND WATERING THE SOD TO PROMOTE ROOT GROWTH INTO THE DISTURBED SOIL. THE CONTRACTOR SHALL NOT USE LATE-SEASON SOD INSTALLATION TO STABILIZE SLOPES HAVING A GRADE GREATER THAN 33% (3H: 1V) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE.

iii. STABILIZE THE SLOPE WITH WOOD WASTE COMPOST. THE CONTRACTOR SHALL PLACE A SIX-INCH LAYER OF WOOD WASTE COMPOST ON THE SLOPE BY NOVEMBER 15TH. PRIOR TO PLACING THE WOOD WASTE COMPOST, THE CONTRACTOR SHALL REMOVE ANY SNOW ACCUMULATION ON THE DISTURBED SLOPE. THE CONTRACTOR SHALL NOT USE WOOD WASTE COMPOST TO STABILIZE SLOPES HAVING GRADES GREATER THAN 50% (2H: 1V) OR HAVING GROUNDWATER SEEPS ON THE SLOPE FACE.

iv. STABILIZE THE SLOPE WITH STONE RIPRAP. THE CONTRACTOR SHALL PLACE A LAYER OF STONE RIPRAP ON THE SLOPE BY NOVEMBER 15TH. THE CONTRACTOR SHALL HIRE A REGISTERED PROFESSIONAL ENGINEER TO DETERMINE THE STONE SIZE NEEDED FOR STABILITY AND TO DESIGN A FILTER LAYER FOR UNDERNEATH THE RIPRAP.

STANDARD FOR THE TIMELY STABILIZATION OF DISTURBED SOIL: BY SEPTEMBER 15TH, THE CONTRACTOR SHALL SEED AND MULCH ALL DISTURBED SOILS ON AREAS HAVING A SLOPE LESS THAN 15%. IF THE CONTRACTOR FAILS TO STABILIZE THESE SOILS BY THIS DATE, THEN THE CONTRACTOR SHALL TAKE ONE OF THE FOLLOWING ACTIONS TO STABILIZE THE SOIL FOR LATE FALL AND WINTER.

i. STABILIZE THE SOIL WITH TEMPORARY VEGETATION. BY OCTOBER 1ST, THE CONTRACTOR SHALL SEED THE DISTURBED SOIL WITH WINTER RYE AT A SEEDING RATE OF 3 POUNDS PER 1,000 SQUARE FEET, LIGHTLY MULCH THE SEEDED SOIL WITH HAY OR STRAW AT 75 POUNDS PER 1,000 SQUARE FEET, AND ANCHOR THE MULCH WITH PLASTIC NETTING. THE CONTRACTOR SHALL MONITOR THE GROWTH OF THE RYE OVER THE NEXT 45 DAYS. IF THE RYE FAILS TO GROW AT LEAST THREE INCHES OR FAILS TO COVER AT LEAST 75% OF THE DISTURBED SOIL BEFORE NOVEMBER 1ST, THEN THE CONTRACTOR SHALL MULCH THE AREA FOR OVER-WINTER PROTECTION AS DESCRIBED IN ITEM III OF THIS STANDARD.

ii. STABILIZE THE SOIL WITH SOD. THE CONTRACTOR SHALL STABILIZE THE DISTURBED SOIL WITH PROPERLY INSTALLED SOD BY OCTOBER 1ST. PROPER INSTALLATION INCLUDES THE CONTRACTOR PINNING THE SOD ONTO THE SOIL WITH WIRE PINS, ROLLING THE SOD TO GUARANTEE CONTACT BETWEEN THE SOD AND UNDERLYING SOIL, AND WATERING THE SOD TO PROMOTE ROOT GROWTH INTO THE DISTURBED SOIL.

iii. STABILIZE THE SOIL WITH MULCH. BY NOVEMBER 15TH, THE CONTRACTOR SHALL MULCH THE DISTURBED SOIL BY SPREADING HAY OR STRAW AT A RATE OF AT LEAST 150 POUNDS PER 1,000 SQUARE FEET ON THE AREA SO THAT NO SOIL IS VISIBLE THROUGH THE MULCH. PRIOR TO APPLYING THE MULCH, THE CONTRACTOR SHALL REMOVE ANY SNOW ACCUMULATION ON THE DISTURBED AREA. IMMEDIATELY AFTER APPLYING THE MULCH, THE CONTRACTOR SHALL ANCHOR THE MULCH WITH PLASTIC NETTING TO PREVENT WIND FROM MOVING THE MULCH OFF THE DISTURBED SOIL.

STANDARD FOR TIMELY STABILIZATION OF SOIL STOCKPILES: STOCKPILES OF SOIL OR SUBSOIL WILL BE MULCHED FOR OVER WINTER PROTECTION WITH HAY OR STRAW AT TWICE THE NORMAL APPLICATION RATE OR WITH A FOUR-INCH THICK LAYER OF EROSION CONTROL MIX. THIS WILL BE COMPLETED WITHIN 24-HOURS OF STOCKPILING OR RE-ESTABLISHED PRIOR TO ANY PREDICTED RAINFALL OR SNOWFALL EVENT. ANY SOIL STOCKPILE WILL NOT BE PLACED (EVEN COVERED WITH MULCH) WITHIN 100 FEET FROM A NATURAL RESOURCE (I.E. WETLAND, ETC.).

h. SPECIAL MEASURES FOR SUMMER CONDITIONS

THE SUMMER PERIOD IS GENERALLY OPTIMUM FOR CONSTRUCTION FOR THIS SITE BUT IT IS ALSO THE PERIOD WHERE INTENSE SHORT DURATION STORMS ARE MOST COMMON MAKING DENUDED AREAS VERY SUSCEPTIBLE TO EROSION, WHERE DUST CONTROL NEEDS TO BE THE MOST STRINGENT, AND WHERE THE POTENTIAL TO ESTABLISH VEGETATION IS OFTEN RESTRICTED BY MOISTURE DEFICIT. DURING THESE PERIODS THE CONTRACTOR MUST:

- IMPLEMENT A PROGRAM TO APPLY DUST CONTROL MEASURES ON A DAILY BASIS EXCEPT THOSE DAYS WHERE THE PRECIPITATION EXCEEDS 0.25 INCHES;
- SPRAY THE MULCH AFTER ANCHORING WITH WATER TO DAMPEN THE SOIL AND ENCOURAGE EARLY GROWTH. TEMPORARY SEED MAY BE REQUIRED UNTIL THE LATE SUMMER SEEDING SEASON.
- MULCH, COVER, AND MOISTEN STOCKPILES OF FINE-GRAINED MATERIALS THAT ARE SUSCEPTIBLE TO EROSION.
- TAKE ADDITIONAL STEPS NEEDED TO CONTROL FUGITIVE DUST EMISSIONS TO MINIMIZE REDUCTIONS IN VISIBILITY AND THE AIRBORNE DISBURSEMENT OF FINE-GRAINED SOILS. THESE MEASURES MAY ALSO BE REQUIRED IN THE SPRING AND FALL DURING THE DRIER PERIODS OF THESE SEASONS.

i. PERMANENT EROSION CONTROL MEASURES

THE FOLLOWING PERMANENT EROSION CONTROL MEASURES HAVE BEEN DESIGNED AS PART OF THE EROSION AND SEDIMENTATION CONTROL PLAN:

- THE DRAINAGE CONVEYANCE SYSTEMS HAVE BEEN DESIGNED TO INTERCEPT AND CONVEY THE 25-YEAR STORM. IN THE CASE OF OPEN CHANNELS OR SWALES, THIS INCLUDES THE DESIGN OF MEASURES TO RESIST SCOUR OF THE CHANNEL.
- ALL STORM DRAIN PIPES SHALL HAVE RIPRAP APRONS AT THEIR OUTLET TO PROTECT THE OUTLET AND RECEIVING CHANNEL OF THE CULVERTS FROM SCOUR AND DETERIORATION. INSTALLATION DETAILS ARE PROVIDED IN THE PLAN SET. THE APRONS SHALL BE INSTALLED AND STABILIZED PRIOR TO DIRECTING RUNOFF TO THE TRIBUTARY PIPE OR CULVERT.
- ALL AREAS DISTURBED DURING CONSTRUCTION, BUT NOT SUBJECT TO OTHER RESTORATION (PAVING, RIPRAP, ETC.) WILL BE LOAMED, LIMED, FERTILIZED, MULCHED, AND SEEDED. FABRIC NETTING, ANCHORED WITH STAPLES, SHALL BE PLACED OVER THE MULCH IN AREAS WHERE THE FINISH GRADE SLOPE IS GREATER THAN 10 PERCENT. NATIVE TOPSOIL SHALL BE STOCKPILED AND TEMPORARILY STABILIZED WITH SEED AND MULCH AND REUSED FOR FINAL RESTORATION WHEN IT IS OF SUFFICIENT QUALITY.
- CATCH BASINS SHALL BE PROVIDED WITH SEDIMENT SUMPS FOR ALL OUTLET PIPES THAT ARE 12" IN DIAMETER OR GREATER.

j. TIMING AND SEQUENCE OF THE EROSION CONTROL MEASURES

THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE REQUIRED TO INSURE THE EFFECTIVENESS OF THE EROSION AND SEDIMENTATION CONTROL MEASURES ARE OPTIMIZED.

NOTE: FOR ALL GRADING ACTIVITIES, THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION NOT TO OVEREXPOSE THE SITE BY LIMITING THE DISTURBED AREA AND SHALL STABILIZE ANY STEEP SLOPES WITHIN 24 HOURS IF FINAL SLOPE GRADING AND STABILIZATION WILL NOT BE COMPLETED WITHIN 7 DAYS. ANY FINAL SLOPES SHALL HAVE THE SPECIFIED EROSION CONTROL MEASURES INSTALLED WITHIN 7 DAYS OF FINAL STABILIZATION.

- INSTALL CRUSHED STONE-STABILIZED CONSTRUCTION ENTRANCES AS SHOWN ON THE EROSION AND SEDIMENTATION CONTROL PLAN.
- MARK THE GRADING AND CLEARING LIMITS AND INITIATE CLEARING THAT WILL PERMIT THE CONTRACTOR TO ACCESS THE SITE AND INSTALL SILT FENCE.
- INSTALL SILTATION FENCE WHERE SHOWN ON THE CONTRACT DRAWINGS. DURING PERIODS OF NOVEMBER 1ST THROUGH APRIL 15TH, THE CONTRACTOR SHALL INSTALL EROSION CONTROL MIX BERMS IN LIEU OF SILT FENCE.
- ESTABLISH AND PREPARE FILTER BAG AREAS.
- SHAPE THE SUBGRADE OF THE PROPOSED INFILTRATION BASINS FOR THE AREA OF THE SITE THAT IS UNDER CONSTRUCTION.
- CONSTRUCT DIVERSION AND DRAINAGE CHANNELS TO DIRECT FLOW TO THE STORMWATER FACILITIES FROM THE LOT DEVELOPMENT AND ROADWAY AREAS.
- PREPARE AREA TO RECEIVE EXCAVATED MATERIAL RECOGNIZING THE NEED TO LIMIT THE DENUDED AREA OF THE SITE.
- BEGIN EARTHWORK WITHIN THE BUILDING PAD AREAS.
- CONSTRUCT THE DISTURBED AREAS TO SUBGRADE AND RESTORE THE SLOPES.
- INSTALL STONE AND HAY BALE CHECK DAMS AT ANY CONCENTRATED FLOW DISCHARGE POINTS.
- INSTALL STORM DRAIN AND OTHER UTILITY WORK. INSTALL INLET AND OUTLET PROTECTION IMMEDIATELY AFTER THE INSTALLATION OF ANY CULVERTS. PUMP ANY ACCUMULATED WATER WITHIN THE TRENCHES TO A FILTER BAG.
- PLACE GRAVELS IN THE PAVED AREAS AS SOON AS SUBGRADE IS PREPARED TO MINIMIZE THE PERIOD THAT THE UNPROTECTED SUBGRADE IS EXPOSED AND VULNERABLE TO EROSION FROM RUNOFF EVENTS.
- RAISE CATCH BASINS TO GRADE AND INSTALL INLET PROTECTION DEVICES, THE SILTSACK® INSIDE THE BASIN, AND THE EXTERNAL HAY BALES OR STONE FILTER (IF APPLICABLE).
- INSTALL BINDER PAVEMENT.
- LOAM, LIME, FERTILIZE, SEED AND MULCH ALL DISTURBED AND DENUDED AREAS.
- REMOVE ALL ACCUMULATED SEDIMENT FROM SILT BARRIERS.
- REVIEW STABILITY OF THE SITE. REMOVAL OF EROSION CONTROL MEASURES SHALL BE PERFORMED WITHIN 30 DAYS OF ESTABLISHING PERMANENT STABILIZATION. PERMANENT STABILIZATION IN GRASSED AREAS IS ESTABLISHED WITH 90% CATCH OF GRASS WITH NO EVIDENCE OF RILLING OR EROSION.

THIS SEQUENCE IS APPLICABLE TO ALL PHASES OF THE PROJECT.

SOIL WILL BE CONSIDERED DISTURBED IF IT DOES NOT HAVE AN ESTABLISHED STAND OF VEGETATION COVERING AT LEAST 90% OF THE SOIL SURFACE OR HAS NOT BEEN MULCHED WITH HAY APPLIED AT A RATE OF 230 LB./1,000 SQ. FT.

k. PROVISIONS FOR MAINTENANCE OF THE EROSION CONTROL MEASURES

THIS PROJECT IS SUBJECT TO THE REQUIREMENTS OF A US EPA NPDES PERMIT AND AN ACCOMPANYING STORMWATER POLLUTION PREVENTION PLAN (SWPPP.) THESE DOCUMENTS REQUIRE THE CONTRACTOR TO PREPARE A LIST AND DESIGNATE BY NAME, ADDRESS AND TELEPHONE NUMBER ALL INDIVIDUALS WHO WILL BE RESPONSIBLE FOR IMPLEMENTATION, INSPECTION AND MAINTENANCE OF ALL EROSION CONTROL MEASURES IDENTIFIED WITHIN THIS SECTION AND AS CONTAINED WITHIN THE CONTRACT DRAWINGS. SPECIFIC RESPONSIBILITIES OF THE INSPECTOR(S) WILL INCLUDE, BUT NOT BE LIMITED TO:

- EXECUTION OF THE CONTRACTOR/SUBCONTRACTOR CERTIFICATION BY ANY AND ALL PARTIES RESPONSIBLE FOR EROSION CONTROL MEASURES ON THE SITE AS REQUIRED BY THE SWPPP.
- ASSURING AND CERTIFYING THE OWNER'S CONSTRUCTION SEQUENCE IS IN CONFORMANCE WITH THE SPECIFIED SCHEDULE OF THIS SECTION. A WEEKLY CERTIFICATION STATING COMPLIANCE, ANY DEVIATIONS, AND CORRECTIVE MEASURES NECESSARY TO COMPLY WITH THE EROSION CONTROL REQUIREMENTS OF THIS SECTION SHALL BE PREPARED AND SIGNED BY THE INSPECTOR(S).
- IN ADDITION TO THE WEEKLY CERTIFICATIONS, THE INSPECTOR(S) SHALL MAINTAIN WRITTEN REPORTS RECORDING CONSTRUCTION ACTIVITIES ON SITE WHICH INCLUDE DATES WHEN MAJOR GRADING ACTIVITIES OCCUR IN A PARTICULAR AREA; DATES WHEN MAJOR CONSTRUCTION ACTIVITIES CEASE IN A PARTICULAR AREA, EITHER TEMPORARY OR PERMANENT; DATES WHEN AN AREA IS STABILIZED.
- INSPECTION OF THE PROJECT WORK SITE AT LEAST ONCE EVERY FOURTEEN (14) CALENDAR DAYS AND BEFORE AND AFTER EACH SIGNIFICANT RAINFALL EVENT (0.25 INCHES OR MORE IN ANY 24-HOUR PERIOD) DURING CONSTRUCTION UNTIL PERMANENT EROSION CONTROL MEASURES HAVE BEEN PROPERLY INSTALLED AND THE SITE HAS BEEN STABILIZED. INSPECTION OF THE PROJECT WORK SITE SHALL INCLUDE:

A. IDENTIFICATION OF PROPER EROSION CONTROL MEASURE INSTALLATION IN ACCORDANCE WITH THE EROSION CONTROL DETAIL SHEET OR AS SPECIFIED IN THIS SECTION.

B. DETERMINE WHETHER EACH EROSION CONTROL MEASURE IS PROPERLY OPERATING. IF NOT, IDENTIFY DAMAGE TO THE CONTROL DEVICE AND DETERMINE REMEDIAL MEASURES.

C. IDENTIFY AREAS THAT APPEAR VULNERABLE TO EROSION AND DETERMINE ADDITIONAL EROSION CONTROL MEASURES THAT SHOULD BE USED TO IMPROVE CONDITIONS.

D. INSPECT AREAS OF RECENT SEEDING TO DETERMINE PERCENT CATCH OF GRASS. A MINIMUM CATCH OF 90 PERCENT IS REQUIRED PRIOR TO REMOVAL OF EROSION CONTROL MEASURES.

E. RECORD DATE OF INSTALLATION OF SORBENT BAGS IN CATCH BASINS, DATES OF PAVING (IF APPLICABLE), DATES REMOVED, AND THE DISPOSAL METHOD AND LOCATION.

- IF INSPECTION OF THE SITE INDICATES A CHANGE SHOULD BE MADE TO THE EROSION CONTROL PLAN, EITHER TO IMPROVE EFFECTIVENESS OR CORRECT A SITE-SPECIFIC DEFICIENCY, THE INSPECTOR SHALL IMMEDIATELY IMPLEMENT THE CORRECTIVE MEASURE AND NOTIFY THE OWNER OF THE CHANGE.

ONCE CONSTRUCTION HAS BEEN COMPLETED, LONG TERM MAINTENANCE OF THE FACILITIES WILL BE THE RESPONSIBILITY OF THE APPLICANT.

l. PRECONSTRUCTION CONFERENCE

PRIOR TO ANY CONSTRUCTION AT THE SITE, REPRESENTATIVES OF THE CONTRACTOR, TOWN OFFICIALS, AND THE SITE DESIGN ENGINEER SHALL ARRANGE FOR AND MEET WITH THE OWNER TO DISCUSS THE SCHEDULING OF THE SITE CONSTRUCTION, AND THE DESIGNATION OF THE RESPONSIBLE PARTIES FOR IMPLEMENTING THE PLAN. THIS MEETING SHALL BE SCHEDULED BY THE CONTRACTOR WITH REASONABLE ADVANCE NOTICE FOR ALL ATTENDEES. PRIOR TO THE MEETING THE CONTRACTOR SHALL PREPARE A DETAILED SCHEDULE AND A MARKED-UP SITE PLAN INDICATING AREAS AND COMPONENTS OF THE WORK AND KEY DATES SHOWING DATE OF DISTURBANCE AND COMPLETION OF THE WORK. IF BID THROUGH A GENERAL CONTRACTOR, THE GENERAL CONTRACTOR'S SUPERINTENDENT SHALL PROVIDE A WRITTEN ACKNOWLEDGEMENT THAT THE EROSION CONTROL PLAN HAS DEFINITIVE DATES FOR IMPLEMENTATION THAT MAY SUPERSEDE THE BUILDING SCHEDULE. THE CONTRACTOR SHALL CONDUCT A MEETING WITH EMPLOYEES AND SUB-CONTRACTORS TO REVIEW THE EROSION CONTROL PLAN, THE CONSTRUCTION TECHNIQUES WHICH WILL BE EMPLOYED TO IMPLEMENT THE PLAN, AND PROVIDE A LIST OF ATTENDEES AND ITEMS DISCUSSED AT THE MEETING TO THE OWNER. THREE COPIES OF THE SCHEDULE, THE CONTRACTOR'S MEETING MINUTES, AND MARKED-UP SITE PLAN SHALL BE PROVIDED TO THE OWNER AT THE PRECONSTRUCTION MEETING.

m. TEMPORARY SEDIMENT BASINS

A. TO MINIMIZE IMPACT ON THE INFILTRATION CAPACITY OF THE FINAL INFILTRATION BASIN, TEMPORARY SEDIMENT BASINS SHOULD BE EXCAVATED TO NO DEEPER THAN 12" ABOVE THE FINAL BOTTOM OF THE INFILTRATION BASIN ELEVATION.

B. THE APPLICANT SHALL MONITOR TEMPORARY SEDIMENT BASINS DURING CONSTRUCTION TO CONFIRM THAT THE BASIN IS DEWATERING WITHIN 72 HOURS. IF BASIN FAILS TO DEWATER WITHIN 72 HOURS, THE TOWN OF LITTLETON MAY REQUIRE THE APPLICANT TO PERFORM CORRECTIVE ACTION

C. FOLLOWING STABILIZATION OF ALL TRIBUTARY AREAS AND FLUSHING/CLEANING OF THE UPSTREAM CLOSED DRAINAGE SYSTEM, THE INFILTRATION BASIN SHALL BE EXCAVATED TO FINAL GRADES AND STABILIZED

D. FOLLOWING CONSTRUCTION, IF THE INFILTRATION BASIN DOES NOT APPEAR TO BE FUNCTIONING AS DESIGNED, THE TOWN MAY REQUIRE DEMONSTRATION OF ACTUAL INFILTRATION RATES USING A DOUBLE-RING INFILTROMETER.

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No.	Revision	Date

COMMONWEALTH OF MASSACHUSETTS
TODD P. MOREY
CIVIL
No. 48885
REGISTERED PROFESSIONAL ENGINEER
8.17.2020

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Designed by: DPH	Checked by: TPM
Proj. No.: C-942	Issue Date: 08.18.20
Drawing Scale:	

Sheet Title
EROSION AND SEDIMENTATION CONTROL NOTES

Sheet Number
C5.1

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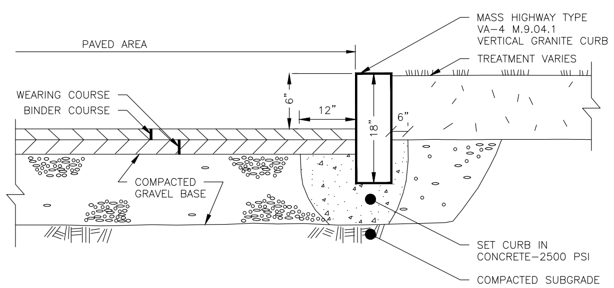
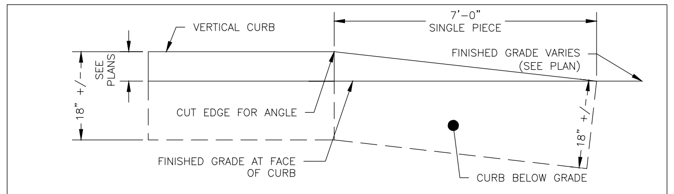


VERTICAL GRANITE CURB

N.T.S

DET NO. 1-5.1



VERTICAL CURB TO NO CURB OR FLUSH CURB TRANSITION

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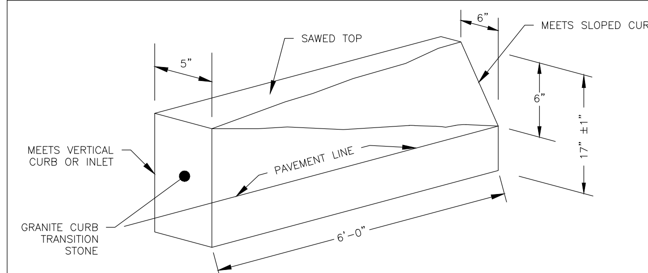

VERTICAL GRANITE CURB TRANSITION STONE

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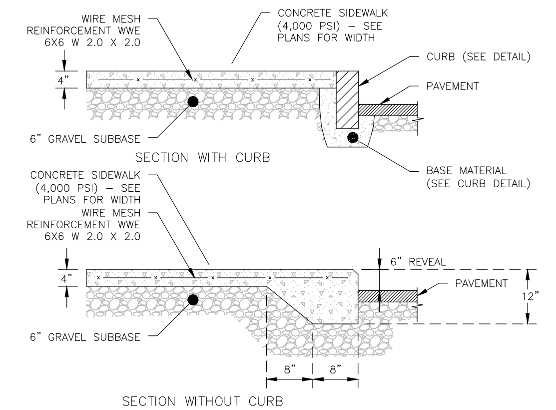
DET NO. 1-5.3



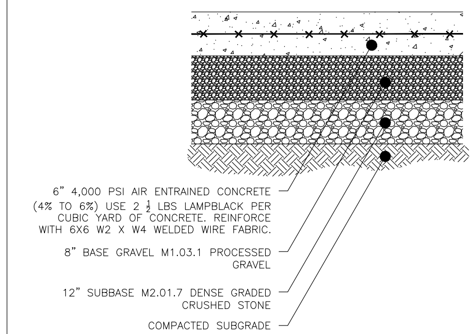
NOTES:
1. CONTROL JOINT SPACING SHALL BE EQUAL TO OR LESS THAN SIDEWALK WIDTH – 35 S.F. MAX.
2. EXPANSION JOINTS @ 20' O.C. (MAX.) – JOINT FILLER MDOT M9.14.0.
3. ALL JOINTS SEALED WITH POLYUTHELANE JOINT SEALER MDOT M9.14.3
4. CONCRETE SHALL BE MDOT M4.02.00 (AIR ENTRAINED 4,000 PSI ¾", 610).
5. WELDED WIRE REINFORCEMENT SHALL BE BROKEN AT ALL JOINTS.
6. CONCRETE MIX SHALL CONTAIN 2 ½ LB LAMP BLACK PER CUBIC YARD.

CONCRETE SIDEWALK

N.T.S.

DET NO. 1-3.1

NOTES:
1. ALL MATERIALS SHALL CONFORM TO MASSACHUSETTS DEPARTMENT OF TRANSPORTATION SPECIFICATIONS, LATEST REVISION.
2. COMPACTION OF ALL MATERIALS TO BE IN ACCORDANCE WITH THE SPECIFICATIONS AND THE GEOTECHNICAL REPORT.
3. AN ADDITIONAL LAYER OF GEOGRID MAY BE REQUIRED IN AREAS OF WET OR UNSTABLE SUBGRADE. CONTACT ENGINEER FOR CLARIFICATION.
4. SEE GEOTECHNICAL REPORT FOR ADDITIONAL REQUIREMENTS.



CONCRETE PAVEMENT DETAIL

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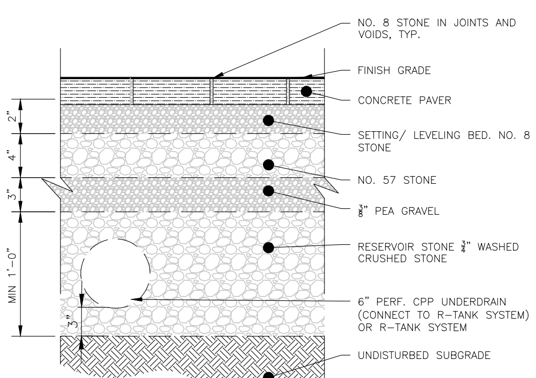
DET NO. 1-1.4

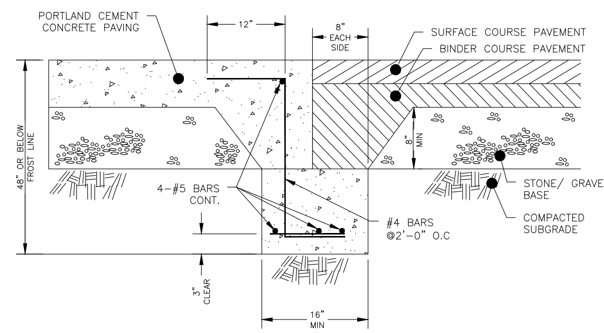


NOTE:
1. FINAL SECTION DESIGN MAY BE MODIFIED BASED ON RECOMMENDATIONS FROM CIVIL ENGINEER

PERMEABLE CONCRETE UNIT PAVEMENT

N.T.S

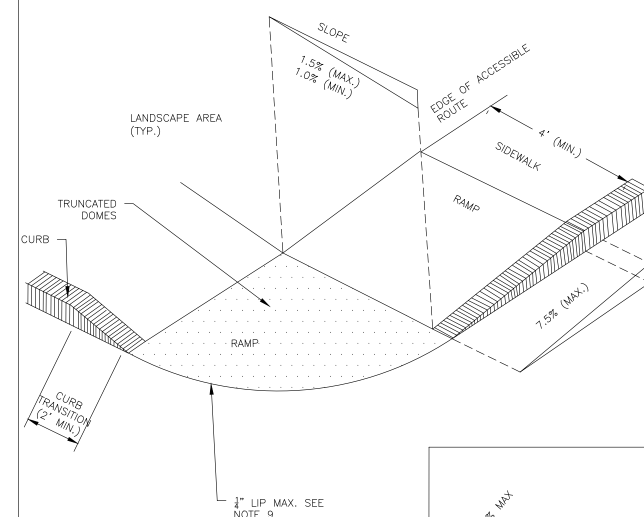
DET NO. 1-1.6



CONCRETE TO ASPHALT PAVING JOINT DETAIL

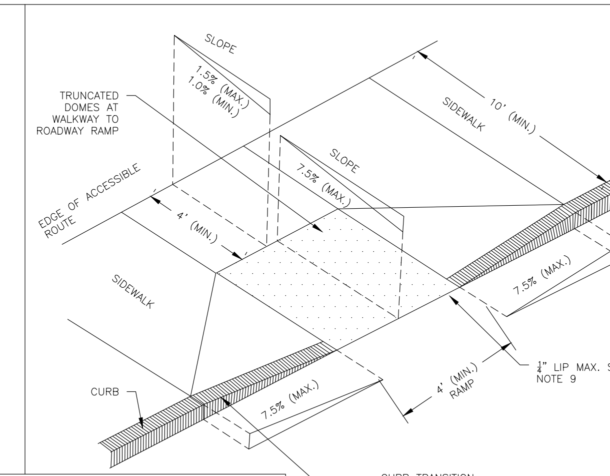
N.T.S.

DET NO. 1-1.7



ADA CURB RAMP A

N.T.S.



ADA CURB RAMP B

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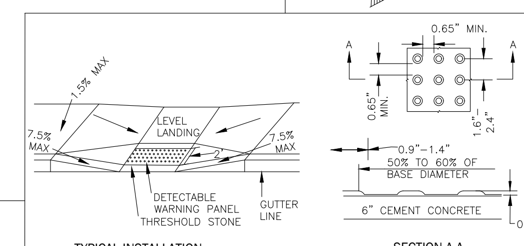

DETECTABLE WARNING PANEL DETAIL

N.T.S.

NOTE:

1. DETECTABLE WARNING PANELS SHALL BE PERMANENTLY APPLIED TO THE RAMP.
2. DETECTABLE WARNING PANELS SHALL BE PALE YELLOW IN COLOR, CONFORMING TO FEDERAL NO. 23594.
3. ALL CEMENT CONCRETE RAMPS SHALL BE 6" THICK. AT BRICK RAMPS, A 6" THICK CEMENT CONCRETE PAD IS REQUIRED UNDER THE AREA OF EACH WARNING PANEL.
4. DETECTABLE WARNING PANELS SHALL BE MANUFACTURED BY ADA SOLUTIONS, INC. OF NORTH BILLERICA, MA OR AN APPROVED EQUAL.
5. DETECTABLE WARNING PANELS SHALL BE INSTALLED PER THE MANUFACTURER'S RECCOMENDATIONS.

DETECTABLE WARNING PANEL NOTES

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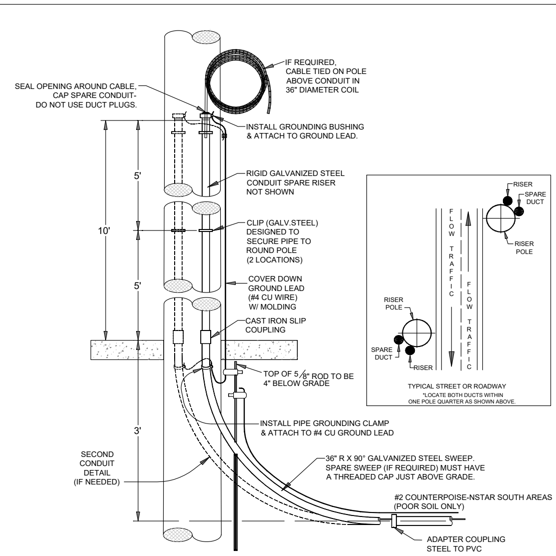
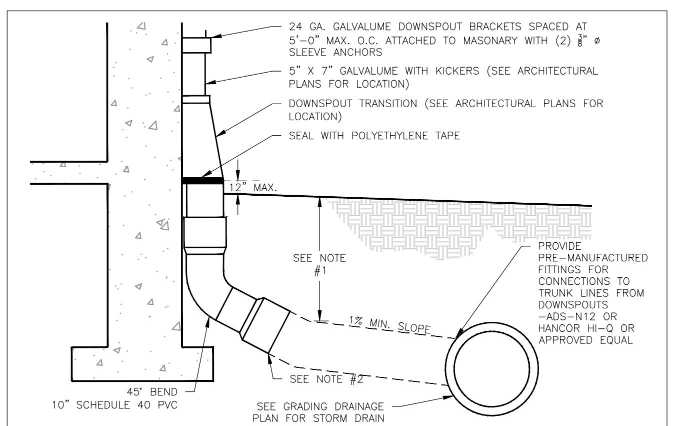


TYPICAL RISER TO UTILITY POLE

N.T.S.

DET NO. 7-1

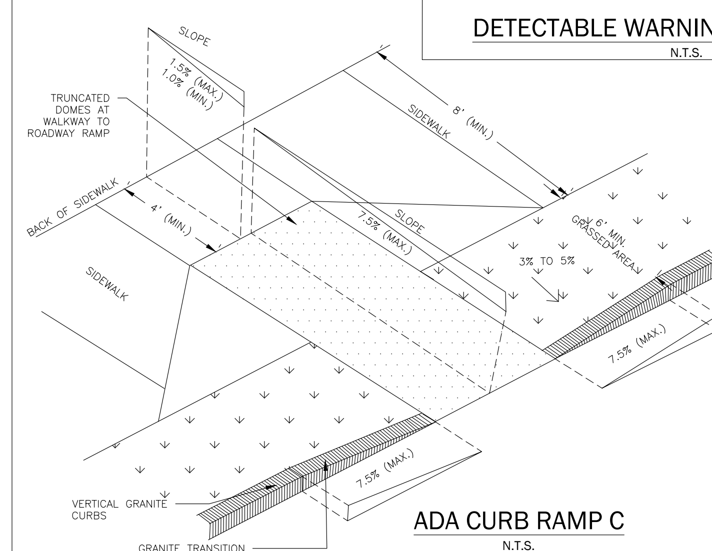


NOTES:
1. FOR ALL DEPTHS OF COVER LESS THAN TWO (2) FEET, PIPE MUST BE SCHEDULE 40 PVC. FOR DEPTHS OF COVER GREATER THAN TWO (2) FEET, FLEXIBLE PIPE MAY BE USED. REFER TO SPECIFACTIONS FOR ALLOWABLE PIPE TYPES.
2. A WATERTIGHT CONNECTION SHALL BE MAINTAINED WITH ANY TRANSITION FROM SCHEDULE 40 PVC PIPE TO ANY OTHER TYPE OF PIPE.
3. THE DOWNSPOUT COLLECTOR DRAIN SHALL BE INSTALLED BEFORE THE DOWNSPOUTS ARE INSTALLED ON THE BUILDING. SITEWORK CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK TO THE DOWNSPOUT TRANSITION. BUILDING CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONNECTION AT THE POINT OF THE DOWNSPOUT TRANSITION.

ROOF DRAIN DETAIL

N.T.S.

DET NO. 3-7.3



ADA CURB RAMP C

N.T.S.

DET NO. 1-4.1

NOTES:
1. THE MAXIMUM ALLOWABLE SIDEWALK AND CURB RAMP CROSS SLOPES SHALL BE 1.5 (1% MIN.).
2. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
3. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 7.5%.
4. A MINIMUM OF 3 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
5. CURB TREATMENT VARIES, SEE PLANS FOR CURB TYPE.
6. RAMP, CURB, AND ADJACENT PAVEMENTS SHALL BE GRADED TO PREVENT PONDING.
7. SEE TYPICAL SIDEWALK SECTION FOR RAMP SECTION CONSTRUCTION.
8. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5'X5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FEET.
9. ELIMINATE CURBING AT RAMP WHERE IT ABUTS ROADWAY, EXCEPT WHERE VERTICAL CURBING IS INDICATED ON THE DRAWINGS TO BE SET FLUSH.
10. DETECTABLE WARNINGS SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES.
11. DETECTIBLE WARNINGS SHALL BE INSTALLED PERPENDICULAR TO THE ACCESSIBLE ROUTE.

ADA CURB RAMP NOTES

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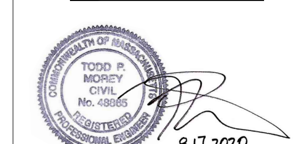

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Sheet Title
DETAILS

Sheet Number
C6.0

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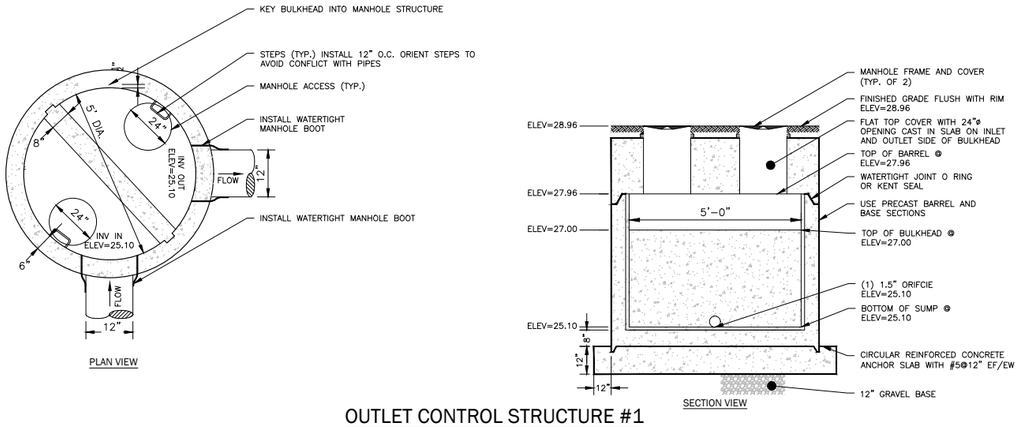
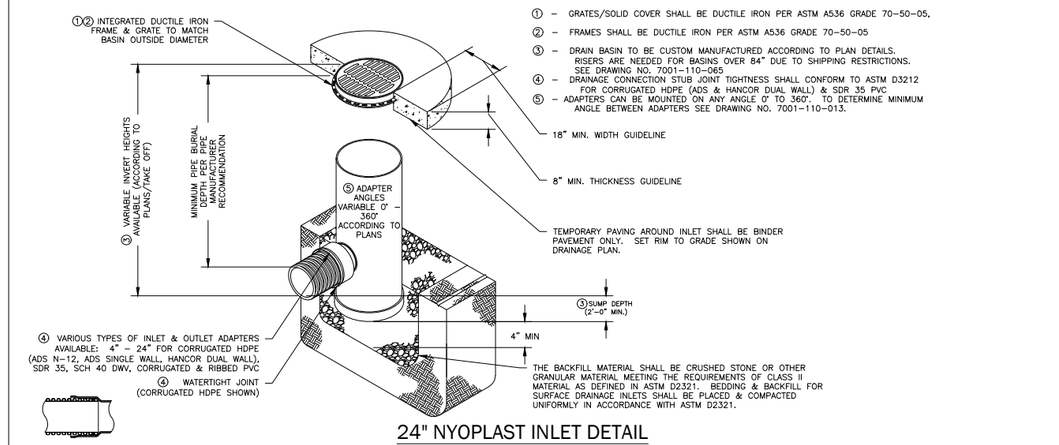


OUTLET CONTROL STRUCTURE #1

N.T.S.

DET NO. 3-1.4



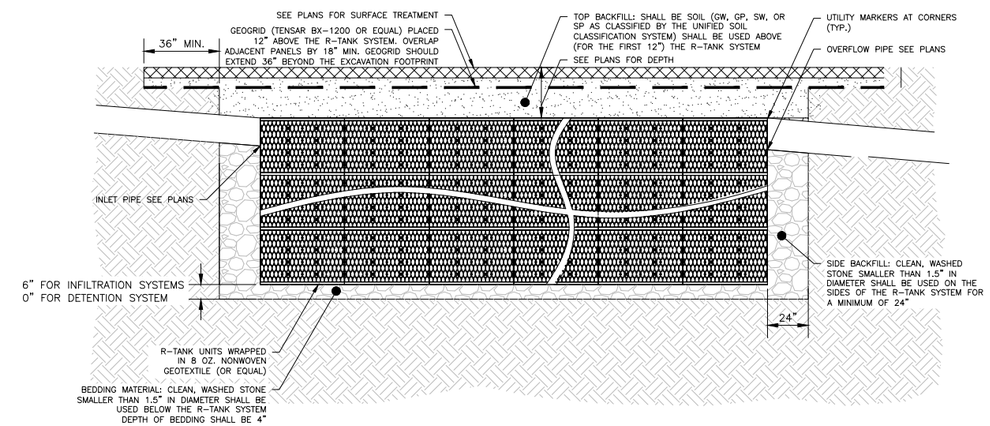
24" NYOPLAST INLET DETAIL

N.T.S.

DET NO. 3-4.1

NOTES:

1. THE SUBGRADE OF THE EXCAVATION SHALL BE ABLE TO SUPPORT THE SYSTEM BASE WHILE REMAINING POROUS TO ALLOW FOR INFILTRATION. TO ACHIEVE THIS, THE SUBGRADE SHALL NOT BE COMPACTED BUT MUST SUPPORT A MINIMUM OF 2,000 PSF. IF THE BEARING CAPACITY OF THE SUBGRADE IS BELOW 2,000 PSF, A QUALIFIED ENGINEER SHALL BE CONSULTED FOR GUIDANCE ON BRINGING THE BEARING CAPACITY UP TO MINIMUM REQUIREMENTS WHILE NOT REDUCING THE INFILTRATION CAPACITY OF THE SOIL.
2. R-TANK SYSTEMS USED FOR INFILTRATION REQUIRE A 4" TO 6" BASE. THE BASE MATERIALS SHALL BE POROUS TO ENCOURAGE INFILTRATION. CLEAN WASHED STONE WILL MEET THIS REQUIREMENT.
3. BACKFILL THE UNITS PER MANUFACTURER'S RECOMMENDATIONS. THIS REQUIRES MATERIAL BE COMPACTED IN 12" LIFTS WITH A VIBRATORY COMPACTOR.
4. GEOGRID IS REQUIRED FOR ALL LOAD-BEARING APPLICATIONS. IT IS NOT REQUIRED ABOVE SYSTEMS USED IN OPEN SPACE WHERE CONSTRUCTION EQUIPMENT IS PROHIBITED. GEOGRID MUST BE PLACED 12" ABOVE THE R-TANK. OVERLAP ADJACENT PANELS BY 18" MINIMUM.
5. MAXIMUM COVER DEPTH FOR STANDARD R-TANK SYSTEM IS 3'.
6. MAXIMUM COVER DEPTH FOR R-TANK HD SYSTEM IS 7'
7. MAXIMUM COVER DEPTH FOR R-TANK SD SYSTEM IS 10'
8. MAXIMUM COVER DEPTH FOR R-TANK XD SYSTEM IS 16'



R-TANK INFILTRATION SYSTEM DETAIL

(THIS IS A MODIFIED ACF ENVIRONMENTAL DETAIL)

N.T.S.

NYLOPLAST 1599CGS

APPROX. DRAIN AREA = 92.70 SQ IN
APPROX. WEIGHT WITH FRAME = 59.62 LBS
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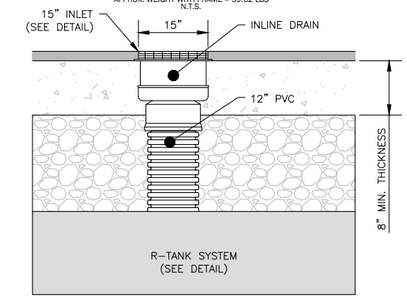
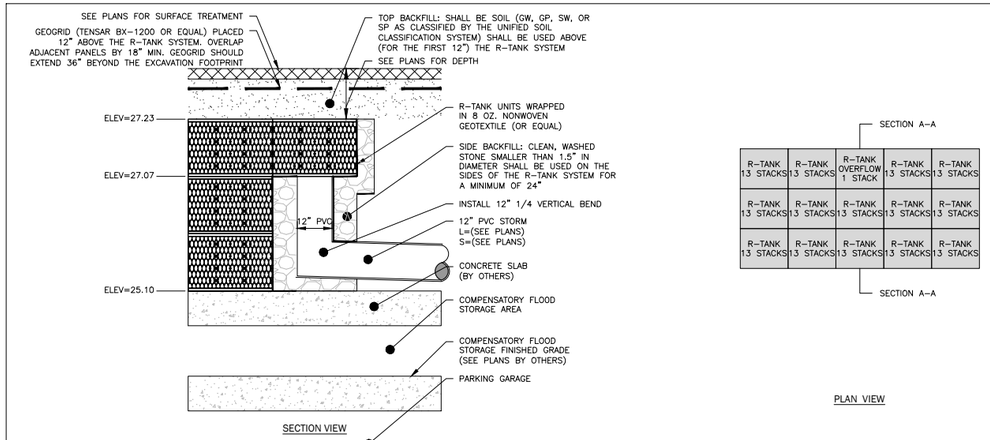


NOTES:

1. THE BACKFILL MATERIAL SHALL BE CRUSHED STONE OR OTHER GRANULAR MATERIAL MEETING THE REQUIREMENTS OF CLASS I, CLASS II, OR CLASS III MATERIAL AS DEFINED IN ASTM D2321. BEDDING & BACKFILL FOR SURFACE DRAINAGE INLETS SHALL BE PLACED & COMPACTED UNIFORMLY IN ACCORDANCE WITH ASTM D2321.
2. TRAFFIC LOADS: CONCRETE SLAB DIMENSIONS ARE FOR GUIDELINE PURPOSES ONLY. ACTUAL CONCRETE SLAB MUST BE DESIGNED TAKING INTO CONSIDERATION LOCAL SOIL CONDITIONS, TRAFFIC LOADING, & OTHER APPLICABLE DESIGN FACTORS.

AD 1 & AD 5

N.T.S.



R-TANK PRIMARY OVERFLOW DRAIN

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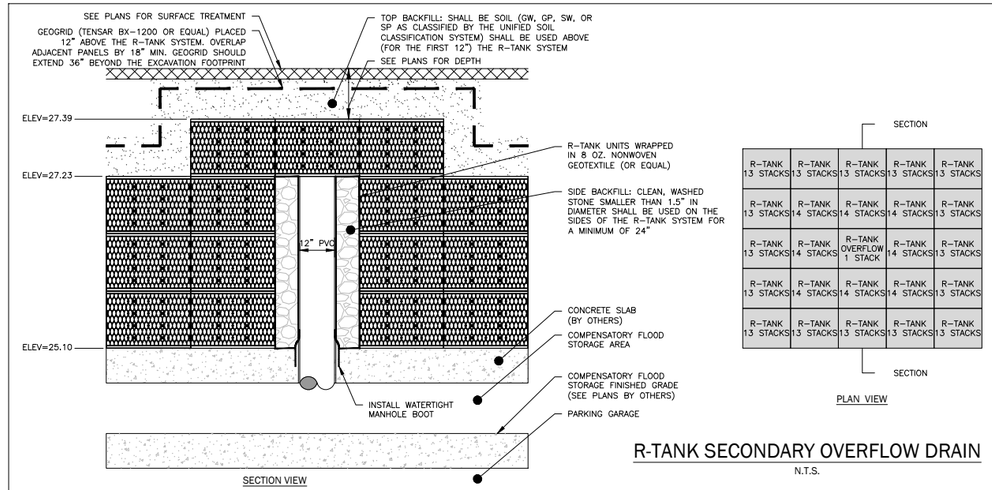

R-TANK SECONDARY OVERFLOW DRAIN

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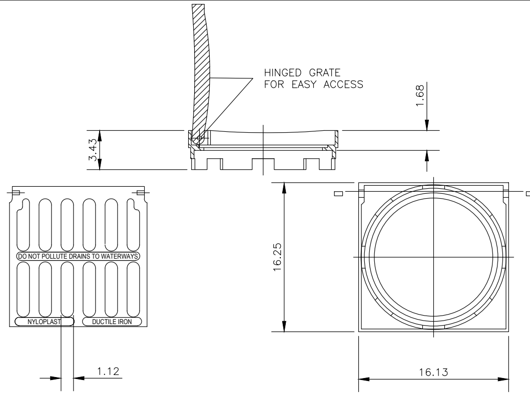
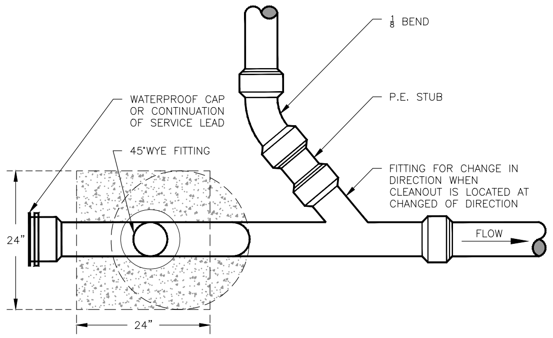


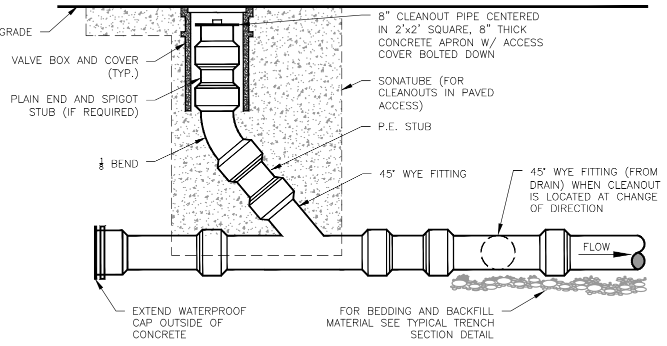
NOTES:
1. DETAIL OBTAINED FROM NYOPLAST
2. DIMENSIONS ARE FOR REFERENCE ONLY ACTUAL DIMENSIONS MAY VARY.
3. DIMENSIONS ARE IN INCHES.
4. GRATE MEETS H-20 LOAD RATING.
5. QUALITY: MATERIALS SHALL CONFORM TO ASTM A536 GRADE 70-50-05
6. PAINT: CASTINGS ARE FURNISHED WITH A BLACK PAINT.

15" INLET DRAIN

N.T.S.



PLAN VIEW
BELOW WYE FITTING OF CLEANOUT



ELEVATION VIEW

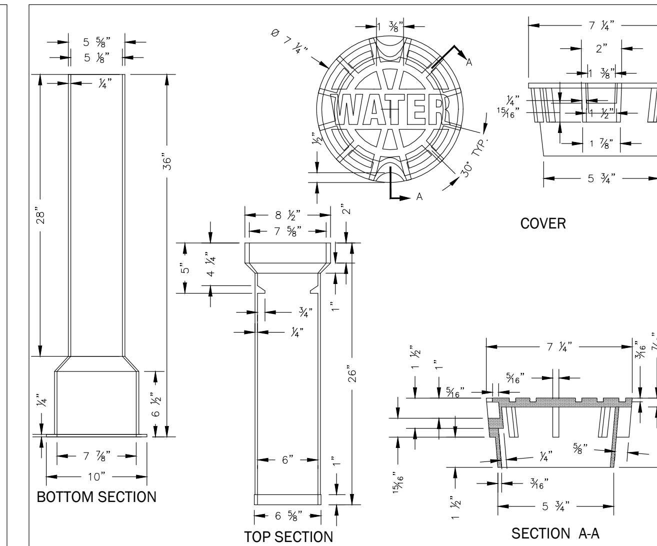
NOTE:
EACH CLEANOUT SHALL BE ENCASED IN CONCRETE TO THE TOP OF THE DRAIN. THE CONCRETE SHALL BE FORMED USING A 36" SONATUBE NOTCHED TO PASS OVER MAINLINE DRAIN. A 6x6/10x10 WELDED WIRE MESH SHALL BE USED FOR CONCRETE REINFORCEMENT.

CLEANOUTS TO BE USED WHEN:
A. CHANGE OF DIRECTION IS 45° AND OVER.
B. WHEN THE CLEANOUT IS LOCATED IN AN AREA WHICH IS CURRENTLY PAVED OR PLANNED TO BE PAVED, THE CLEANOUT SHALL BE ENCASED IN CONCRETE. THE CONCRETE ENCASEMENT SHALL EXTEND FROM FINISH GRADE DOWN TO THE MAINLINE SEWER GRANULAR BASE BEDDING MATERIAL. THE CONCRETE SHALL BE FORMED USING A 36" SONATUBE NOTCHED TO PASS OVER MAINLINE DRAIN. A 6x6/10x10 WELDED WIRE MESH SHALL BE USED FOR CONCRETE REINFORCEMENT.

PVC CLEANOUT DETAIL

N.T.S.

DET NO.
7-12

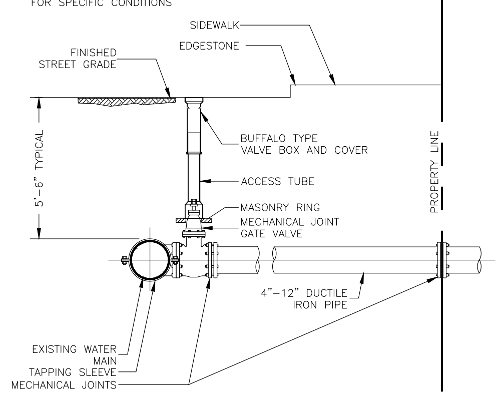


BUFFALO TYPE VALVE BOX

N.T.S.

DET NO.
6-5

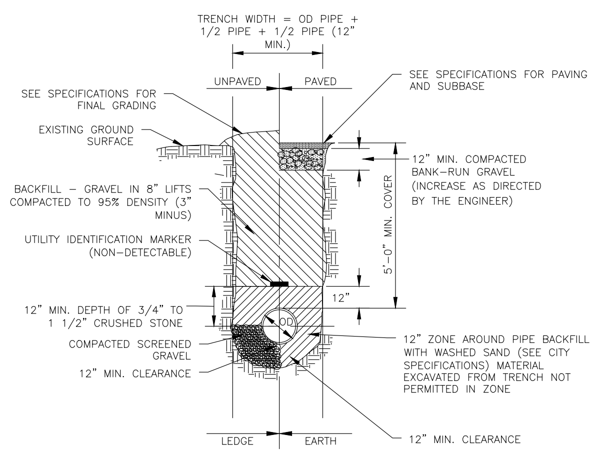
NOTES:
1. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH
2. USE RESTRAINED JOINT FITTINGS OR TIE RODS WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE
3. SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS



TYPICAL WATER PIPE CONNECTION WITH TAPPING SLEEVE AND VALVE

N.T.S.

DET NO.
6-8



NOTES:
1. CONTRACTOR RESPONSIBLE FOR DESIGNING AND MAINTAINING PROPER TRENCH PROTECTION AND OBTAINING ALL REQUIRED PERMITS.
2. SEE ADDITIONAL DETAILS FOR EARTH AND PAVING MATERIALS WITHIN THIS PLAN SET.
3. ALL PIPE CONNECTIONS AT FITTINGS AND HORIZONTAL AND VERTICAL BENDS SHALL BE MECHANICALLY RESTRAINED JOINTS.

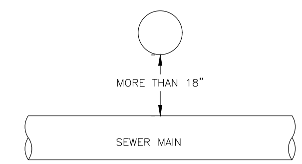
WATER TRENCH DETAIL

N.T.S.

DET NO.
6-3

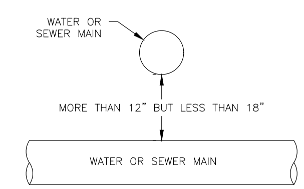
NOTE: IN NO CASE SHALL PIPES BE CLOSER THAN 12" APART HORIZONTALLY. DISTANCES ARE MEASURED BETWEEN OUTSIDES OF PIPES.

WATER MAIN ABOVE SEWER MAIN



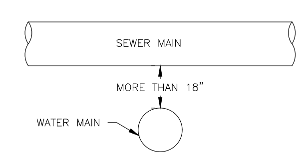
A. WATER LINE AND SEWER LINE PIPE LENGTHS TO BE CENTERED AT EACH CROSSING. EACH LENGTH OF PIPE TO BE 10' MINIMUM.
B. WATER SERVICE CROSSING SEWER MAIN SHALL BE A MINIMUM OF 18" VERTICAL SEPARATION. ALL WATER SERVICE LINES SHALL BE TYPE "K" COPPER.

WATER MAIN ABOVE OR BELOW SEWER MAIN

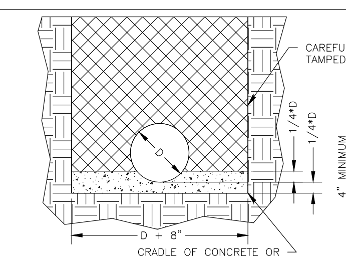


A. THE CROSSING SHALL BE ARRANGED SO THAT ONE FULL LENGTH OF SEWER IS CENTERED ABOVE OR BELOW THE WATERLINE WITH SEWER JOINT AS FAR AS POSSIBLE FROM WATER JOINTS.
B. THE SEWER PIPE MUST BE CONSTRUCTED TO WATER MAIN STANDARDS FOR A MINIMUM DISTANCE OF 20' EITHER SIDE OF THE CROSSING OR A TOTAL OF 3 PIPE LENGTHS, WHICHEVER IS GREATER.
C. THE SECTION CONSTRUCTED TO WATER MAIN STANDARDS MUST BE PRESSURE TESTED TO MAINTAIN 50 PSI FOR 145 MINUTES WITHOUT LEAKAGE PRIOR TO BACKFILLING BEYOND 1' ABOVE THE PIPE TO ASSURE WATER TIGHTNESS.
D. WHERE A WATER MAIN CROSSES UNDER A SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO PREVENT DAMAGE TO THE WATER MAIN.

SEWER MAIN ABOVE WATER MAIN



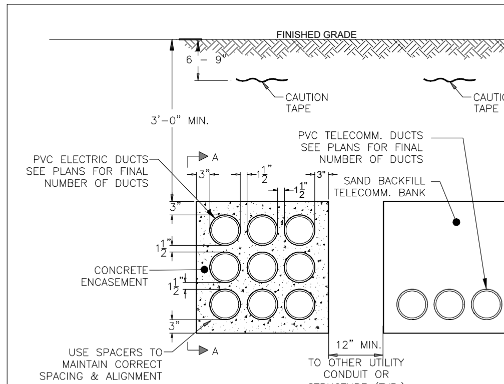
A. WATER LINE AND SEWER LINE PIPE LENGTHS TO BE CENTERED AT EACH CROSSING. EACH LENGTH OF PIPE SHALL BE 10' MINIMUM.
B. PROVIDE CRADLE OF CONCRETE OR CRUSHER RUN STONE (SEE TRENCH DETAIL BELOW) FOR WATER LINE AND SEWER LINE FOR 10' ON EITHER SIDE OF CROSSING.



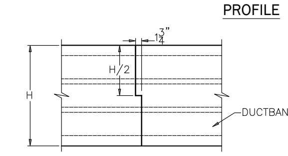
WATER MAIN/SEWER MAIN CROSSING DETAIL

N.T.S.

DET NO.
5-7



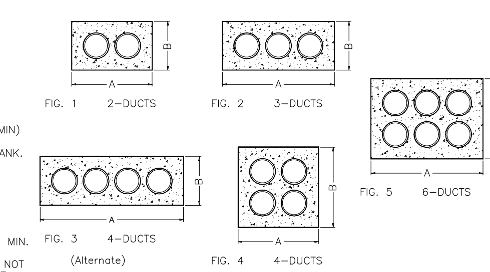
PROFILE



SECTION A-A

NOTES:
1. FOR DUCTBANKS INSTALLED OVER LEDGE; A MINIMUM 2" LAYER OF COMPACTED GRAVEL SHALL BE PLACED BETWEEN THE BOTTOM OF THE DUCTBANK AND THE LEDGE. THE SIDE FORMS SHALL BE REMOVED AFTER THE CONCRETE IS SET.
2. MAINTAIN A CLEAR DISTANCE OF 12" (MIN) FROM ALL STRUCTURES THAT CROSS ABOVE OR BELOW THE ELECTRIC DUCTBANK.
3. PVC SOLVENT CEMENT SHALL BE USED TO CREATE WATER-TIGHT JOINTS FOR ALL CONDUIT INSTALLED.
4. RED CAUTION TAPE REQUIRED. CENTERED ABOVE ALL DUCT LINES.
5. OTHER UTILITIES SHALL MAINTAIN A 12" MIN. CLEAR DISTANCE FROM ELECTRIC WHEN SHARING SAME TRENCH & SHALL NOT BE IN THE SAME CONCRETE ENCASEMENT.

CONCRETE SPECIFICATION:
1. CONCRETE SHALL BE NORMAL WEIGHT WITH PEASTONE MIX, 2500 PSI @ 28 DAY COMPRESSIVE STRENGTH.
2. UNLESS OTHERWISE SPECIFIED, CONSTRUCTION SHALL CONFORM TO ACI-318 (LATEST EDITION) WHERE REINFORCEMENT IS SPECIFIED.



DIMENSIONS						
FIG	4" Ducts		5" Ducts		6" Ducts	
	A Inches	B Inches	A Inches	B Inches	A Inches	B Inches
1	16-1/2"	10-1/2"	18-1/2"	11-1/2"	21"	12-1/2"
2	22-1/2"	10-1/2"	25-1/2"	11-1/2"	29"	12-1/2"
3	28-1/2"	10-1/2"	32-1/2"	11-1/2"	37"	12-1/2"
4	16-1/2"	16-1/2"	18-1/2"	18-1/2"	21"	21"
5	22-1/2"	16-1/2"	25-1/2"	18-1/2"	29"	21"

DUCT BANK LAYOUT FOR 4", 5", & 6" CONDUIT
(NON REINFORCED CONCRETE)

ELECTRIC & TELECOMMUNICATIONS DUCT BANK

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7-2

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•PLANNING •ENGINEERING •PERMITTING •MANAGEMENT

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Touloukian Touloukian Inc.
Architecture + Urban Design

Copley Wolff Design Group
Landscape Architects & Planners

Fells Hardware Redevelopment
54 Main Street
Winchester, MA

No.	Revision	Date

COMMONWEALTH OF MASSACHUSETTS
TODD P. MOREY
CIVIL
No. 48865
REGISTERED
PROFESSIONAL ENGINEER
8.17.2020

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Sheet Title
DETAILS

Sheet Number
C6.2

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Plotted by Devin Howe on August 17, 2020

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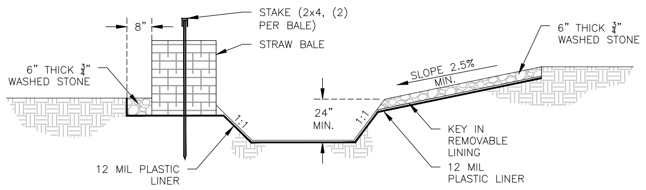
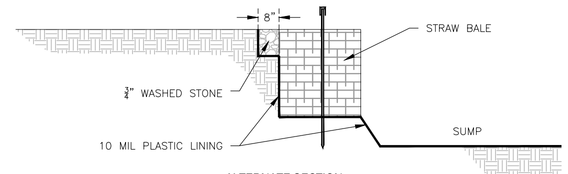
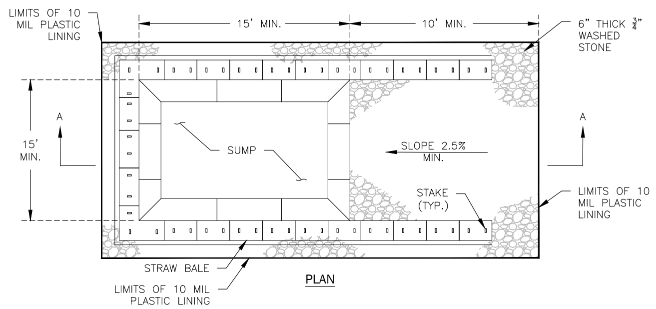


SECTION A-A

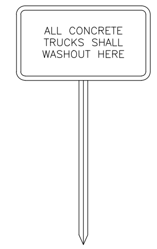


ALTERNATE SECTION

USE WHERE MORE THAN ONE ACCESSIBLE SIDE IS NEEDED



PLAN



WASHOUT SIGN

NOTES:
1. PIT IS SPECIFICALLY DESIGNATED, DIKED AND IMPERVIOUS CONTAINMENT TO PREVENT CONTACT BETWEEN CONCRETE WASH AND STORMWATER.
2. WASH WATER SHALL NOT BE ALLOWED TO FLOW TO SURFACE WATER.
3. FACILITY MUST HOLD SUFFICIENT VOLUME TO CONTAIN CONCRETE WASTE WITH A MINIMUM FREEBOARD OF 12."
4. FACILITY SHALL NOT BE FILLED BEYOND 95% CAPACITY UNLESS A NEW FACILITY IS CONSTRUCTED.
5. SAW CUT PORTLAND CEMENT CONCRETE, RESIDUE FROM SAWCUT & GRINDING TO BE DISPOSED OF IN THE PIT.
6. CONCRETE WASHOUTS SHALL BE LOCATED A MINIMUM OF 100' FROM DRAINAGE WAYS, INLETS, & SURFACE WATERS.
7. MANUFACTURED CONCRETE WASHOUT DEVICES MAY BE USED IF REMOVED FROM THE SITE WHEN 95% FULL CAPACITY.

CONCRETE WASHOUT AREA DETAIL

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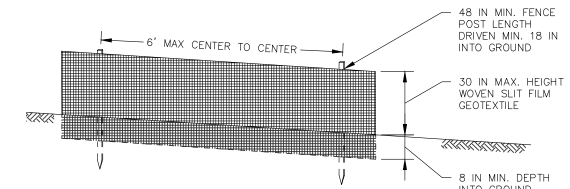
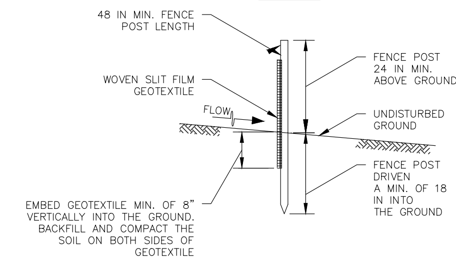
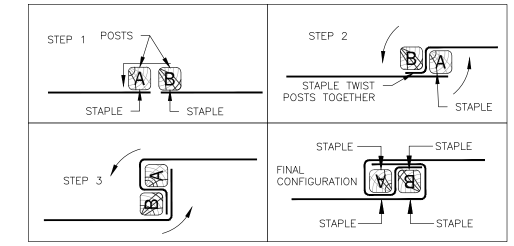


ELEVATION



CROSS SECTION



JOINING TWO ADJACENT SILT FENCE SECTIONS (TOP VIEW)

CONSTRUCTION SPECIFICATIONS
1. USE WOOD POSTS 1¾ X 1¾ ± 1/16 INCH (MINIMUM) SQUARE CUT OF SOUND QUALITY HARDWOOD. AS AN ALTERNATIVE TO WOODEN POST USE STANDARD "T" OR "U" SECTION STEEL POSTS WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
2. USE 48 INCH MINIMUM POSTS DRIVEN 18 INCH MINIMUM INTO GROUND NO MORE THAN 8 FEET APART.
3. USE WOVEN SLIT FILM GEOTEXTILE AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID–SECTION.
4. EMBED GEOTEXTILE A MINIMUM OF 8 INCHES VERTICALLY INTO THE GROUND. BACKFILL AND COMPACT THE SOIL ON BOTH SIDES OF FABRIC.
5. WHERE TWO SECTIONS OF GEOTEXTILE ADJOIN: OVERLAP, TWIST, AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL.
6. EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SILT FENCE.
7. REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

SILT FENCE

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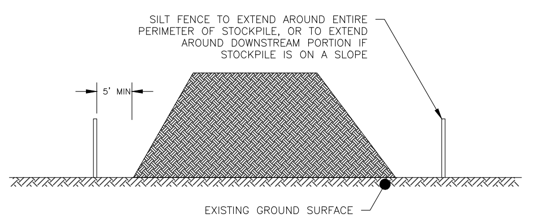

NOTES
1. AN ON–SITE DRAINAGE SWALE SHALL BE LOCATED BETWEEN THE STOCKPILE AND OFF–SITE PROPERTY.
2. REFERENCE IS MADE TO THE SILT FENCE DETAIL FOR MATERIALS AND INSTALLATION METHODS.
3. IF THE STOCKPILE IS TO REMAIN FOR MORE THAN 14 DAYS, IT SHALL BE STABILIZED WITH STRAW BLANKET OR SEEDED TO MINIMIZE EROSION.
4. INSPECTION OF SILT FENCES SHALL BE AT LEAST ONCE PER WEEK AND AFTER RAIN EVENTS IN EXCESS OF HALF INCH (1/2") PER DAY OR EQUAL SNOW MELT. REPAIR OR REPLACEMENT OF SILT FENCE SHALL BE MADE PROMPTLY AS REQUIRED.
5. SEDIMENT TRAPPED BY THE SILT FENCES SHALL BE REMOVED AND PROPERLY DISPOSED OF WHENEVER SEDIMENT ACCUMULATION DEPTH AT THE SILT FENCE IS APPROXIMATELY EQUAL TO 12 INCHES OR ONE HALF THE SILT FENCE HEIGHT, WHICHEVER IS LESS.
6. SILT FENCES SHALL BE MAINTAINED IN PLACE UNTIL TOPSOIL STOCKPILE HAS BEEN ELIMINATED AND SHALL BE REMOVED ONLY WHEN DIRECTED BY THE ENGINEER.

TEMPORARY STOCKPILE DETAIL

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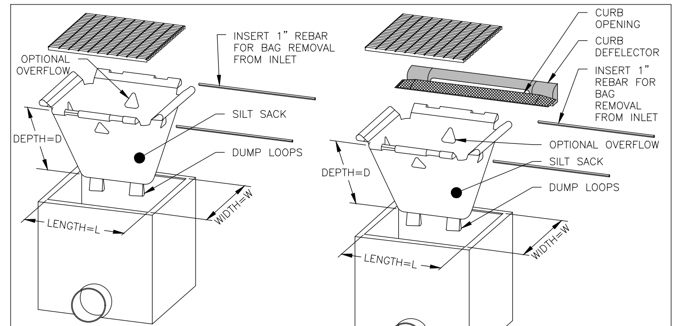
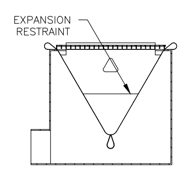
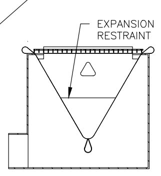




SILT SACK TYPE A

NOTES:
1. SILTSACKS SHOULD BE INSPECTED AFTER EVERY MAJOR RAIN EVENT GREATER THAN 0.25 INCHES.
2. IF THERE HAVE BEEN NO MAJOR RAIN EVENTS, SILTSACKS SHOULD BE INSPECTED EVERY TWO TO THREE WEEKS.
3. WHEN THE EXPANSION RESTRAINT CORD IS NO LONGER VISIBLE, SILTSACKS SHOULD EITHER BE REMOVED, CLEANED AND REINSTALLED, OR DISCARDED AND REPLACED.



SILT SACK TYPE B

SILT SACK INSTALLATION DETAIL

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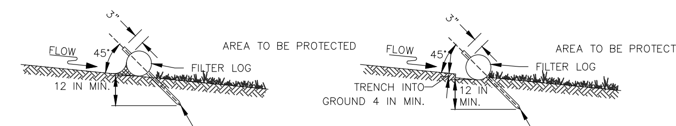

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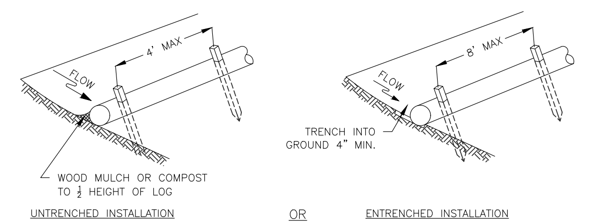
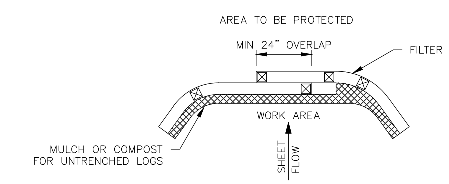


UNTRENCHED INSTALLATION OR ENTRENCHED INSTALLATION

ISOMETRIC VIEW



PLAN

CONSTRUCTION SPECIFICATIONS
1. PRIOR TO INSTALLATION, CLEAR ALL OBSTRUCTIONS INCLUDING ROCKS, CLODS, AND DEBRIS GREATER THAN ONE INCH THAT MAY INTERFERE WITH PROPER FUNCTION OF FILTER LOG.
2. FILTER LOG SHALL BE MINIMUM 12" DIAMETER.
3. FILL LOG NETTING UNIFORMLY WITH COMPOST, STRAW, WOOD CHIPS, OR OTHER APPROVED BIODEGRADABLE MATERIAL TO DESIRED LENGTH SUCH THAT LOGS DO NOT DEFORM.
4. INSTALL FILTER LOGS PERPENDICULAR TO THE FLOW DIRECTION AND PARALLEL TO THE SLOPE WITH THE BEGINNING AND END OF THE INSTALLATION POINTING SLIGHTLY UP THE SLOPE CREATING A "J" SHAPE AT EACH END TO PREVENT BYPASS.
5. FOR UNTRENCHED INSTALLATION BLOW OR HAND PLACE MULCH OR COMPOST ON UPHILL SIDE OF THE SLOPE ALONG LOG.
6. FOR UNTRENCHED OR ENTRENCHED APPLICATIONS STAKE FILTER LOG EVERY 4 FEET OR CLOSER ALONG ENTIRE LENGTH OF LOG.
7. USE STAKES WITH A MINIMUM NOMINAL CROSS SECTION OF 2X2 INCH AND OF SUFFICIENT LENGTH TO ATTAIN A MINIMUM OF 12 INCHES INTO THE GROUND AND 3 INCHES PROTRUDING ABOVE LOG.
8. WHEN MORE THAN ONE LOG IS NEEDED, OVERLAP ENDS 24 INCHES MINIMUM AND STAKE.
9. REMOVE SEDIMENT WHEN IT HAS ACCUMULATED TO A DEPTH OF ½ THE EXPOSED HEIGHT OF LOG AND REPLACE MULCH. REPLACE FILTER LOG IF TORN. REINSTALL FILTER LOG IF UNDERMINING OR DISLODGING OCCURS. REPLACE CLOGGED FILTER LOGS.

SILT SOCK DETAIL

N.T.S.

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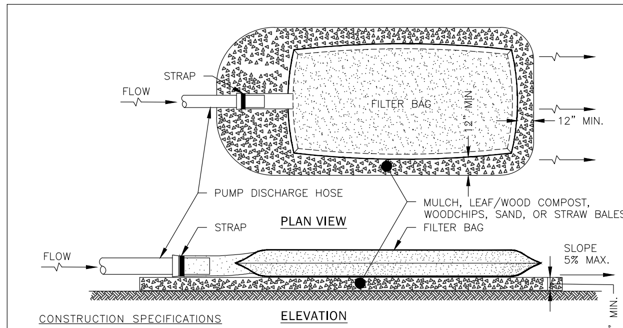
4-8



PLAN VIEW

ELEVATION

CONSTRUCTION SPECIFICATIONS
1. TIGHTLY SEAL SLEEVE AROUND THE PUMP DISCHARGE HOSE WITH A STRAP OR SIMILAR DEVICE.
2. PLACE FILTER BAG ON SUITABLE BASE (E.G., MULCH, LEAF/WOOD COMPOST, WOODCHIPS, SAND, OR STRAW BALES) LOCATED ON A LEVEL OR 5% MAXIMUM SLOPING SURFACE. DISCHARGE TO A STABILIZED AREA. EXTEND BASE A MINIMUM OF 12 INCHES FROM EDGES OF BAG.
3. CONTROL PUMPING RATE TO PREVENT EXCESSIVE PRESSURE WITHIN THE FILTER BAG IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS. AS THE BAG FILLS WITH SEDIMENT, REDUCE PUMPING RATE.
4. REMOVE AND PROPERLY DISPOSE OF FILTER BAG UPON COMPLETION OF PUMPING OPERATIONS OR AFTER BAG HAS REACHED CAPACITY, WHICHEVER OCCURS FIRST. SPREAD THE DEWATERED SEDIMENT FROM THE BAG IN AN APPROVED UPLAND AREA AND STABILIZE WITH SEED AND MULCH BY THE END OF THE WORK DAY. RESTORE THE SURFACE AREA BENEATH THE BAG TO ORIGINAL CONDITION UPON REMOVAL OF THE DEVICE.
5. REPLACE FILTER BAG IF BAG CLOGS OR HAS RIPS, TEARS, OR PUNCTURES. DURING OPERATION KEEP CONNECTION BETWEEN PUMP HOSE AND FILTER BAG WATER TIGHT. REPLACE BEDDING IF IT BECOMES DISPLACED.

FILTER BAG

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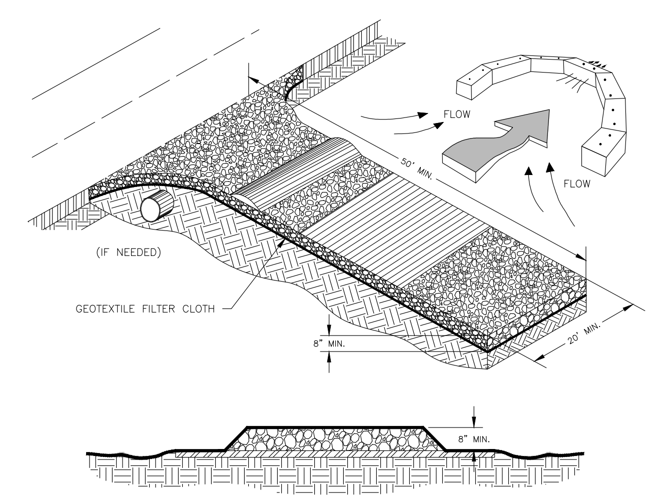

NOTES:
1. STONE SHALL BE COURSE AGGREGATE, 2 TO 3 INCH STONE.
2. THE LENGTH OF THE CONSTRUCTION EXIT SHALL NOT BE LESS THAN 50 FEET, EXCEPT FOR A SINGLE FAMILY RESIDENTIAL LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY.
3. THE MINIMUM THICKNESS OF THE STABILIZED EXIT SHALL NOT BE LESS THAN 8 INCHES.
4. THE WIDTH SHALL NOT BE LESS THAN THE FULL WIDTH OF THE INGRESS OR EGRESS POINT OR 20 FEET, WHICHEVER IS GREATER.
5. GEOTEXTILE FILTER CLOTH SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE. FILTER CLOTH IS NOT REQUIRED FOR A SINGLE FAMILY RESIDENTIAL LOT.
6. AVOID LOCATING ON STEEP SLOPES OR AT CURVES ON PUBLIC ROADS.
7. ALL SURFACE WATER THAT IS FLOWING TO OR DIVERTED TOWARD THE CONSTRUCTION ENTRANCE SHALL BE PIPED BENEATH THE ENTRANCE. IF PIPING IS IMPRACTICAL, A BERM WITH 5:1 SIDE SLOPES THAT CAN BE CROSSED BY VEHICLES MAY BE SUBSTITUTED FOR PIPE.
8. WASHRACKS AND/OR TIRE WASHERS MAY BE REQUIRED DEPENDING ON SCALE AND CIRCUMSTANCE. IF NECESSARY, WASHRACK DESIGN MAY CONSIST OF ANY MATERIAL SUITABLE FOR TRUCK TRAFFIC THAT WILL REMOVE MUD AND DIRT.
9. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH, OR WATERCOURSE THROUGH THE USE OF SAND BAGS, GRAVEL, BOARDS OR OTHER APPROVED METHODS.
10. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, WASHED, OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED PROMPTLY.

STABILIZED CONSTRUCTION ENTRANCE

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54 Main Street
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No.	Revision	Date

TODD P. MOREY CIVIL No. 48865 REGISTERED PROFESSIONAL ENGINEER — COMMONWEALTH OF MASSACHUSETTS
8.17.2020

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APPENDIX D: STORMWATER MANAGEMENT REPORT

STORMWATER MANAGEMENT REPORT

648-654 Main Street & 63 Vine Street

Winchester, Massachusetts

August 18, 2020

Prepared By:
Beals Associates, Inc.
2 Park Plaza, Suite 200
Boston, MA 02116

BEALS · ASSOCIATES INC.

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0. Executive Summary

The proposed project consists of a four-story mixed-use building containing approximately 6,200 square feet of retail space (including basement storage) along Main Street and 36 residential units in the rear and upper floors of the building. The larger of the two retail spaces will contain the Fells True Value Hardware store that exists onsite today. Parking for the residential units will be provided under the building and will be accessed via an automatic parking system. An interior courtyard will be enclosed by the proposed building and by a repositioned and renovated historic structure currently at 63 Vine Street. This single-family-sized building will also complement the adjacent residential neighborhood.

The Massachusetts Stormwater Standards, where applicable have been met for this project. A summary of the Standards and how they were met is presented below.

Standard 1 – No Untreated Discharges or Erosion to Wetlands

This standard has been met by providing treatment to proposed impervious surfaces and points of discharge on the site. Calculations have been provided throughout the report to confirm this. **Standard 1 has been met.**

Standard 2 – Peak Rate Attenuation

The proposed project reduces the rate of runoff to the point of analysis through the use of onsite stormwater management facilities. Complete runoff calculations for the 2-, 10-, 25- and 100-year storm events based on the Cornell rainfall data have been included in the Appendix. **Standard 2 has been met.**

Standard 3 – Stormwater Recharge

Calculations have been provided to demonstrate the total recharge volume of the project meets this standard. **Standard 3 has been met**

Standard 4 – Water Quality

The project features various Best Management Practices and proprietary devices to improve the quality of the stormwater runoff prior to discharge. Calculations demonstrating that the runoff has been treated to remove a minimum of 80% of the Total Suspended Solids (TSS) has been included in the report. **Standard 4 has been met.**

Standard 5 – Land Uses with Higher Potential Pollution Loads

The project is not considered a Land Use with Higher Potential Pollution Load, therefore **Standard 5 does not apply.**

Standard 6 – Critical Areas

The project site is not located within any critical areas. **Standard 6 has been met.**

Standard 7 – Redevelopment

The project is a redevelopment, however the stormwater management systems have been designed to meet or exceed all the applicable Massachusetts Stormwater Management standards and improve upon existing conditions. **This Standard has been met.**

Standard 8 – Construction Period Controls

A complete erosion control plan and narrative has been provided. **Standard 8 has been met.**

Standard 9 – Operation and Maintenance Plan

The project documentation includes a complete Stormwater Operation and Maintenance Manual for the site. This manual meets all MA DEP checklist requirements. **Standard 9 has been met.**

Standard 10 – Illicit Discharges to Drainage System

The report includes a signed illicit discharge statement in Appendix B. **Standard 10 has been met.**

Based on the documentation and calculations in this report, the project meets or exceeds Commonwealth of Massachusetts Stormwater Standards.

1. Project Summary

The purpose of this project is to redevelop an underutilized parcel at the northern gateway of the Central Business District (CBD) into a mixed-use building of 36 residences and two retail spaces, one of which will continue to house the Fells True Value Hardware store. Parking for the residents and the owners of the Fells Hardware store will be provided underneath the building. The historic structure at 63 Vine Street will be renovated and repositioned to frame an internal courtyard in conjunction with the main mixed-use building.

The intent is to create a unique place that respects nearby historic buildings, complements adjacent properties, and builds future homes for Winchester residents and businesses. The proposed project is intended to further the Town's goals socially, environmentally, and economically by introducing a building that engages the community, encourages alternative transportation, and strengthens the tax base.

In total, the project will include 36 residences over three floors above two ground floor commercial spaces oriented towards Main Street. The larger of the two retail spaces will house the Fells True Value Hardware store that exists on the site today, and the smaller retail space will be open to a variety of retail or restaurant uses that are consistent with the CBD zoning and complementary to existing surrounding uses.

2. Massachusetts Stormwater Standards

a. Standard 1 – No Untreated Discharges or Erosion to Wetlands

Stormwater Management Standard 1 requires that there be no new stormwater conveyances that would discharge untreated stormwater to or cause erosion to waters or wetlands of the Commonwealth. The project has been designed to direct stormwater discharges to either piped conveyances or to subsurface infiltrative practices. To the maximum extent practicable, discharges of stormwater will be treated for Total Suspended Solids removal prior to discharge. Flow rates to the existing municipal drainage system will be substantially reduced. As a result of this, it can be stated that stormwater runoff from impervious areas will be treated through stormwater management devices and will not result in erosion in or adjacent to waters or wetlands of the Commonwealth. **Massachusetts Stormwater Standard 1 has been met.**

b. Standard 2 – Peak Rate Attenuation

The Peak Rate Attenuation Standard requires that stormwater management systems be designed such that post development peak discharge rates do not exceed predevelopment discharge rates. The only time this standard may be waived is for discharges to land subject to coastal storm flowage. The project site does not fall into this category. As described above, we believe this criterion will be met by restricting discharge rates through a series of underground detention and infiltration systems. The project has been designed such that there will be no discharge from any infiltration system up to and including the 25-year storm.

The site is located within the 100-year FEMA floodplain. The compensatory storage for work within the Floodplain will be provided underneath the proposed building. The stormwater management systems are

separate from the compensatory flood storage, and will not discharge to the compensatory storage area on storm events up to and including the 100-year storm. On storm events exceeding the 100-year storm, stormwater will begin discharging through a secondary overflow contained within the subsurface detention system.

Predevelopment Model

The predevelopment model was created by observing existing conditions and drainage structures. The proposed system will be offline from the existing drainage system within Elmwood Avenue and Main Street. The predevelopment watershed accounts for all of the area tributary to the project area, and as well as the project area itself. The existing buildings and parking areas on the site do not have any stormwater management features, and stormwater currently flows into the municipal drainage system within Elmwood Avenue and Main Street in an untreated and unrestricted manner.

Methodology

The hydrologic analyses for post development conditions have been conducted based upon the methodology contained in the USDA Soil Conservation Service's Technical Release No. 20 (TR-20). A 24-hour SCS Type III storm distribution was used for the analysis using the following storm frequencies and rainfall values for the town of Winchester area based on data obtained from the Extreme Precipitation in New York and New England.

STORM EVENT, RECURRENCE INTERVAL	24-HOUR PRECIPITATION
2-YEAR	3.23 inches
10-YEAR	4.90 inches
25-YEAR	6.21 inches
100-YEAR	8.92 inches

The HydroCAD computer program was used in the analyses. This program determines the critical points of the overall drainage system and uses SCS TR-20 methodologies for evaluation of the anticipated conditions at these points. Travel times, storage capacity and the effects of hydraulic head are considered for analysis within the program. The model uses reservoirs and pipes to model actual conditions and can assess storage and kinematic effects.

The drainage system is represented by a system network consisting of four basic components in the model.

- Subcatchment: A relatively homogenous area of land that drains into a single reach or pond. Each subcatchment generates a hydrograph.
- Reach: A uniform stream, channel or pipe which conveys water from one point to another reach or pond. The outflow of each reach is determined by a hydrograph routing calculation.

- Pond: A pond, swamp, dam, catch basin, manhole or other impoundment which fill with water from one or more sources and empties in a manner determined by weir, culvert or other device(s) at tis outlet. A pond may empty into a reach or another pond. The outflow of the pond is also determined by a hydrograph routing calculation.
- Link: A multi-purpose mechanism for introducing a hydrograph from outside the diagram, either by manual entry, file import, or linkage to another diagram. A link also allows the diversion and/or scaling of a hydrograph. In this analysis, the links are simply used to compute the confluence of the various hydrographs at the points of analyses.

After identifying each of the components, the system may be represented by a routing diagram such as that shown in the computations in the appendices to this report.

Soils

The NRCS Soil Survey for Middlesex County identifies the entire project area as Charlton-Urban Land. The NRCS Soils Map is included in Appendix D. Charlton is interpreted as a Hydrologic Soil Group A.

Borings were performed by Carr-Dee Corporation on October 23 and 24, 2019 for McPhail Associates, LLC. A copy of the geotechnical report has been attached in Appendix D.

Time of Concentration

Time of Concentration flow paths were developed using TR-55 methodologies. Sheet flow was limited to no more than 50 feet in length. The minimum time of concentration used for this analysis was 6.0 minutes. Time of concentration utilized in this report for both the existing and proposed conditions were all 6 minutes.

Runoff Curve Numbers

The runoff curve numbers for the various soil types and land use covers were initially developed in accordance with TR-55 methodologies.

Points of Analyses

For this project, the point of analysis was identified as the overall collection of stormwater tributary to the municipal drainage system from the project site.

Post-development Methodology

The post development stormwater management system uses a series of underground detention and infiltration systems. Stormwater will be collected on the roof and be conveyed to various subsurface systems through roof leaders. Stormwater that collects within the systems will infiltrate into the ground up to and including the 25-year storm event. In storm events exceeding the 25-year storm, stormwater will begin discharging to the municipal drainage system from the stormwater management system. A portion of sidewalks throughout the project area will not be directed to the stormwater management facilities.

Stormwater Runoff Calculations

In order to compare the existing conditions to design flow rates and volumes, our office set up a simple model to compute the previously modeled conditions flow rates and volumes. The existing conditions model does not factor in individual manhole and pipe lengths but takes an overview approach by providing for the existing developed area as well as the undeveloped areas of the site. By using this as a baseline, a comparison can be made to the design project that will check to ensure anticipated flow rates and volumes are not being exceeded to the municipal drainage system. The results of the overall stormwater modeling indicate the following:

Peak Runoff Rates and Overall Volumes					
		Existing		Proposed Design	
Storm	Rainfall	Rate, cfs	Surface Runoff Volume, cubic-ft.	Rate, cfs	Surface Runoff Volume, cubic-ft
2-Year	3.23”	1.13	3,495	0.17	493
10-Year	4.90”	1.99	6,253	0.26	767
25-Year	6.21”	2.66	8,494	0.34	983
100-Year	8.92”	4.04	13,228	1.25	4,928

Based on the results above, the project meets the goal for the runoff rates and volumes described earlier in this document. As shown in the table above, all proposed discharge rates and volumes have been reduced. **This Standard has been met.**

c. Standard 3 – Stormwater Recharge

Standard 3 of the Massachusetts Stormwater Handbook states that loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The first step in documenting compliance with this Standard is to compute the required recharge volume for the soil type that the site impacts. One component of this calculation is to determine the total area of new impervious surface over each soil type on the site.

The characterization of the site as Charlton-Urban land-Hollis complex in conjunction with the geotechnical report by McPhail Associates, we expect the soils present in this area would likely be a A soil and conducive for infiltration.

The required volume of recharge is expressed as:

$$Rv = F \times \text{Impervious Area},$$

where F is a factor dependent on Hydrologic Soil Groups. In this case, the onsite soils are Hydrologic Group A soils, therefore, F is 0.60 inches. Applying this to the total impervious site area yields:

$$\text{Impervious Area} = 19{,}613\ ft^2$$

$$Rv_1 = (0.60") \times (1\ ft/12") \times (19{,}613\ ft^2) = 981\ ft^3$$

Sufficient runoff must be directed to the infiltration BMPs to ensure infiltration of the Required Recharge Volume. In some cases, such as the proposed project, only a portion of the site's impervious area can be directed to the BMPs. As a result, the infiltration BMPs may not be able to capture sufficient rainfall on an average annual basis to meet the Required Recharge Volume. In this case, designers can either redesign the site so that runoff from more of the impervious areas located on the site are directed to the infiltration BMPs, or increase the storage capacity of the infiltration BMPs so that they may capture more of the runoff from the impervious surfaces located within the contributing area. In no case shall runoff from less than 65% of the site's impervious cover be directed to the BMPs intended to infiltrate the Required Recharge Volume. To calculate the "adjusted recharge volume", the Required Recharge Volume must be multiplied by the ratio of total site area to site area draining to recharge facilities. This is expressed below.

$$Rv_{Adjusted} = (19{,}613\ ft^2) \div (17{,}640 ft^2) \times 981 ft^3 = 1{,}091\ ft^3$$

The project features four infiltration systems designed to infiltrate stormwater. The total available volume within each infiltration system with the corresponding impervious area is shown in the table below.

Table 1 – Water Quality and Recharge Volume

Name of System(s)	Contributing Impervious Area (Square-Feet)	Water Quality Volume Required (0.50" over all impervious area) (Cubic-Feet)	Recharge Volume Required (0.60" over all impervious area) (Cubic-Feet)	Static Volume Provided (Cubic-Feet)
Infiltration System 1A & Infiltration System 1B	10,516	438	526	237 & 1,179 (1,416 Total)
Infiltration System 2	5,124	213	256	1,674
Infiltration System 3	2,000	83	100	515
Total	17,640	734	882	3,605

As demonstrated in the table above, all of the Infiltration Systems provide a total recharge volume of 3,605 cubic-feet which exceeds the requirement of 1,091 cubic-feet.

Drawdown times have been analyzed for these systems as well. Per Massachusetts Stormwater Management Standards, the infiltration BMP (best management practice) must drain within 72 hours for the recharge volume. To determine whether an infiltration BMP will drain within 72 hours, the formula below has been used.

$$Time_{drawdown}=R_V/[(K*1ft/12")*(Bottom\ Area)]$$

Table 2 – Drawdown Time

Name of System	Storage Volume ($R_{v)}$	Saturated Hydraulic Conductivity (K)	Bottom Area of Recharge Structure	Drawdown Time
Infiltration System 1A	237	2.41	157	7.5 Hours
Infiltration System 1B	1,179	2.41	707	8.3 Hours
Infiltration System 2	1,674	2.41	510	16.3 Hours
Infiltration System 3	515	2.41	214	12.0 Hours

Mounding analyses are required where the systems are less than four (4) feet above seasonal high groundwater table and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher storm event. Infiltration Systems 1A, 1B, and 2 are all greater than four (4) feet above the seasonal high groundwater table however the mounding analysis has still been performed. Table 3 below demonstrates the summary of the mounding analysis. Calculations of the Mounding Analysis can be found in Appendix E.

Table 3 – Mounding Analysis Summary

Name of System	Groundwater Elevation	Groundwater + Mound	System Bottom (Including Stone)	Delta
Infiltration System 1A	14.6	14.6 + 0.25 (14.85)	22.50	+7.65
Infiltration System 1B	14.6	14.6 + 0.66 (15.26)	22.50	+7.24
Infiltration System 2	14.6	14.6 + 1.30 (15.90)	18.67	+2.77
Infiltration System 3	15.4	15.4 + 0.48 (15.88)	17.40	+1.52

This standard has been met.

d. Standard 4 – Water Quality

Massachusetts Stormwater Standard 4 requires stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). In order to meet this criteria, BMPs must be designed into the overall site to provide treatment of runoff from impervious areas. Design criteria for many of these BMPs are based on a water quality volume of either ½" or 1", depending on several criteria for the project and site location. Water quality volumes must be based on a volume of 1/2" for each BMP when calculating effectiveness.

Treatment trains for the project have been computed using the Massachusetts DEP TSS Removal Worksheets based on the DEP removal credits for properly designed and implemented measures. The various treatment devices include:

- Infiltration (80% TSS Removal)

As demonstrated in Table 1, in Section 2.C., the water quality storage volume provided exceeds the required water quality storage volume and will provide 80% TSS removal for each of the infiltration systems. **This Standard has been met.**

e. Standard 5 – Land Uses with Higher Potential Pollution Loads

This project does not feature a land use with higher potential pollution loads. **This Standard does not apply.**

f. Standard 6 – Critical Areas

The project site is not located within any critical areas. **This Standard does not apply.**

g. Standard 7 – Redevelopment

The project is a redevelopment, however the stormwater management systems have been designed to meet or exceed all the applicable Massachusetts Stormwater Management standards and improve upon existing conditions. **This Standard has been met.**

h. Standard 8 – Construction Period Controls

Pollution prevention and erosion and sedimentation control measures will be implemented during all construction phases of the project. Control measures will address construction related impacts and land disturbance activities. An Erosion Control Plan is included in the planset and incorporates the use of silt fences with straw wattle barrier or silt sock along the downstream slope of the property. Silt sacks will be installed in existing catch basins within the public roadways prevent sediment accumulation within them. **This standard has been met.**

i. Standard 9 – Operation and Maintenance Plan

For this project, a Long-Term Operations and Maintenance manual has been developed under separate cover. This manual has been developed for the property owner and operator to maintain records of all required inspections and maintenance activities as the project site is operated in the future. The requirements listed in the Massachusetts Stormwater Checklist have been incorporated into the Manual. **This Standard has been met.**

j. Standard 10 – Illicit Discharges to Drainage System

This standard requires a signed statement regarding illicit discharges. A stamped and signed statement reading the following is included in the appendices.

> The stormwater management system is the system for conveying, treating, and infiltrating stormwater on-site, including stormwater best management practices and any pipes intended to transport stormwater to the groundwater, a surface water, or municipal separate storm sewer system. Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.
>
> It is our belief and understanding, to the best of our knowledge, that there are no known illicit discharges on the site at 648-654 Main Street & 63 Vine Street in Winchester, Massachusetts.

Standard 10 also requires that, in addition to the Illicit Discharge Compliance Statement, a site map, drawn to scale, must identify the location of all systems conveying stormwater on the site and display that no connections between these systems and any waste management system exist. Engineering drawings accompanying this report display the location of all stormwater management components. These drawings serve as site maps and establish that no illicit discharges are proposed for this project.

This Standard has been met.

4. Appendices

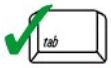
Appendix A – Massachusetts Stormwater Checklist

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
TODD P. MOREY
CIVIL
No. 48865
REGISTERED PROFESSIONAL ENGINEER

8.18.2020

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): SUBSURFACE INFILTRATION SYSTEM

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix B – Illicit Discharge Compliance Statement

BEALS · ASSOCIATES INC.
2 Park Plaza, Suite 200, Boston, MA 02116
Phone: 617-242-1120

ILLICIT DISCHARGE STATEMENT

The stormwater management system is the system for conveying and detaining stormwater on-site, including stormwater best management practices and any pipes intended to transport stormwater to the groundwater, a surface water, or municipal separate storm sewer system. Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

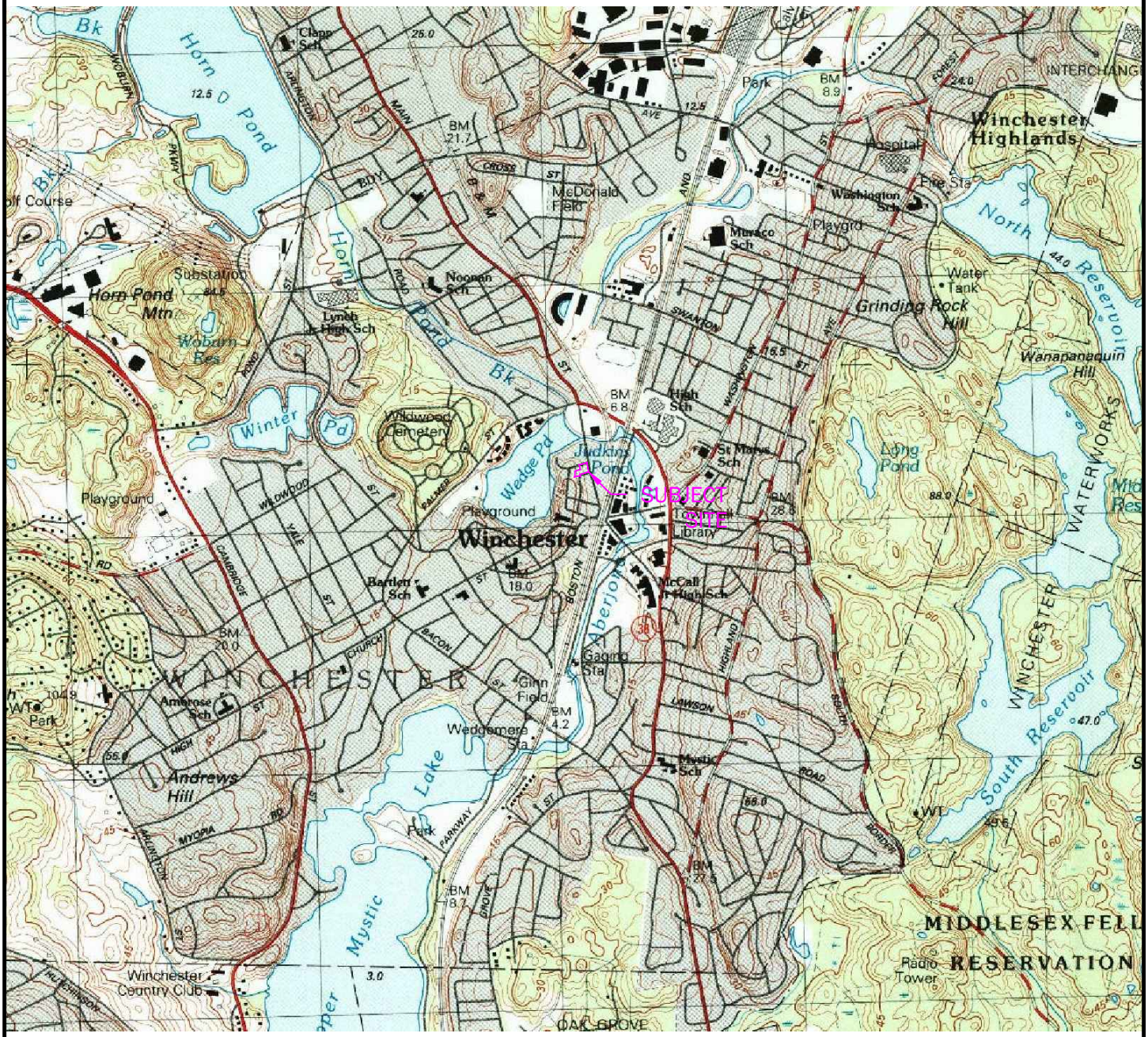
It is our belief and understanding, to the best of our knowledge, that there are no known illicit discharges on the site at 648-654 Main Street & 63 Vine Street in Winchester, Massachusetts.

COMMONWEALTH OF MASSACHUSETTS
TODD P. MOREY
CIVIL
No. 48865
REGISTERED PROFESSIONAL ENGINEER

Todd P. Morey, P.E.	August 18, 2020 Date	Massachusetts 48865

Appendix C – Location Maps and Figures

REFERENCES: PROPERTY LINE INFORMATION WAS OBTAINED FROM MASS GIS. USGS MAP WAS OBTAINED FROM USGS BOSTON NORTH MASSACHUSETTS TOPOGRAPHIC MAP DATED 1985.



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654 Main Street LLC.

USGS Map

Winchester
Massachusetts

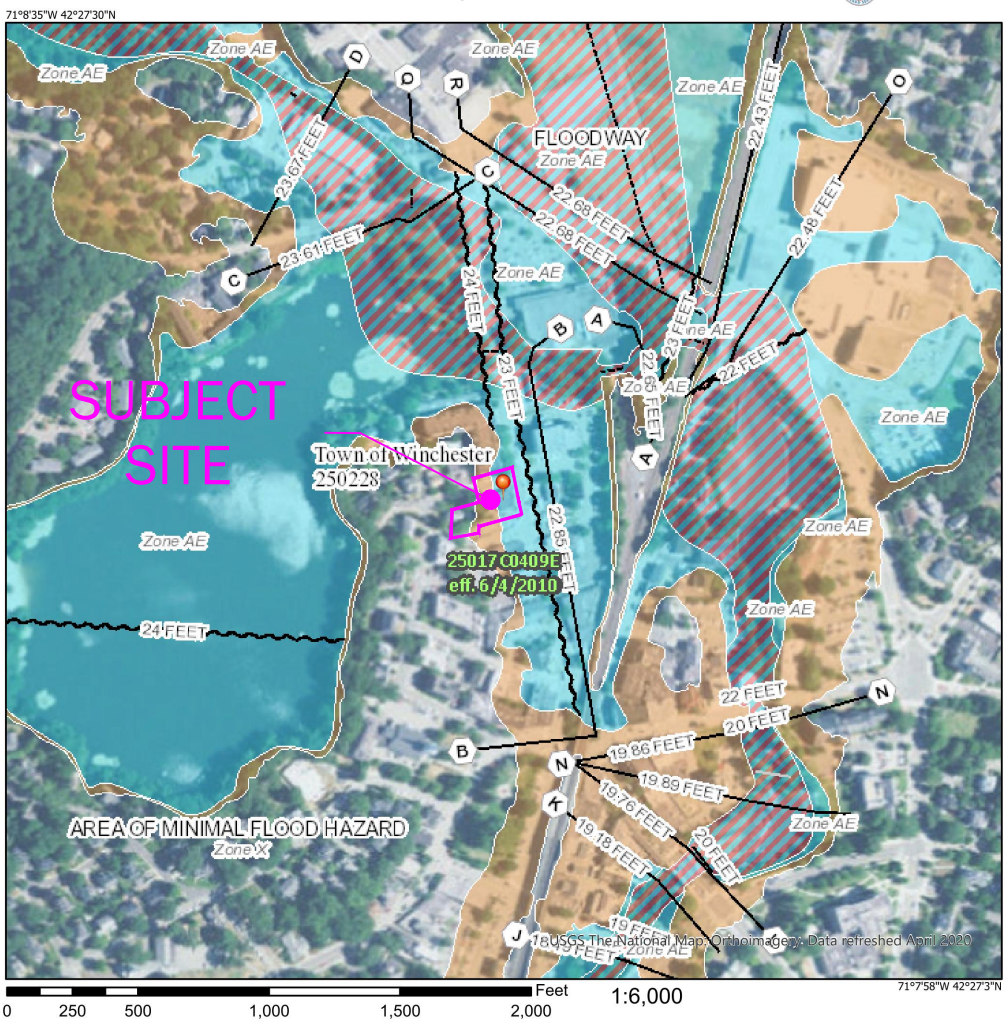
Figure 1
August 18, 2020

SCALE: 1"=2000'
0 1000 2000

REFERENCES:
PROPERTY LINE INFORMATION OBTAINED FROM MASS GIS. FEMA WAS OBTAINED FROM FEMA FLOOD MAP SERVICE CENTER.

National Flood Hazard Layer FIRMette

FEMA



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/18/2020 at 11:20 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

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654 Main Street LLC.

FEMA Map

Winchester
Massachusetts

Figure 2
August 2020

SCALE: AS NOTED

Appendix D – Watershed Maps

NOTES:

- ACCORDING TO NRCS SOIL MAPPING, ALL OBJECT AREAS HAVE BEEN IDENTIFIED AS HYDROLOGIC SOIL GROUP (HSG) A.
- SUBCATCHMENT 1S USES A TIME OF CONCENTRATION OF 6 MINUTES.

PATH:H:\C-942 Winchester\Autocad\Permit Documents\Watershed Map - Existing.dwg

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AD MELIORA

Fells Hardware Redevelopment

654 Main Street
Winchester, MA

SCALE: 1"=20'

20 0 10 20 40

Sheet Title:
Pre-Development Watershed Map

Sheet No:
C.1

Date:
August 18, 2020

NOTES:

- ACCORDING TO NRCS SOIL MAPPING, ALL OBJECT AREAS HAVE BEEN IDENTIFIED AS HYDROLOGIC SOIL GROUP (HSG) A.
- SUBCATCHMENTS 1S, 2S, 3S, 4S AND THE BUILDING USE THE MINIMUM TIME OF CONCENTRATION OF 6 MINUTES.

PATH:H:\C-942 Winchester\Autocad\Permit Documents\Watershed Map - Proposed.dwg

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AD MELIORA

Fells Hardware Redevelopment

654 Main Street
Winchester, MA

SCALE: 1"=20'

20 0 10 20 40

Sheet Title:
Post-Development Watershed Map

Sheet No:
C.2

Date:
August 18, 2020

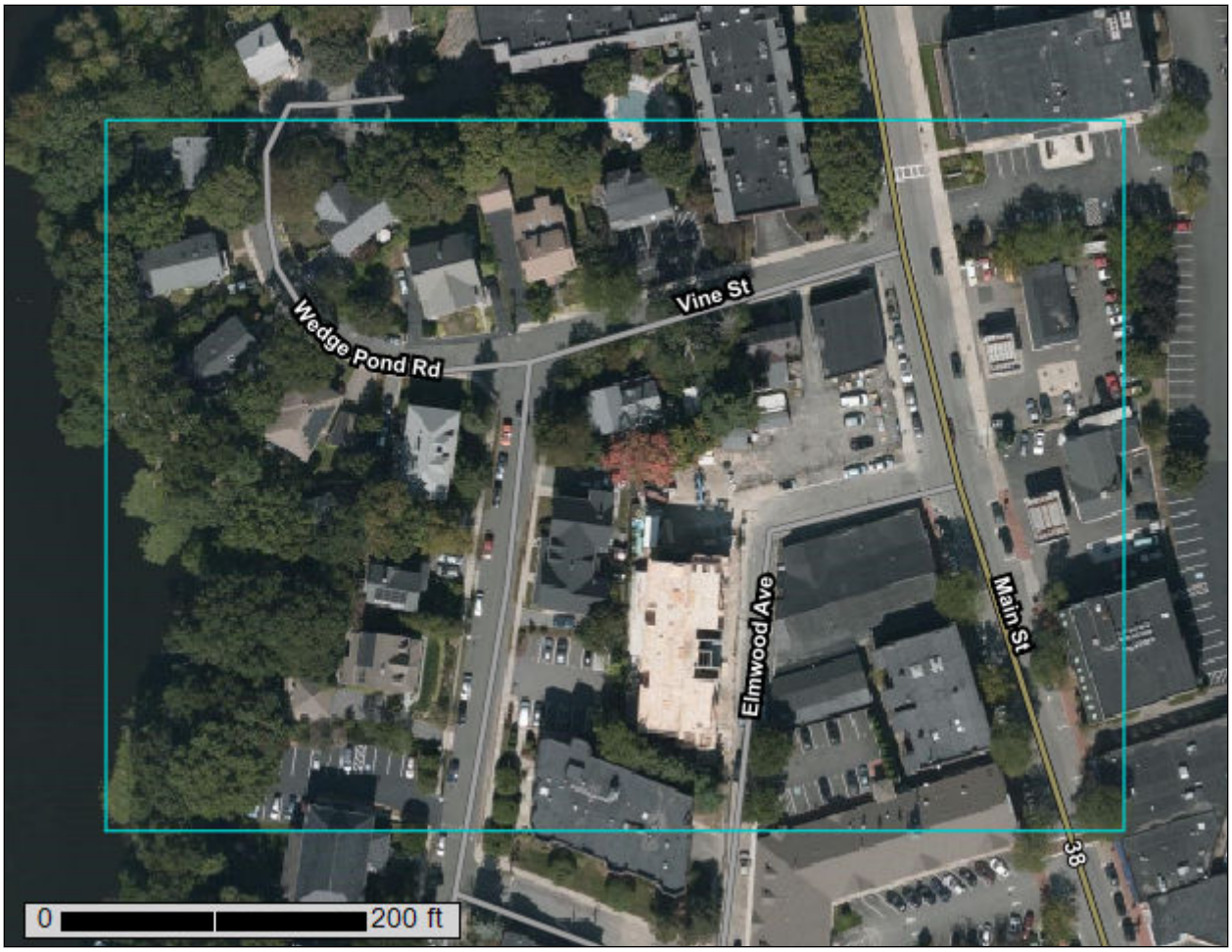
Appendix E – NRCS Soils Data and Geotechnical Report

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Middlesex County, Massachusetts



July 28, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 20, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	0.3	3.7%
603	Urban land, wet substratum	1.1	14.7%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	5.9	81.6%
Totals for Area of Interest		**7.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, Massachusetts

1—Water

Map Unit Setting

National map unit symbol: 996p
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

603—Urban land, wet substratum

Map Unit Setting

National map unit symbol: 9951
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land over alluvium and/or marine deposits

Minor Components

Udorthents, loamy

Percent of map unit: 10 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

631C—Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky

Map Unit Setting

National map unit symbol: vr1g
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 45 percent
Urban land: 35 percent
Hollis and similar soils: 10 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 22 inches: sandy loam
H3 - 22 to 65 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water storage in profile: Moderate (about 7.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: Well Drained Till Uplands (F144AY034CT)
Hydric soil rating: No

Description of Urban Land

Setting
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Description of Hollis

Setting
Landform: Ridges, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile
H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities
Slope: 3 to 15 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: Shallow Dry Till Uplands (F144AY033MA)
Hydric soil rating: No

Minor Components

Canton
Percent of map unit: 4 percent
Landform: Hills

Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Udorthents, loamy
Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop
Percent of map unit: 2 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

Scituate
Percent of map unit: 1 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, summit
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Montauk
Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Nose slope, head slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

References

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PRELIMINARY GEOTECHNICAL ENGINEERING REPORT

648-645 MAIN STREET AND 63 VINE STREET

WINCHESTER, MASSACHUSETTS

NOVEMBER 19, 2019

Prepared For:

AD Meliora, LLC
Two Oliver Street, 10th Floor
Boston, MA 02109

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PROJECT NO. 6880.2.00

November 19, 2019

AD Meliora, LLC
Two Oliver Street, 10th Floor
Boston, MA 02109

Attention: Mr. Paul Soughley, Senior Vice President

Reference: 648-654 Main Street and 63 Vine Street; Winchester, Massachusetts
Preliminary Geotechnical Engineering Report

Ladies and Gentlemen:

This report documents the results of our preliminary subsurface exploration program and foundation design study for the proposed project located at 648-654 Main Street and 63 Vine Street in Winchester, Massachusetts. Refer to the Project Location Plan, **Figure 1**, for the general site location.

This report was prepared in accordance with our proposal dated September 24, 2019 and the subsequent authorization of Mr. Paul Soughley of AD Meliora, LLC. These services are subject to the limitations contained in **Appendix A.**

Purpose and Scope

The purposes of our preliminary subsurface exploration program and foundation design study are to assess the subsurface soil and groundwater conditions at the site as they relate to foundation design, and based on these conditions, to provide preliminary foundation design recommendations.

Our preliminary foundation design recommendations include foundation support of the proposed building and its lowest level slab, treatment of the lowest level slab in consideration of groundwater, lateral earth pressures on foundation walls, and seismic design considerations in accordance with the provisions of the Ninth Edition of the Massachusetts State Building Code (Code). Preliminary foundation construction considerations relating to geotechnical aspects of the proposed construction are also presented herein.

Available Information

Available information which was provided to McPhail Associates, LLC (McPhail) included the following:

- An existing conditions DRAFT drawing entitled, "ALTA/NSPS Land Title Survey, 648-654 Main Street, 63 Vine Street, Winchester, Mass.", dated July 22, 2019, prepared by Feldman Land Surveyors.

Existing Conditions

The project site is bounded by Vine Street to the north, Main Street to the east, Elmwood Street to the south and residential properties to the west. The irregular shaped site occupies and approximate 18,708 square-foot (sq. ft.) area and is currently improved by an approximate 2,072 square-foot, 1-story hardware store on the northeast corner of the site, an approximate 1,025 sq. ft. (plan area) 2-story residential building on the northwest corner of the site, and four small support structures consisting of 2 sheds and 2 storage containers.

The ground surface across the site consist primarily of asphalt surfaces. Landscaped margins (grass areas) are present along the northern and western sides of the residential building. The ground surface across the site slopes downward from west to east from about Elevation +29 along the western perimeter of the site to about Elevation +22 as it fronts onto Main Street, across a horizontal distance of about 175 feet. It is noted that an approximate 8 to 12-foot high field stone retaining wall is located along the western perimeter of the site.

Elevations indicated herein are in feet and are from the above referenced existing conditions drawing which are referenced to the North American Vertical Datum (NAVD) of 1988.

Proposed Development

It is understood that a design study is currently being conducted to assess options for the redevelopment of this site which include the demolition of the existing structures and the construction of a multi-story building which may extend one level below grade.

Subsurface Explorations

From October 23 to 24, 2019, three (3) soil borings were performed at the project site by Carr-Dee Corp. of Medford, Massachusetts under contract to McPhail. The approximate locations of the borings are indicated on the enclosed Subsurface Exploration Plan, **Figure 2.**

The borings were performed utilizing truck-mounted drilling equipment and were advanced using NW casing and rotary wash drilling methods. Standard 2-inch O.D. split-spoon samples and standard penetration tests (SPT) were obtained at minimum 5-foot intervals of depth or continuously through the fill and outwash deposit in accordance with the standard procedures in ASTM D1586. Borings B-1 and B-2 were advanced to depths of about 52 and 62 feet below the existing ground surface, respectively, and were terminated within a natural glacial outwash deposit. Boring B-3 was advanced to a depth of about 20 feet below the existing ground surface and was also terminated within a natural glacial outwash deposit. Boring logs prepared by McPhail are presented in **Appendix B** following the text of this report.

To permit monitoring of the groundwater level at the site, a groundwater observation well was installed within the borehole identified as boring B-2(OW). Prior to the installation of the observation well pipe, boring B-2 was backfilled from the bottom of the borehole up to about 20 feet from ground surface with drill cuttings. Construction of the observation well from the ground surface downward consisted of a 10-foot long, 2-inch diameter solid PVC pipe which transitioned to a 10-foot long, 2-inch diameter slotted PVC pipe. The 10-foot section of slotted pipe was backfilled with well sand followed by a bentonite seal. Drill cuttings were used to fill from the top of the bentonite seal to ground surface. A steel road box with a removable cap was installed flush with the ground surface to protect the top of the well pipe.

It is also noted that the groundwater level at the site was also monitored at two previously installed groundwater observation wells identified as MW-1 and MW-2. The locations of the existing observation wells and the observation well installed as part of our exploration program are indicated on the enclosed **Figure 2**. Groundwater observation reports are presented in **Appendix C.**

Field locations of the borings were determined by taping from existing site features and the existing ground surface elevation at each exploration location was determined by a level survey performed by our field staff utilizing the information indicated on the existing conditions plan referenced herein.

Laboratory Testing

At the completion of the recent field work, soil samples obtained from the borings were returned to our laboratory for more detailed classification, analysis and testing. The laboratory testing consisted of sieve analyses to determine the gradations and confirm the visual classifications of the fill material and natural glacial outwash deposit. Laboratory test procedures were in general accordance with applicable ASTM Standards. Results of the gradation testing appear on **Figures 3 and 4** following the text of this report.

Subsurface Conditions

A detailed description of the subsurface conditions encountered within the explorations is documented on the boring logs contained in **Appendix B**. Approximate locations of the borings are indicated on the enclosed Subsurface Exploration Plan, **Figure 2.** Based on the subsurface explorations, the following is a description of the generalized subsurface conditions across the site encountered from ground surface downward.

In general, the ground surface at the boring locations consist of an approximate 0.5-foot thick asphalt layer underlain by a fill layer that extends up to 5 feet below the existing ground surface. The fill material was observed to vary from a very loose to loose, light brown to brown, sand and silt with trace gravel to a sand with some silt and gravel and occasional brick fragments. The fill material is considered to be indicative of a reworked natural glacial outwash deposit which underlies the site. A typical grain size distribution of

fill material is presented on the enclosed **Figure 3.** Based on the current development of the site, the fill material is anticipated to extend to depths which coincide with previous excavation and backfilling activities associated with existing and former building foundations and basement levels at the site.

Underlying the fill material, a natural glacial outwash deposit was encountered. The surface of the glacial outwash deposit was encountered at depths ranging from about 2 to 5 feet below the existing ground surface, corresponding to levels ranging from Elevation +17.4 and +23.2. Based on the results of the three (3) borings, the surface of the glacial outwash deposit appears to slope downward from west to east across the site from about Elevation +23.3 at boring B-2 to about Elevation +17.8 at boring B-1 located at the southern end of the site and near Main Street.

In general, the glacial outwash deposit varies from a loose to dense, stratified, light brown to brown, sand and silt to silty sand with trace gravel containing silt seams. Grain size distributions of three (3) typical samples of the glacial outwash deposit are presented on the enclosed **Figure 4.** Each of the three explorations were terminated within the glacial outwash deposit at depths of about 20 to 62 feet below the existing ground surface.

The groundwater level at the site was measured from within groundwater observation wells B-1(OW), MW-1 and MW-2 at depths ranging from about 7.2 to 11.0 feet below the existing ground surface, corresponding to levels ranging from about Elevation +14.2 to Elevation +15.4. Groundwater observation reports are included in **Appendix C.**

It is anticipated that future groundwater conditions across the site may vary from those reported herein due to factors such as normal seasonal changes, periods of heavy precipitation, and alterations to existing drainage patterns. Groundwater is also anticipated to become perched on the relatively impervious silt seams located within the outwash deposit.

Preliminary Foundation Design Recommendations

Based upon our current understanding of the proposed construction and the subsurface conditions described herein, it is anticipated that the proposed structure could be designed utilizing a conventional spread footing foundation system in conjunction with slab-on-grade construction for the lowest level floor slab or a thickened mat slab in the case of a full basement level.

Based on the results of the borings, it is anticipated that the proposed spread footing foundations or mat slab foundation and should be proportioned utilizing a maximum design soil bearing pressure of 1 ton per square foot (tsf) and bear on the natural glacial outwash deposit or on structural fill that is placed directly over the surface of the natural glacial outwash deposit.

Additional recommendations associated with various options for the location of the building's lowest level slab are presented in the following section of the report. Specifically, three (3) design cases are addressed:

Design Case I - No Below Grade Space

The building foundations for a proposed lowest level floor slab that is located at or slight above the proposed finish exterior grades would be designed on conventional spread footings in conjunction with a soil supported slab-on-grade which is underlain by a polyethylene vapor barrier. The vapor barrier should be underlain by a minimum 6-inch thickness of gravel fill that is derived from an off-site source consisting of a well-graded sand and gravel containing less than 10 percent passing the No. 200 sieve. Prior to placement of the gravel fill base course layer, the exposed subgrade should be proof compacted with the use of a vibratory compactor having a minimum operating weight of 5 tons. Soft and/or spongy areas detected during the proof compaction measures should be removed and replaced with imported gravel fill.

All elevator pits and other local depressions in the lowest level slab should be provided with properly tied continuous water stops in all construction joints and cementitious waterproofing on properly prepared interior surfaces. All pits which extend below the surface of the lowest level floor slab, should be designed to withstand a hydrostatic uplift force corresponding to a design groundwater level of Elevation +18 to which a factor of safety of 1.5 should be applied.

Where the lowest level floor slab is located at or slightly above the proposed finish exterior grades, underslab and perimeter foundation drainage is not considered necessary. Roof drains should be piped away from the building area and the finished exterior grades should be pitched away from the perimeter walls to promote surface water flow away from the building.

Design Case II: Lowest Level Slab above Elevation +18 (Partial Basement)

For preliminary design purposes, the building foundations for a lowest level slab located no lower than Elevation +18 should be designed as conventional spread footings in conjunction with a soil supported slab-on-grade underlain by a polyethylene vapor barrier which is underlain by a minimum 12-inch thick drainage layer consisting of ¾-inch crushed stone. To protect the below grade area from groundwater intrusion, an underslab drainage system and perimeter foundation drainage system should be installed. The underslab drainage system should consist of a network of 4-inch diameter perforated PVC pipes with its invert located 12-inches below the underside of the floor slab and installed within the crushed stone drainage layer referenced above. The perimeter foundation drainage system should consist of a 4-inch diameter perforated PVC pipe located adjacent to the exterior perimeter foundation. The perimeter foundation drainage pipe should be surrounded with a minimum 6-inch thickness of ¾-inch crushed stone which is in-turn wrapped in a non-woven geotextile filter fabric, such as Mirafi 140N.

The underslab and perimeter foundation drainage systems should discharge by gravity to the storm drain system which is equipped with a backwater flow preventer. Should a gravity drained system not be feasible, the underslab and perimeter foundations drainage systems should gravity drain into a sump pit, which is equipped with a duplex pump system and is provided with a backup power source.

All pits (such as sump and elevator pits) which extend below the surface of the lowest level floor slab, should be designed to withstand a hydrostatic uplift force corresponding to the lowest invert elevation of the underslab drainage system or the highest level/elevation at which the pump activation float within the sump is set at or Elevation +18 whichever is higher, to which a factor of safety of 1.5 should be applied.

Design Case III - Lowest Level Slab Below Elevation +18 (Full Basement Level)

The design of lowest level floor slab located below Elevation +18 should be designed as a waterproofed mat slab capable of withstanding hydrostatic uplift forces corresponding to a design groundwater Elevation +18. The waterproofing should extend from below the floor slab and continue along the exterior face of the perimeter foundation walls and terminate at the ground surface. All penetrations through the mat slab such as utilities should be coordinated with the reinforcing located in the mat slab foundation and waterproofing consultant.

Above Elevation +18, the below-grade foundation walls receiving lateral support at the top and bottom (i.e. restrained walls) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 60 pounds per cubic foot (pcf). Below a design groundwater level of Elevation +18 the below-grade foundation walls receiving lateral support at the top and bottom (i.e. restrained walls) should be designed for a lateral earth pressure corresponding to an equivalent fluid density of 90 pounds per cubic foot (pcf).

General Foundation Design Recommendations

All perimeter or interior foundations adjacent to unheated areas should be provided with a minimum 4-foot thickness of soil cover as frost protection. Interior footings adjacent to heated areas should be located such that the top of the foundation concrete is at least 6 inches below the underside of the slab-on-grade. The bottom of the footings should be located such that they are below a theoretical line drawn upward and outward at 2 to 1 (horizontal to vertical) from the bottom exterior edge of the existing foundations, structures and utilities.

Cantilevered or unrestrained site retaining walls may be designed utilizing a lateral earth pressure corresponding to an equivalent fluid density of 40 pounds per cubic foot subject to the walls being provided with positive drainage to prevent hydrostatic pressures from acting on the walls. To these values must be added the pressures attributable to earthquake forces per Section 1610.2 of the Code and any applicable surcharges from adjacent structures.

Seismic Design Considerations

For the purposes of determining parameters for structural seismic design, this site is considered to be a Site Class D as defined in Chapter 20 of American Society of Civil Engineers (ASCE) Standard 7-10 "Minimum Design Loads for Buildings and Other Structures". Further, the bearing stratum on the proposed site is not considered to be subject to liquefaction during an earthquake based on the criterion of Section 1806.4 of the Code.

Preliminary Foundation Construction Considerations

This section addresses excavation and preparation footing bearing surfaces, temporary construction dewatering, temporary support of excavation, waterproofing, re-use of excavated soils, and off-site disposal of excess excavated soil, which are considered by McPhail to be critical to proper foundation performance of the proposed development.

Preparation of the Foundation Bearing Surfaces

Final excavation to the surface of the glacial outwash deposit should be performed with a backhoe which is equipped with a "toothless" or smooth-edged bucket. All construction equipment, such as excavators, loaders, trucks and bull dozers, should be prohibited from working directly on the exposed surface of the glacial outwash deposit.

Spread footing or mat slab bearing surfaces consisting of the glacial outwash deposit should be covered with a layer of nonwoven geotextile filter fabric, such as Mirafi 140N or equal, followed by a minimum 6-inch thickness of compacted ¾-inch crushed stone.

Based on the results of borings and the currently development of the site, it is anticipated that for Design Case I, the removal of existing fill material and/or placement of structural fill may be required below the proposed design bottom of the proposed footings to reach the surface of the glacial outwash bearing stratum. These areas could include in the vicinity of boring B-1 where the fill was observed to extend up to 5 feet below the existing ground surface and where existing basement levels area currently present below the buildings located at 63 Vine Street and 648-654 Main Street. Furthermore, with respect to Design Case I, all basement levels should be backfilled with structural fill.

Where encountered, all fill material should be removed from below the proposed foundations down to the surface of the glacial outwash deposit and replaced with structural fill. The lateral limits of the removal of the fill material and the placement with structural fill should extend beyond the perimeter outside edges of the proposed footing a distance equal to depth from the proposed bottom of footing elevation to the surface of the glacial outwash deposit plus 2 feet in all directions.

All structural fill should be placed in maximum 6-inch lifts and compacted to a minimum of 95 percent of the materials Modified Proctor maximum dry density. Monitoring of the removal of the fill and placement of structural fill as recommended herein should be observed on a full-time basis as a quality control check that the design requirements are satisfied.

With respect to Design Case III, the application of the waterproofing membrane to the underside of the mat slab typically requires the installation of an approximate 4-inch thick concrete “mud mat” across the bottom of the excavation upon which the waterproofing membrane is installed followed by the construction of the mat slab over the waterproofing membrane.

Temporary Construction Dewatering

Based on the anticipated dewatering requirements, which would be directly related to the depth of the basement level and the proposed building footprint, it likely that on-site recharge of groundwater will not be sufficient during the excavation phase of this project. Therefore, off-site discharge of groundwater during construction should be anticipated. Temporary off-site discharge of groundwater during construction activities will require the submittal of an application for a temporary construction dewatering permit to either the US Environmental Protection Agency (EPA) or the Massachusetts Water Resource Authority (MWRA) and can take up to three (3) months to be approved.

It should be noted that the full basement level option (Design Case III) may require the installation of a groundwater cut-off or more extensive dewatering efforts.

Temporary Support of Excavation and Monitoring of Ground Vibrations

The final building plan location and design elevation of the lowest level floor slab are required to evaluate the extent of the temporary excavation support that would be required on this project. Maximizing the building set back from the adjacent property lines is anticipated to minimize the extent of the temporary support of excavation that will be required for this project.

As previously indicated in the "Existing Conditions" section of this report, the ground surface slopes upward toward the western perimeter of the site where an existing approximately 8 to 12-foot tall field stone retaining wall is located. The extent of earth support should also take into account the proposed building configuration with respect to this existing retaining wall located along the western perimeter of the site. Test pit explorations should be performed to document the extent and configuration of the below grade portions to the existing retaining wall which abuts the western property line of the site.

Where required, installation of a temporary support of excavation system to protect nearby structures and to permit excavation of the below grade level or foundations which are located adjacent to the properly lines is recommended.

Based on the anticipated range of excavation required for each design case and due to the proximity of the structures which abut the project site, such as the existing field stone retaining wall, a cantilevered earth support system consisting of drilled-in steel soldier piles and lagging is considered suitable for temporary support of the building excavation along the property lines. The purpose of using drilling methods to install the soldier piles, would be to minimize ground vibrations which could potentially damage the existing structures which abut the project site, such as the stone retaining wall and neighboring buildings.
It is recommended that ground vibration monitoring be performed during the installation of the temporary earth support system. In addition, a preconstruction condition survey should be performed of the adjacent buildings, the field stone retaining wall and below grade utilities.

Reuse of On-Site Excavated Material

Based on the results of the grain size distributions, the fill and outwash soil contain approximately between 27 to 66 percent silt, which makes it extremely sensitive to increases in moisture and subsequently difficult to compact for reuse as structural fill. Therefore, it is recommended that the fill and glacial outwash soil material be reused only as ordinary fill outside the building footprint and within landscaped areas. Furthermore, stockpiles of excavated fill and glacial outwash material intended for reuse should be protected against increases in moisture content by securely covering the stockpiles prior to and during precipitation events. The placement and compaction of the onsite excavated fill and glacial outwash material should be completed during relatively dry and non-freezing conditions. If, due to any of the above conditions, the excavated fill or glacial outwash become unsuitable for reuse as ordinary fill, an off-site Gravel Fill consisting of a well-graded sand and gravel with a maximum of 10 percent by weight passing the No. 200 sieve should be used.

All structural fill utilized within the building footprint and for support of the building foundation should consist of off-site Gravel Fill as described above.

Off Site Disposal of Excess Excavated Soil

The requirements for the off-site disposal of excess excavated soil from the site is anticipated and will be dependent on the final design elevation of the lowest level floor slab.

Chemical analysis in preparation for off-site disposal/reuse will be required to conform with the regulations and policies of the Commonwealth of Massachusetts Department of Environmental Protection (DEP). The frequency of chemical analysis for the off-site disposal/reuse of natural soil consisting of the glacial outwash deposit, is typically one sample per 1,000 cubic yards, and for the fill material is one sample per 500 cubic yards to be disposed/reused off-site.

Final Comments

This report was prepared to provided preliminary foundation design recommendations as part of a due diligence period. It is recommended that a supplemental subsurface exploration program be performed at the site, which is based on the proposed final design of the building and elevation of the lowest level floor slab.

Therefore, the recommendations provided herein should be considered preliminary and subject to change. The preliminary recommendations provided herein are not intended for use in the final design of the foundation support utilized on this project.

It is recommended that McPhail be engaged to prepare a scope of additional subsurface explorations at the project site, which is based on the proposed final design and lowest level of the proposed building, and based on the results of the additional subsurface explorations to prepare the final Foundation Engineering Report for use in the design of the proposed foundation support on this project. The additional explorations should include exploratory test pits to document the extent and configuration of the below grade portions to the existing retaining wall which abuts the western property line of the site.

It is also recommended that McPhail be retained to provide design assistance to the Architect and Structural Engineer during the final design phase of this project. The purpose of this involvement is to review the drawings and prepare geotechnical engineering related specifications as a check on implementation of our foundation design recommendations into the Contract Documents.

McPhail should be retained during the construction period to monitor the preparation of the foundation bearing surfaces, backfilling and compaction operations, installation of the perimeter and underslab drainage systems (if required), review of the support of excavation design submittal and monitoring of the installation of the temporary earth support system for conformance with the design submittal (where required), and to perform chemical precharacterization testing and preparation of applicable disposal packages for off-site disposal of excess soil. Our involvement during the construction phase of the work should minimize costly delays due to unanticipated field problems since our field engineer would be under the direct supervision of our project manager who was responsible for the subsurface investigation and foundation design recommendations documented herein.

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the preliminary foundation design recommendations presented herein, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, LLC

Harry J. Berlis

Chris M. Erikson, P.E.

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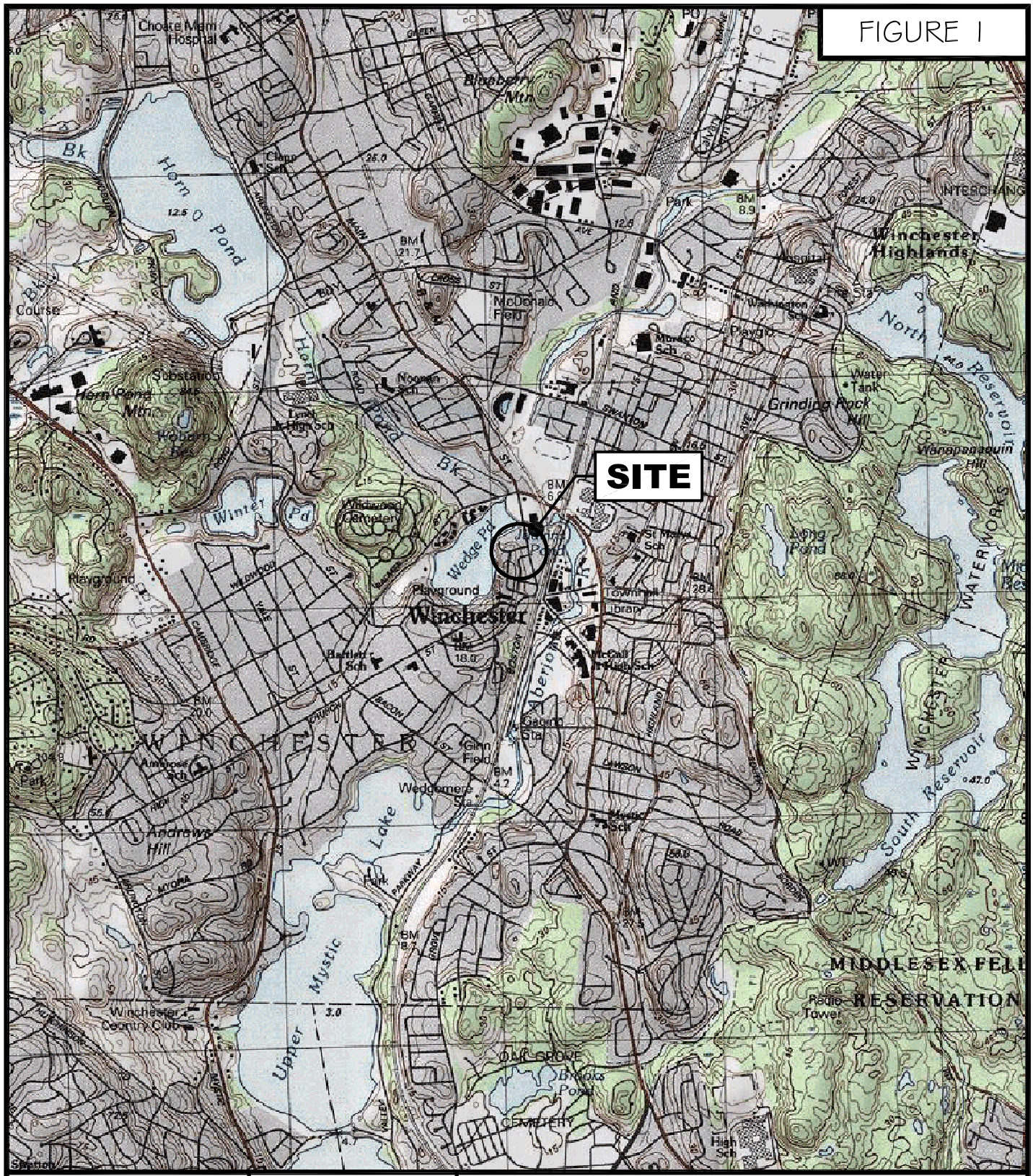
HJB/cme

FIGURE 1



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N

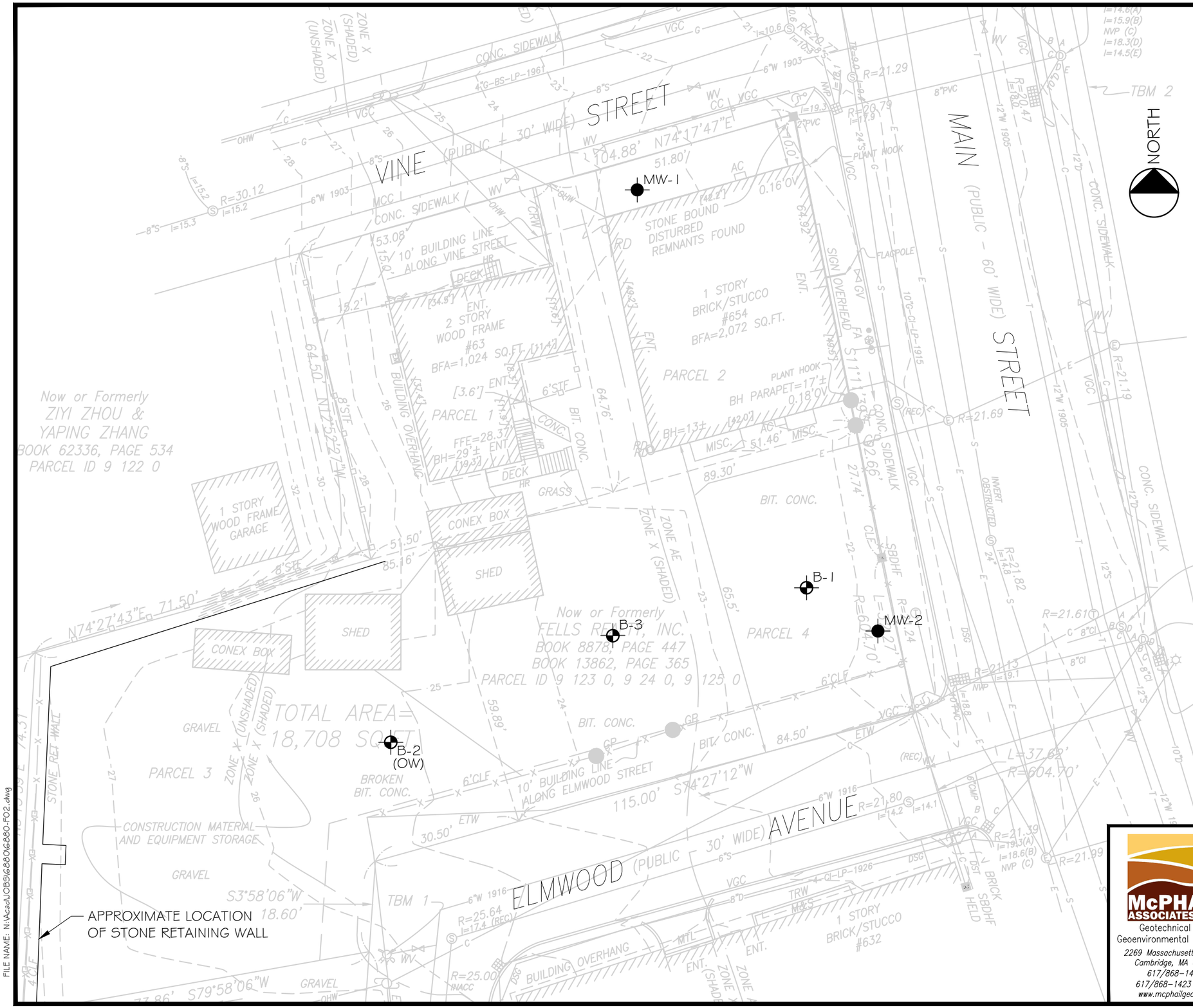
SCALE 1:25,000

PROJECT LOCATION PLAN

648 - 654 MAIN STREET
AND 63 VINE STREET

WINCHESTER MASSACHUSETTS

FIGURE 2



LEGEND

- ⊕ — APPROXIMATE LOCATION OF BORING PERFORMED BY CARR-DEE CORP. ON OCTOBER 23 AND 24, 2019 FOR McPHAIL ASSOCIATES, LLC
- ⊕ — APPROXIMATE LOCATION OF EXISTING MONITORING WELL INSTALLED BY OTHERS

(OW) — INDICATES OBSERVATION WELL INSTALLED WITHIN COMPLETED BOREHOLE

REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED, "ALTA / NSPS LAND TITLE SURVEY" DATED JUNE 26, 2018 PREPARED BY FELDMAN LAND SURVEYORS

GRAPHIC SCALE

20 0 20 40

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648 - 654 MAIN STREET AND 63 VINE STREET

WINCHESTER MASSACHUSETTS

SUBSURFACE EXPLORATION PLAN

FOR

AD MELIORA

BY

McPHAIL ASSOCIATES, LLC

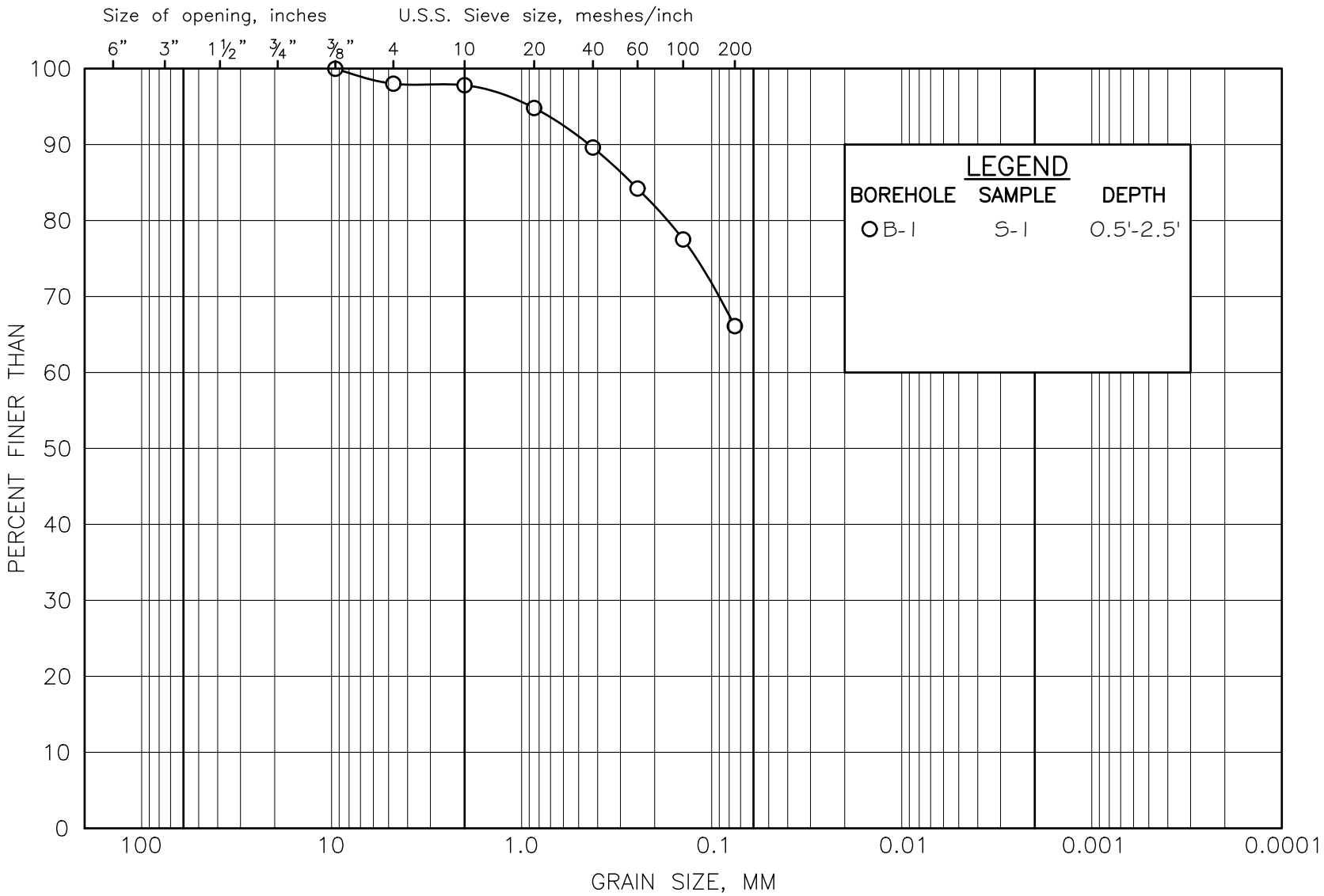
Date: NOVEMBER 2019	Dwn: M.B.S.	Chkd: H.J.B.	Scale: 1" = 20'
Project No: 6880			

FILE NAME: N:\Acad\JOBS\6880\6880-F02.dwg

FILE NAME: N:\Acad\JOBS\6880\6880-F03_Sieve.dwg

PROJECT No. 6880

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

McPHAIL ASSOCIATES, LLC

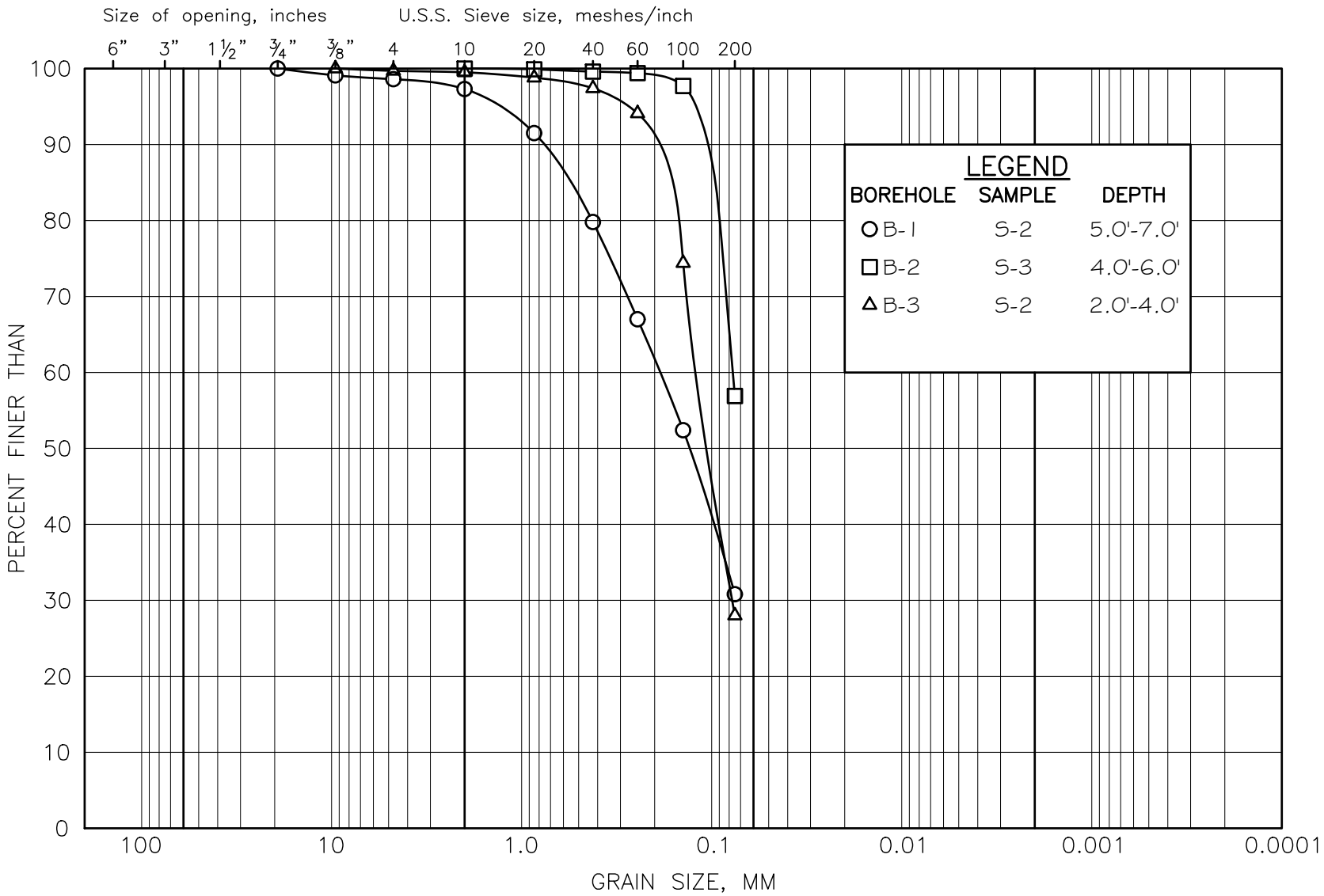
GRAIN SIZE DISTRIBUTION
FILL

FIGURE 3

FILE NAME: N:\Acad\JOBS\6880\6880-F04_Sieve.dwg

PROJECT No. 6880

M.I.T. GRAIN SIZE SCALE



COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

McPHAIL ASSOCIATES, LLC

GRAIN SIZE DISTRIBUTION
GLACIAL OUTWASH

FIGURE 4

APPENDIX A:

LIMITATIONS

LIMITATIONS

This report was prepared on behalf of and for the exclusive use of AD Meliora, LLC for the purpose of providing preliminary foundation design recommendations as part of a due diligence period for specific application to the proposed 648-654 Main Street and 63 Vine Street project located in Winchester, Massachusetts in accordance with generally accepted soil and geotechnical engineering practices. No other warranty, expressed or implied, is made.

The preliminary analyses and recommendations presented in this report are based upon the data obtained from the widely spaced subsurface explorations performed at the approximate locations indicated on the enclosed plan and conceptual building design scenarios describe herein. If variations in the nature and extent of subsurface conditions between the widely spaced explorations become evident following the completion of the additional explorations performed at the site, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by McPhail Associates, LLC.

The preliminary recommendations provided herein are not intended for use in the final design of the foundation support utilized on this project. Therefore, the recommendations provided herein should be considered preliminary and subject to change.

APPENDIX B:

MCPHAIL ASSOCIATES, LLC
BORING LOGS

B-1, B-2 AND B-3

Project:	654 Main St	**Job #:**	6880.2.00
Location:		**Date Started:**	10-23-19
City/State:	Winchester, MA	**Date Finished:**	10-23-19

Boring No.

B-1

Contractor: Carr-Dee
Driller/Helper: Joey/Sean
Logged By/Reviewed By: JDM
Surface Elevation (ft): 22.4

Casing Type: 3"
Casing Hammer (lbs)/Drop (in): 300lb/24in
Sampler Size/Type: 2' Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/24in

Groundwater Observations

Date	Depth	Elev.	Notes
10-23-19	7	15.4	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" / Min/ft	Sample Description and Boring Notes
	22		0.5 / 21.9	ASPHALT						
1	21			FILL	3	S1	24/12	0.5-2.5	2 1 2 3	Very loose, light brown, SAND, some silt, some gravel, w/ brick. (Fill)
2	20									
3	19									
4	18		5.0 / 17.4							
5	17			GLACIAL OUTWASH	5	S2	24/18	5.0-7.0	3 2 3 3	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
6	16									
7	15									
8	14									
9	13									
10	12				3	S3	24/24	10.0-12.0	2 1 2 2	Very loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
11	11									
12	10									
13	9									
14	8									
15	7				6	S4	24/16	15.0-17.0	8 3 3 4	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
16	6									
17	5									
18	4									
19	3									
20	2				17	S5	24/12	20.0-22.0	9 8 9 8	Compact, light brown to red-brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
21	1									
22	0									
23	-1									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
Autohammer

Weather:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	654 Main St	**Job #:**	6880.2.00
Location:		**Date Started:**	10-23-19
City/State:	Winchester, MA	**Date Finished:**	10-23-19

Boring No.

B-1

Contractor: Carr-Dee
Driller/Helper: Joey/Sean
Logged By/Reviewed By: JDM
Surface Elevation (ft): 22.4

Casing Type: 3"
Casing Hammer (lbs)/Drop (in): 300lb/24in
Sampler Size/Type: 2' Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/24in

Groundwater Observations

Date	Depth	Elev.	Notes
10-23-19	7	15.4	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" / Min/ft	Sample Description and Boring Notes
	-2									
25	-3				20	S6	24/10	25.0-27.0	7 7 13 11	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
26	-4									
27	-5									
28	-6									
29	-7									
30	-8				16	S7	24/10	30.0-32.0	9 7 9 11	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
31	-9									
32	-10									
33	-11									
34	-12									
35	-13				19	S8	24/12	35.0-37.0	7 8 11 12	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
36	-14			GLACIAL OUTWASH						
37	-15									
38	-16									
39	-17									
40	-18				25	S9	24/14	40.0-42.0	10 10 15 13	Compact, light brown to brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
41	-19									
42	-20									
43	-21									
44	-22									
45	-23				21	S10	24/10	45.0-47.0	9 7 14 15	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
46	-24									
47	-25									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
Autohammer

Weather:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	654 Main St	**Job #:**	6880.2.00
Location:		**Date Started:**	10-23-19
City/State:	Winchester, MA	**Date Finished:**	10-23-19

Boring No.

B-1

Contractor: Carr-Dee
Driller/Helper: Joey/Sean
Logged By/Reviewed By: JDM
Surface Elevation (ft): 22.4

Casing Type: 3"
Casing Hammer (lbs)/Drop (in): 300lb/24in
Sampler Size/Type: 2' Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/24in

Groundwater Observations

Date	Depth	Elev.	Notes
10-23-19	7	15.4	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" / Min/ft	Sample Description and Boring Notes
49	-26			GLACIAL OUTWASH						
50	-27									
51	-28				24	S11	24/8	50.0-52.0	7 12 12 12	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
52	-29		52.0 / -29.6							
53	-30			Bottom of borehole 52 feet below ground surface.						
54	-31									
55	-32									
56	-33									
57	-34									
58	-35									
59	-36									
60	-37									
61	-38									
62	-39									
63	-40									
64	-41									
65	-42									
66	-43									
67	-44									
68	-45									
69	-46									
70	-47									
71	-48									
	-49									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
Autohammer

Weather:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	654 Main St	**Job #:**	6880.2.00
Location:		**Date Started:**	10-24-19
City/State:	Winchester, MA	**Date Finished:**	10-24-19

Boring No.

B-2 (OW)

Contractor: Carr-Dee
Driller/Helper: Joey/Sean
Logged By/Reviewed By: JDM
Surface Elevation (ft): 25.2

Casing Type: 3"
Casing Hammer (lbs)/Drop (in): 300lb/24in
Sampler Size/Type: 2' Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/24in

Groundwater Observations

Date	Depth	Elev.	Notes
10-24-19	12	13.2	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" / Min/ft	Sample Description and Boring Notes
	25		0.5 / 24.7	ASPHALT						
1	24		2.0 / 23.2	FILL	7	S1	18/8	0.5-2.0	5 4 3	Loose, brown to light brown, SAND, some gravel, some silt. (Fill)
2	23			GLACIAL OUTWASH	7	S2	24/22	2.0-4.0	5 4 3 3	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
3	22									
4	21				8	S3	24/20	4.0-6.0	4 4 4 4	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
5	20									
6	19				8	S4	24/16	6.0-8.0	4 3 5 5	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
7	18									
8	17				10	S5	24/20	8.0-10.0	5 4 6 5	Loose to compact, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
9	16									
10	15				7	S6	24/12	10.0-12.0	3 3 4 4	Loose, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
11	14									
12	13				7	S7	24/16	12.0-14.0	3 3 4 5	Loose, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
13	12									
14	11				4	S8	24/4	14.0-16.0	3 2 2 4	Very loose to loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
15	10									
16	9				9	S9	24/10	16.0-18.0	3 4 5 5	Loose, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
17	8									
18	7				9	S10	24/8	18.0-20.0	4 4 5 4	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
19	6									
20	5				7	S11	24/18	20.0-22.0	3 3 4 6	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
21	4									
22	3									
23	2									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
Autohammer

Weather:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	654 Main St	**Job #:**	6880.2.00
Location:		**Date Started:**	10-24-19
City/State:	Winchester, MA	**Date Finished:**	10-24-19

Boring No.

B-2 (OW)

Contractor: Carr-Dee
Driller/Helper: Joey/Sean
Logged By/Reviewed By: JDM
Surface Elevation (ft): 25.2

Casing Type: 3"
Casing Hammer (lbs)/Drop (in): 300lb/24in
Sampler Size/Type: 2' Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/24in

Groundwater Observations

Date	Depth	Elev.	Notes
10-24-19	12	13.2	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" / Min/ft	Sample Description and Boring Notes
	1									
25	0				9	S12	24/14	25.0-27.0	3 3 6 7	Loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
26	-1									
27	-2									
28	-3									
29	-4									
30	-5				21	S13	24/10	30.0-32.0	6 9 12 12	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
31	-6									
32	-7									
33	-8									
34	-9									
35	-10				15	S14	24/3	35.0-37.0	5 6 9 8	Compact, brown to light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
36	-11			GLACIAL OUTWASH						
37	-12									
38	-13									
39	-14									
40	-15				20	S15	24/10	40.0-42.0	8 8 12 13	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
41	-16									
42	-17									
43	-18									
44	-19									
45	-20				26	S16	24/12	45.0-47.0	10 12 14 14	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
46	-21									
47	-22									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
Autohammer

Weather:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	654 Main St	**Job #:**	6880.2.00
Location:		**Date Started:**	10-24-19
City/State:	Winchester, MA	**Date Finished:**	10-24-19

Boring No.

B-2 (OW)

Contractor: Carr-Dee
Driller/Helper: Joey/Sean
Logged By/Reviewed By: JDM
Surface Elevation (ft): 25.2

Casing Type: 3"
Casing Hammer (lbs)/Drop (in): 300lb/24in
Sampler Size/Type: 2' Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/24in

Groundwater Observations

Date	Depth	Elev.	Notes
10-24-19	12	13.2	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	Sample N-Value / RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" / Min/ft	Sample Description and Boring Notes
49	-23									
	-24									
50	-25									
51	-26				42	S17	24/4	50.0-52.0	5 16 26 19	Dense, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
52	-27									
53	-28									
54	-29									
55	-30			GLACIAL OUTWASH						
56	-31				27	S18	24/12	55.0-57.0	15 12 15 17	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
57	-32									
58	-33									
59	-34									
60	-35									
61	-36				31	S19	24/6	60.0-62.0	12 15 16 19	Dense, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
62	-37		62.0 / -36.8							
63	-38			Bottom of borehole 62 feet below ground surface.						
64	-39									
65	-40									
66	-41									
67	-42									
68	-43									
69	-44									
70	-45									
71	-46									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
Autohammer

Weather:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

Project:	654 Main St	**Job #:**	6880.2.00
Location:		**Date Started:**	10-23-19
City/State:	Winchester, MA	**Date Finished:**	10-23-19

Boring No.

B-3

Contractor: Carr-Dee
Driller/Helper: Joey/Sean
Logged By/Reviewed By: JDM
Surface Elevation (ft): 23.6

Casing Type: 3"
Casing Hammer (lbs)/Drop (in): 300lb/24in
Sampler Size/Type: 2' Split Spoon
Sampler Hammer (lbs)/Drop (in): 140lb/24in

Groundwater Observations

Date	Depth	Elev.	Notes
10-21-19	10	13.6	

Depth (ft)	Elev. (ft)	Symbol	Depth/EL to Strata Change (ft)	Stratum	N-Value / RQD	No.	Pen. /Rec. (in)	Depth (ft)	Blows/6" / Min/ft	Sample Description and Boring Notes
			0.5 / 23.1	ASPHALT						
1	23			FILL	9	S1	18/14	0.5-2.0	5 4 5	Loose, brown to light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
2	22									
3	21				3	S2	24/14	2.0-4.0	2 1 2 5	Very loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
4	20		4.0 / 19.6							
5	19			GLACIAL OUTWASH	12	S3	24/2	4.0-6.0	5 7 5 6	Compact, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
6	18									
7	17				7	S4	24/2	6.0-8.0	3 3 4 5	Loose, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
8	16									
9	15				7	S5	24/10	8.0-10.0	4 3 4 4	Loose, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
10	14									
11	13				9	S6	24/14	10.0-12.0	3 4 5 4	Loose, brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
12	12									
13	11				7	S7	24/4	12.0-14.0	10 4 3 3	Loose, light brown to brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
14	10									
15	9				3	S8	24/10	14.0-16.0	2 1 2 2	Very loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
16	8									
17	7				4	S9	24/16	16.0-18.0	2 1 3 2	Very loose to loose, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
18	6									
19	5				14	S10	24/14	18.0-20.0	5 6 8 6	Compact, light brown, SAND and SILT varying to Silty SAND, trace gravel. (Glacial Outwash)
20	4		20.0 / 3.6							
21	3			Bottom of borehole 20 feet below ground surface.						
22	2									
23	1									
	0									

GRANULAR SOILS	
BLOWS/FT.	DENSITY
0-4	V.LOOSE
4-10	LOOSE
10-30	COMPACT
30-50	DENSE
>50	V.DENSE

COHESIVE SOILS	
BLOWS/FT.	CONSISTENCY
<2	V.SOFT
2-4	SOFT
4-8	FIRM
8-15	STIFF
15-30	V.STIFF
>30	HARD

SOIL COMPONENT

DESCRIPTIVE TERM	PROPORTION OF TOTAL
"TRACE"	0-10%
"SOME"	10-20%
"ADJECTIVE" (eg SANDY, SILTY)	20-35%
"AND"	35-50%

SOIL CONTAINING THREE COMPONENTS EACH OF WHICH COMPRISE AT LEAST 25% OF THE TOTAL ARE CLASSIFIED AS "A WELL-GRADED MIXTURE OF"

Notes:
Autohammer

Weather:

McPHAIL ASSOCIATES, LLC
2269 MASSACHUSETTS AVENUE
CAMBRIDGE, MA 02140
TEL: 617-868-1420
FAX: 617-868-1423

APPENDIX C:

GROUNDWATER OBSERVATION REPORTS

MW-1, MW-2 AND B-2(OW)

GROUNDWATER OBSERVATION REPORT

MW-1	Elevation Subtrahend : +23.2	Job No: 6880.2.00 Job Name: 654 Main St; Winchester, MA

Date	Time	Elapsed Time	Depth To Groundwater from Ground Surface (Ft)	Elevation of Water	Remarks	Read By
10/24/2019	9:00	0	8.1	15.1		JDM
10/28/2019	15:00	4 Days	7.8	15.4		JDM
10/30/2019	12:00	6 Days	7.9	15.3	Bail 5 Gallons after gauging	DAT
10/30/2019	13:55	6 Days	7.9	15.3		DAT

McPHAIL ASSOCIATES, LLC

GROUNDWATER OBSERVATION REPORT

MW-2	Elevation Subtrahend : +21.8	Job No: 6880.2.00 Job Name: 654 Main St; Winchester, MA

Date	Time	Elapsed Time	Depth To Groundwater from Ground Surface (Ft)	Elevation of Water	Remarks	Read By
10/24/2019	9:00	0	8	14.2		JDM
10/28/2019	15:00	4 Days	7.3	14.5		JDM
10/30/2019	12:15	6 Days	7.3	14.5	Bail 5 Gallons after gauging	DAT
10/30/2019	14:05	6 Days	7.2	14.6		DAT

McPHAIL ASSOCIATES, LLC

GROUNDWATER OBSERVATION REPORT

B-2 (OW)	Elevation Subtrahend : +25.2	Job No: 6880.2.00 Job Name: 654 Main St; Winchester, MA

Date	Time	Elapsed Time	Depth To Groundwater from Ground Surface (Ft)	Elevation of Water	Remarks	Read By
10/24/2019	14:00	0	11.0	14.2		JDM
10/28/2019	15:00	4 Days	10.7	14.5		JDM
10/30/2019	12:15	6 Days	10.6	14.6	Bail 5 Gallons after gauging	DAT
10/30/2019	14:00	6 Days	10.6	14.6		DAT

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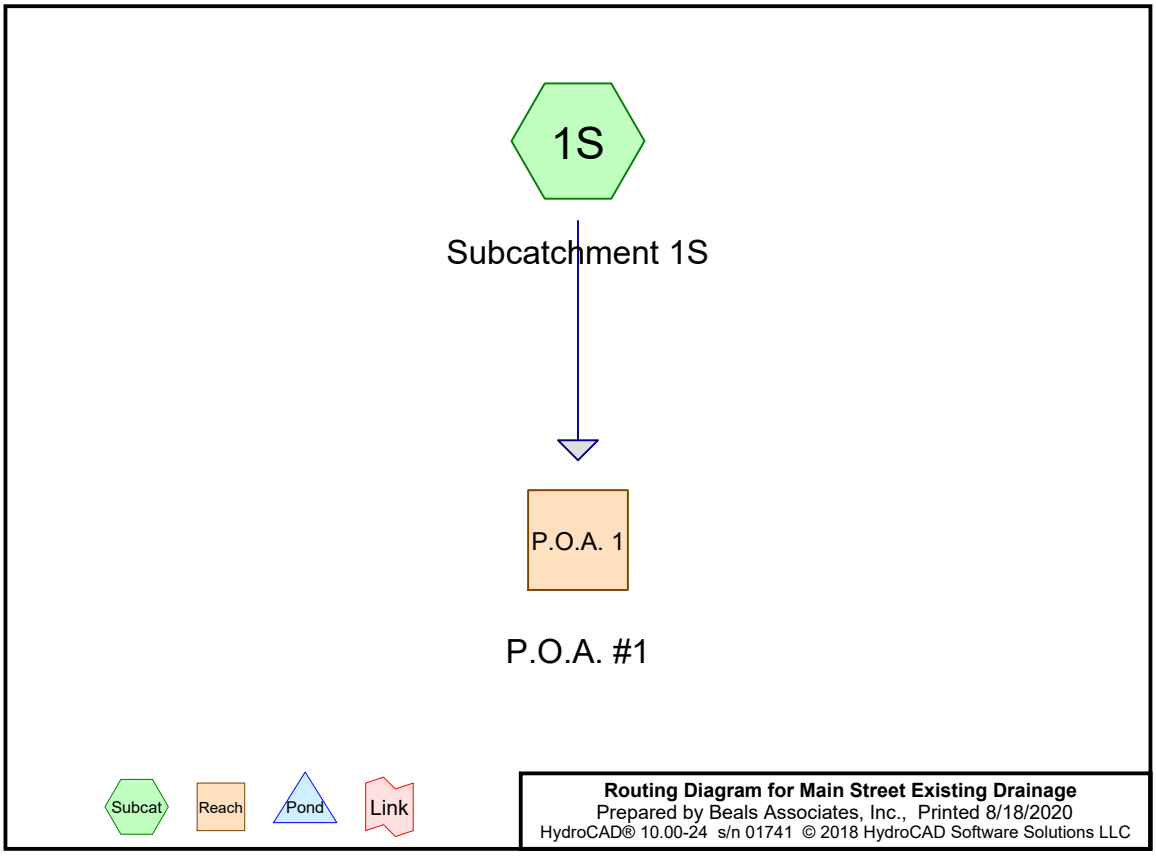
Appendix F – Calculations



Summary for Subcatchment 1S: Subcatchment 1S

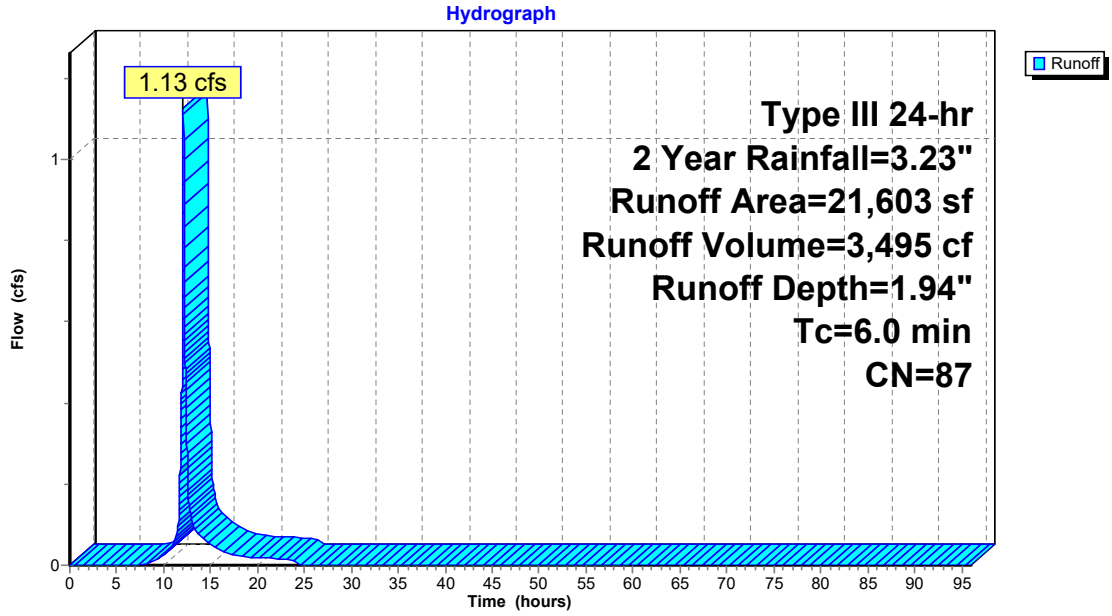
Runoff = 1.13 cfs @ 12.09 hrs, Volume= 3,495 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
	4,450	49	50-75% Grass cover, Fair, HSG A
	5,329	96	Gravel surface, HSG A
*	11,824	98	Impervious
	21,603	87	Weighted Average
	9,779		45.27% Pervious Area
	11,824		54.73% Impervious Area

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

Subcatchment 1S: Subcatchment 1S

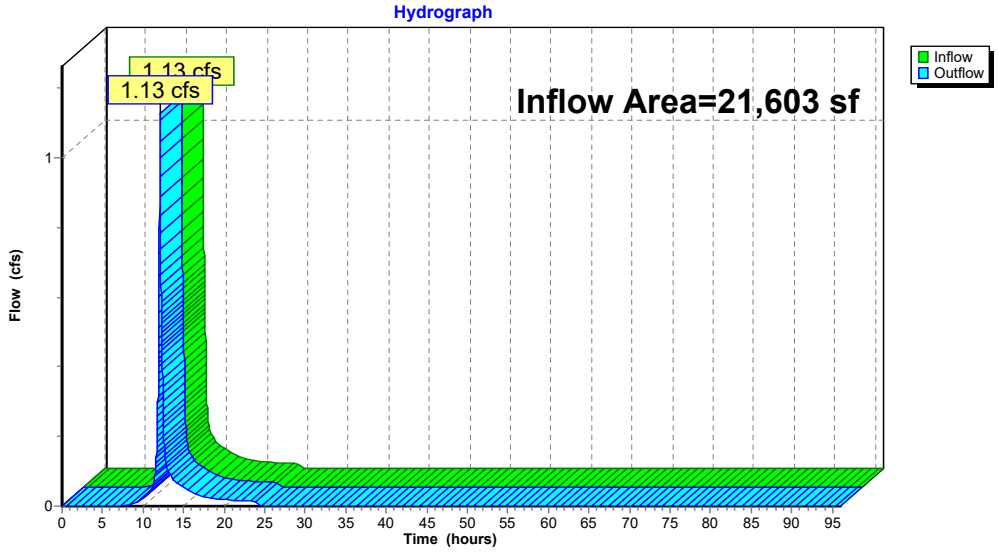


Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 21,603 sf, 54.73% Impervious, Inflow Depth = 1.94" for 2 Year event
Inflow = 1.13 cfs @ 12.09 hrs, Volume= 3,495 cf
Outflow = 1.13 cfs @ 12.09 hrs, Volume= 3,495 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1



Summary for Subcatchment 1S: Subcatchment 1S

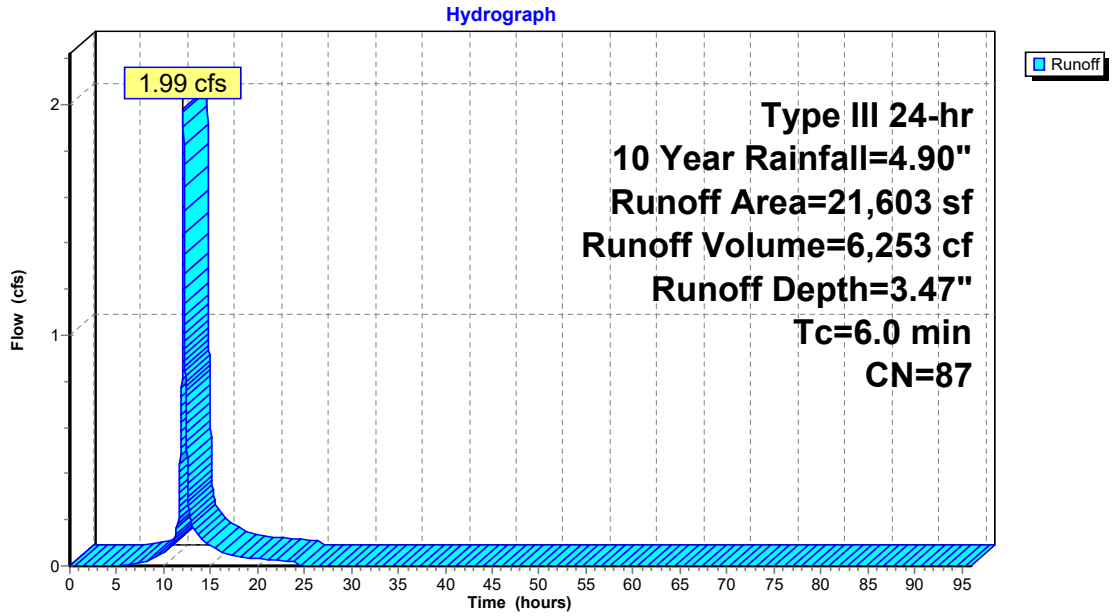
Runoff = 1.99 cfs @ 12.09 hrs, Volume= 6,253 cf, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
	4,450	49	50-75% Grass cover, Fair, HSG A
	5,329	96	Gravel surface, HSG A
*	11,824	98	Impervious
	21,603	87	Weighted Average
	9,779		45.27% Pervious Area
	11,824		54.73% Impervious Area

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

Subcatchment 1S: Subcatchment 1S

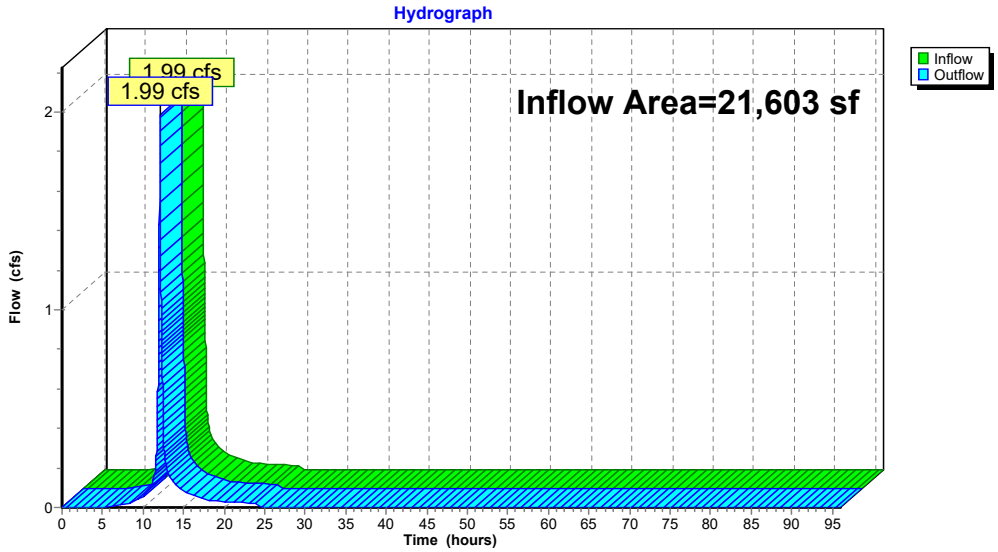


Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 21,603 sf, 54.73% Impervious, Inflow Depth = 3.47" for 10 Year event
Inflow = 1.99 cfs @ 12.09 hrs, Volume= 6,253 cf
Outflow = 1.99 cfs @ 12.09 hrs, Volume= 6,253 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1



Summary for Subcatchment 1S: Subcatchment 1S

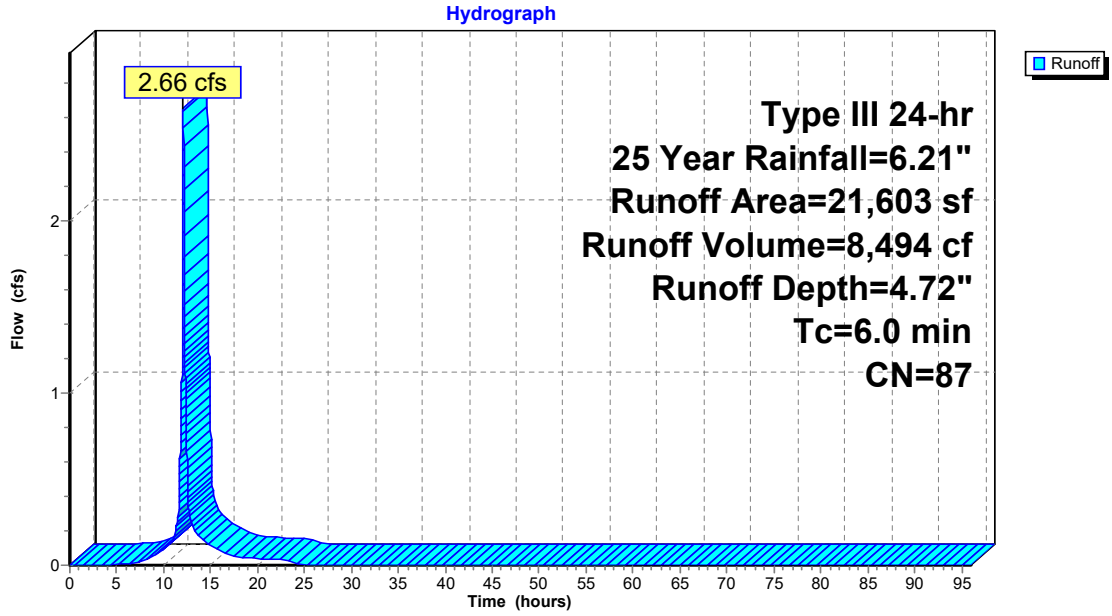
Runoff = 2.66 cfs @ 12.09 hrs, Volume= 8,494 cf, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
	4,450	49	50-75% Grass cover, Fair, HSG A
	5,329	96	Gravel surface, HSG A
*	11,824	98	Impervious
	21,603	87	Weighted Average
	9,779		45.27% Pervious Area
	11,824		54.73% Impervious Area

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

Subcatchment 1S: Subcatchment 1S

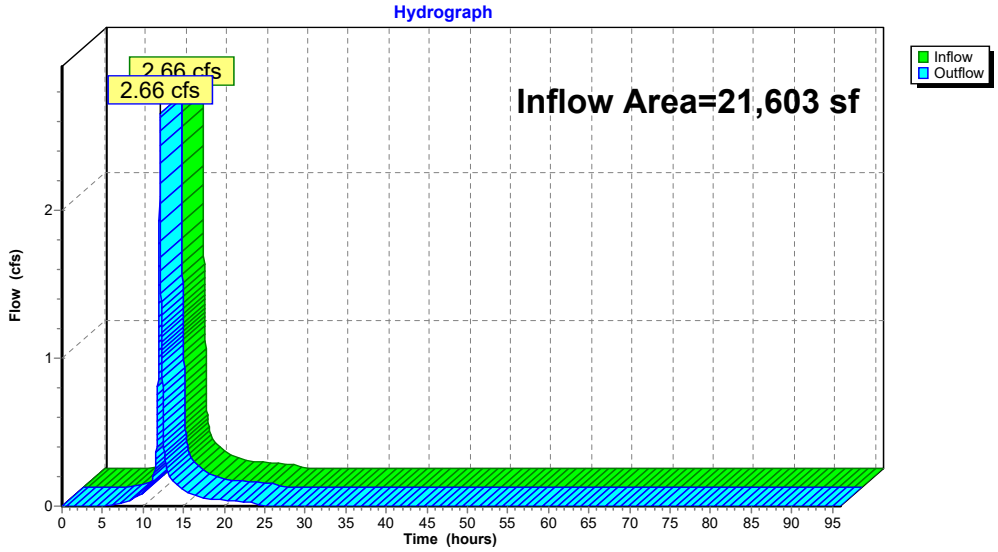


Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 21,603 sf, 54.73% Impervious, Inflow Depth = 4.72" for 25 Year event
Inflow = 2.66 cfs @ 12.09 hrs, Volume= 8,494 cf
Outflow = 2.66 cfs @ 12.09 hrs, Volume= 8,494 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1



Summary for Subcatchment 1S: Subcatchment 1S

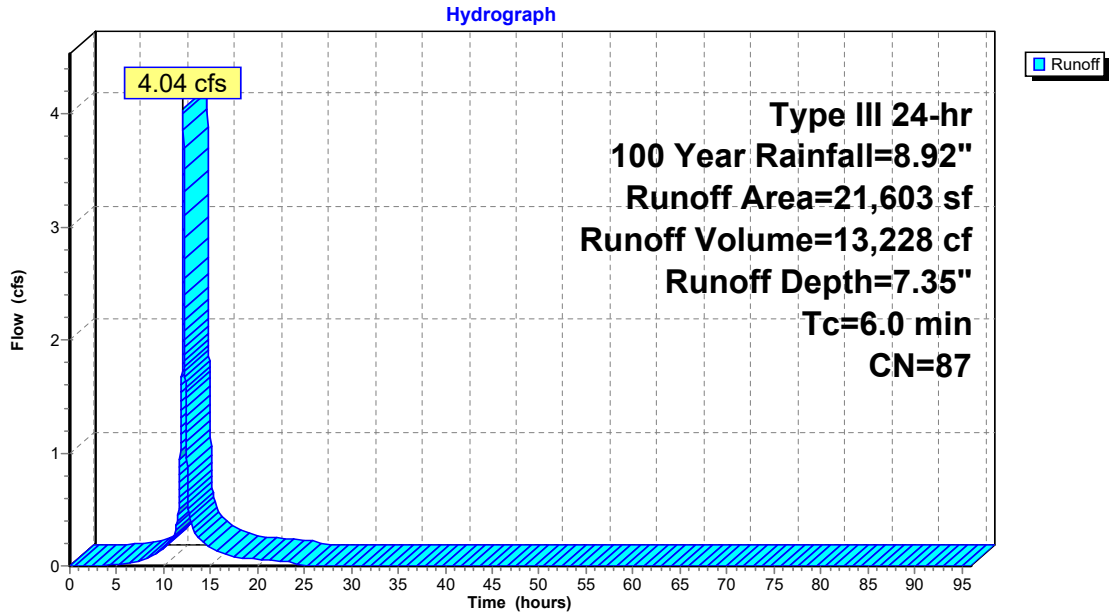
Runoff = 4.04 cfs @ 12.08 hrs, Volume= 13,228 cf, Depth= 7.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
	4,450	49	50-75% Grass cover, Fair, HSG A
	5,329	96	Gravel surface, HSG A
*	11,824	98	Impervious
	21,603	87	Weighted Average
	9,779		45.27% Pervious Area
	11,824		54.73% Impervious Area

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

Subcatchment 1S: Subcatchment 1S

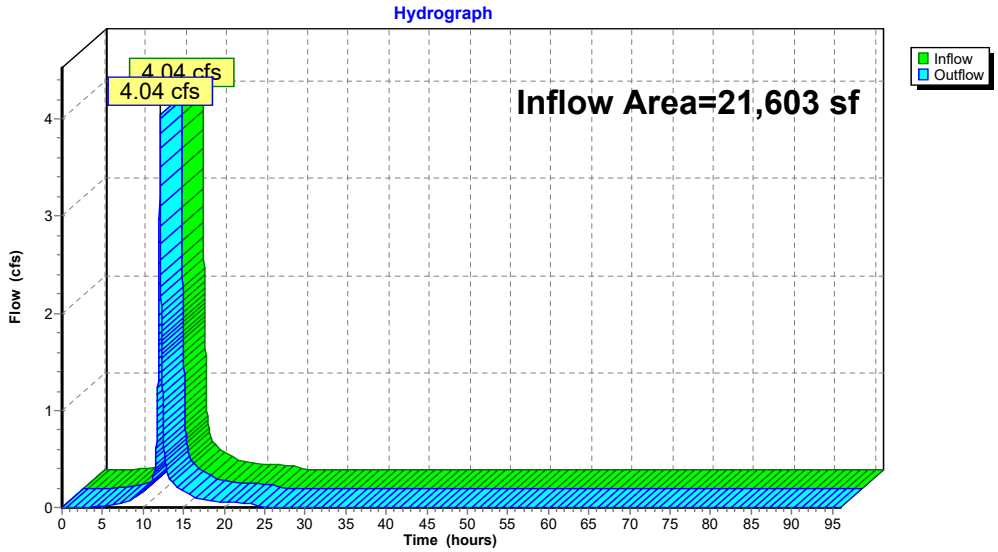


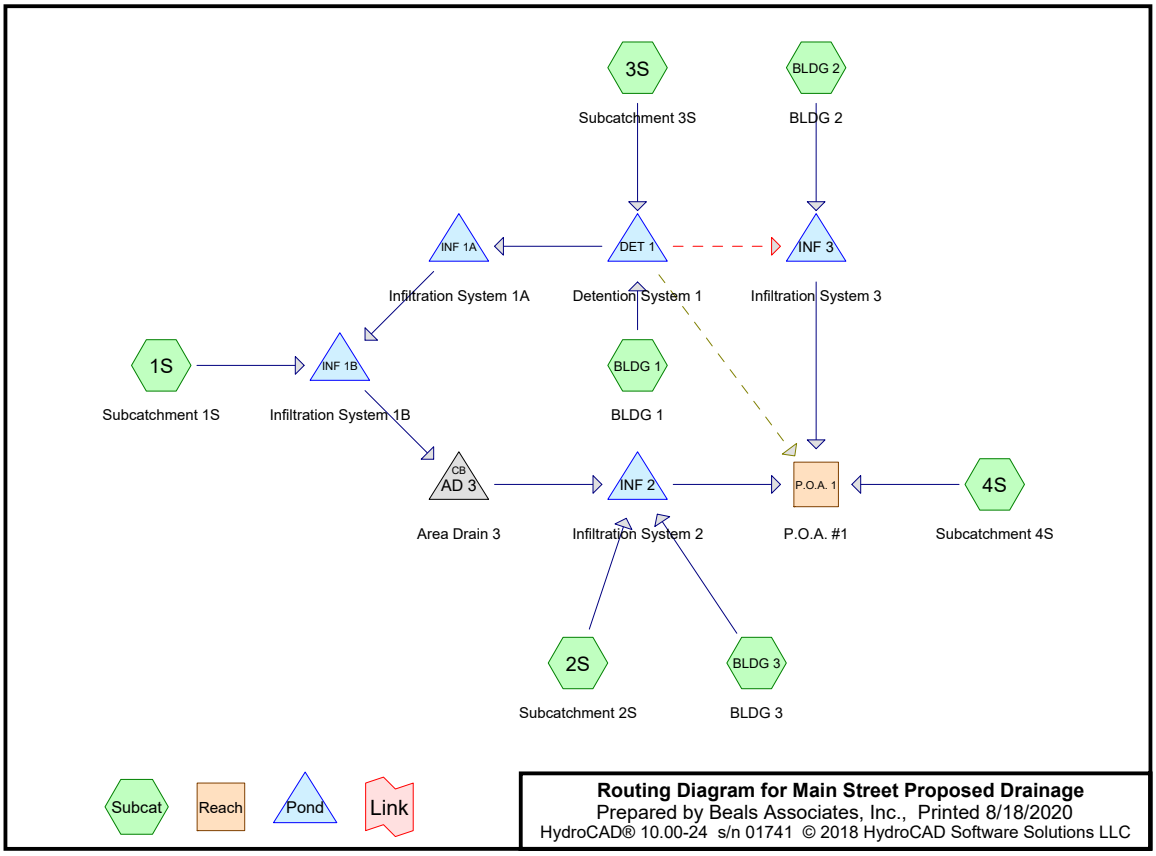
Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 21,603 sf, 54.73% Impervious, Inflow Depth = 7.35" for 100 Year event
Inflow = 4.04 cfs @ 12.08 hrs, Volume= 13,228 cf
Outflow = 4.04 cfs @ 12.08 hrs, Volume= 13,228 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1





Summary for Subcatchment 1S: Subcatchment 1S

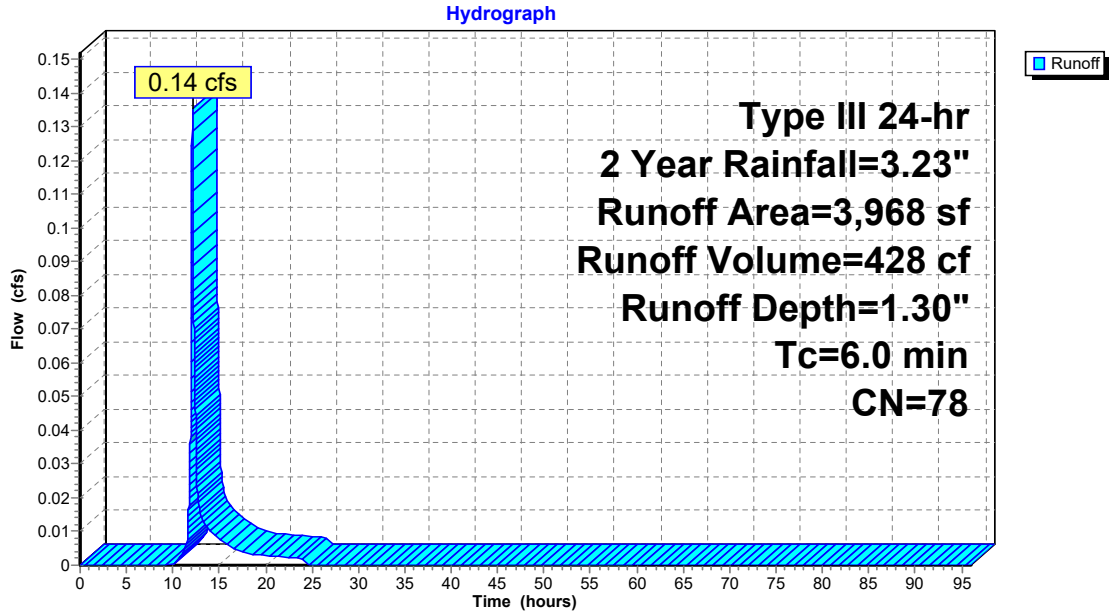
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 428 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
*	1,098	98	Pavers
*	1,253	98	Impervious
	1,617	49	50-75% Grass cover, Fair, HSG A
	3,968	78	Weighted Average
	1,617		40.75% Pervious Area
	2,351		59.25% Impervious Area

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

Subcatchment 1S: Subcatchment 1S



Summary for Subcatchment 2S: Subcatchment 2S

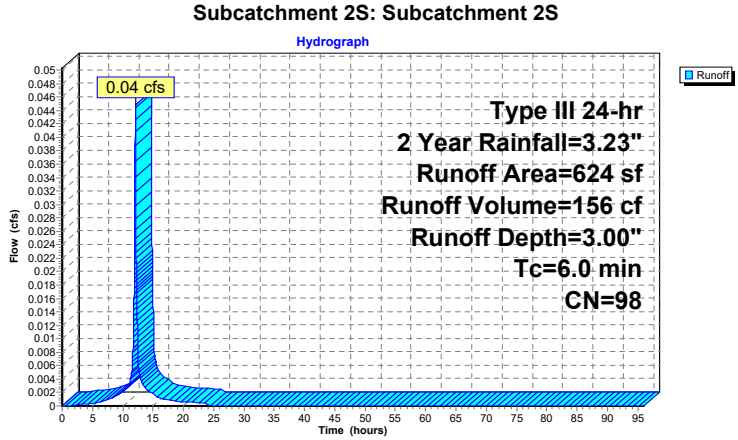
Runoff = 0.04 cfs @ 12.08 hrs, Volume= 156 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
*	624	98	Pavers
	624		100.00% Impervious Area

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

Subcatchment 2S: Subcatchment 2S



Summary for Subcatchment 3S: Subcatchment 3S

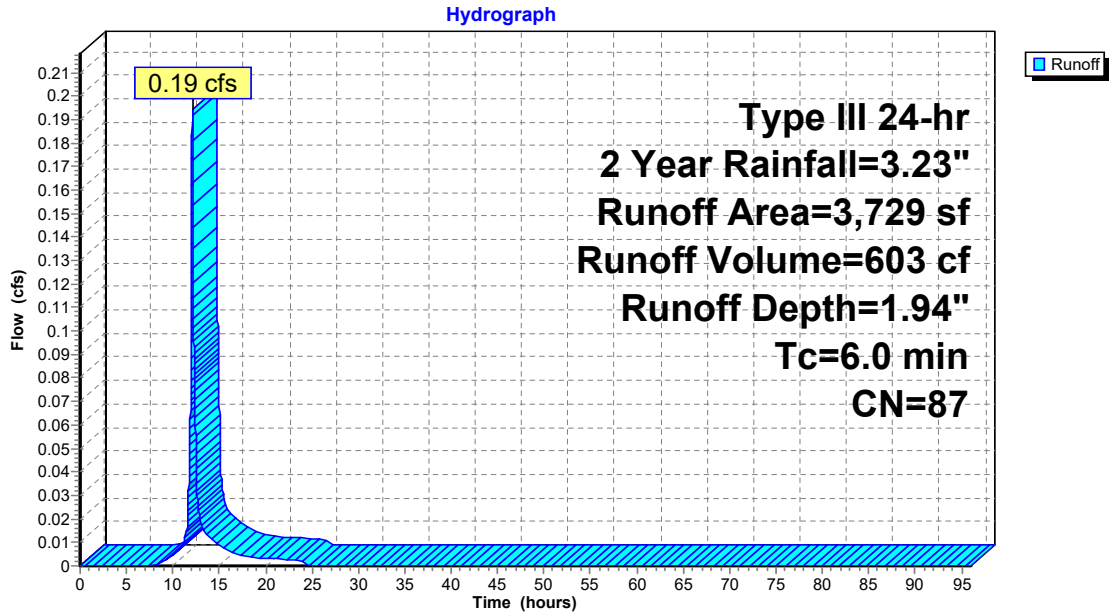
Runoff = 0.19 cfs @ 12.09 hrs, Volume= 603 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
*	2,260	98	Pavers
*	605	98	Building
	864	49	50-75% Grass cover, Fair, HSG A
	3,729	87	Weighted Average
	864		23.17% Pervious Area
	2,865		76.83% Impervious Area

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

Subcatchment 3S: Subcatchment 3S



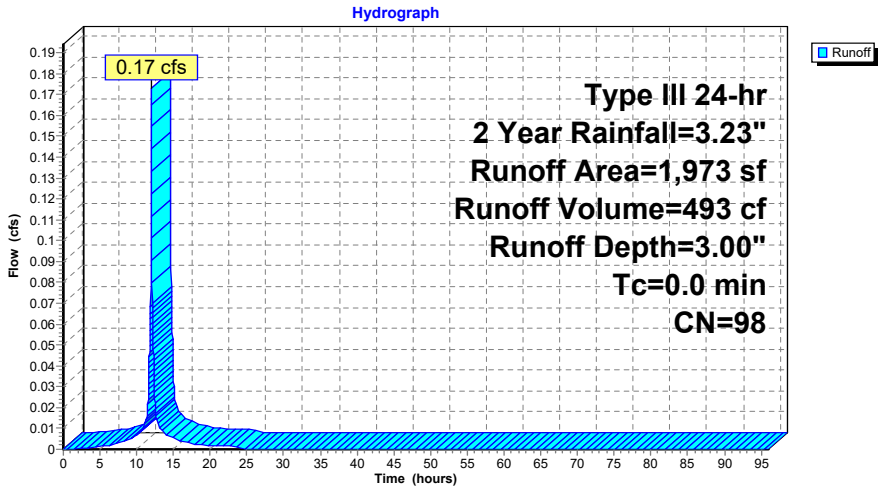
Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.17 cfs @ 12.00 hrs, Volume= 493 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
*	1,973	98	Impervious
	1,973		100.00% Impervious Area

Subcatchment 4S: Subcatchment 4S



Summary for Pond AD 3: Area Drain 3

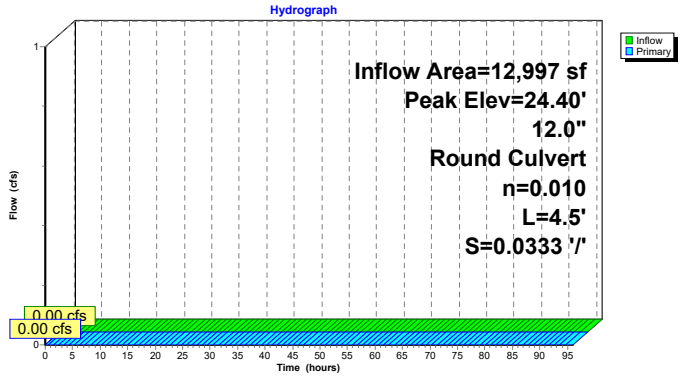
Inflow Area = 12,997 sf, 80.91% Impervious, Inflow Depth = 0.00" for 2 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.40' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	24.40'	**12.0" Round Culvert** L= 4.5' Ke= 0.500 Inlet / Outlet Invert= 24.40' / 24.25' S= 0.0333 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.40' TW=18.67' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond AD 3: Area Drain 3



Summary for Subcatchment BLDG 1: BLDG 1

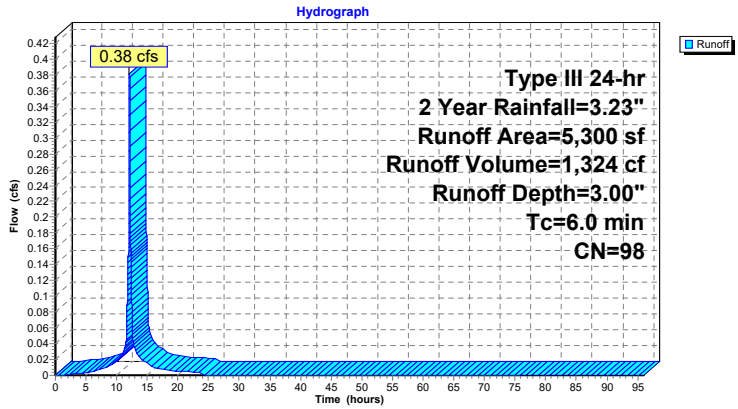
Runoff = 0.38 cfs @ 12.08 hrs, Volume= 1,324 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
*	5,300	98	Impervious
	5,300		100.00% Impervious Area

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

Subcatchment BLDG 1: BLDG 1



Summary for Subcatchment BLDG 2: BLDG 2

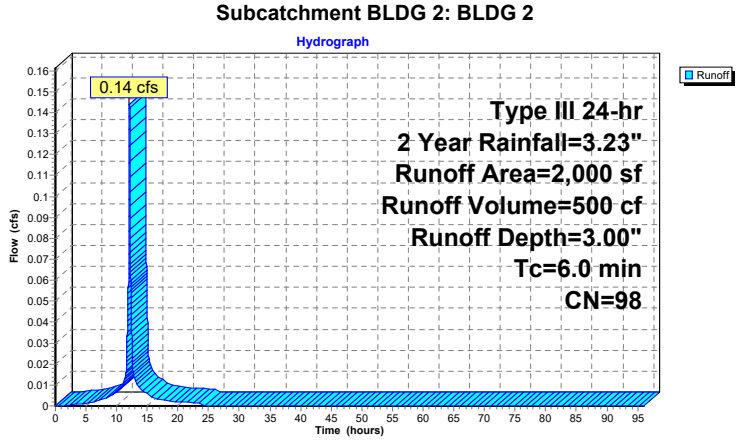
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 500 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment BLDG 2: BLDG 2



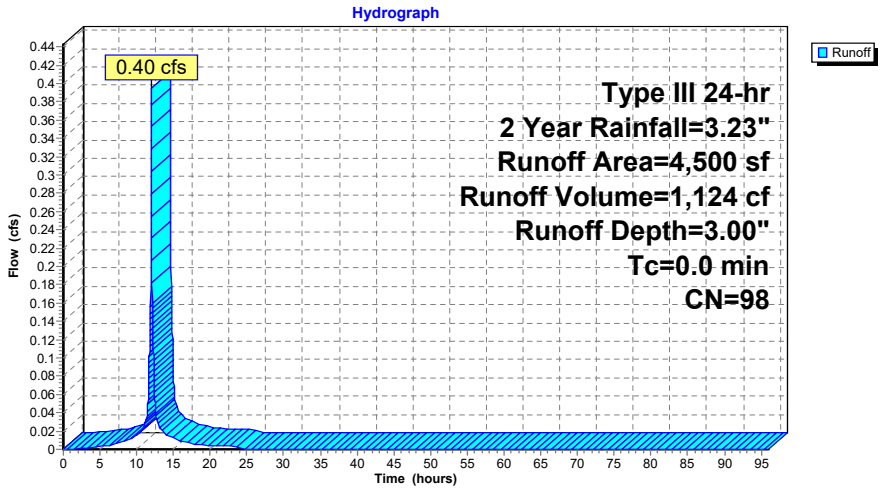
Summary for Subcatchment BLDG 3: BLDG 3

Runoff = 0.40 cfs @ 12.00 hrs, Volume= 1,124 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 Year Rainfall=3.23"

	Area (sf)	CN	Description
*	4,500	98	Impervious
	4,500		100.00% Impervious Area

Subcatchment BLDG 3: BLDG 3



Summary for Pond DET 1: Detention System 1

Inflow Area = 9,029 sf, 90.43% Impervious, Inflow Depth = 2.56" for 2 Year event
Inflow = 0.58 cfs @ 12.08 hrs, Volume= 1,927 cf
Outflow = 0.06 cfs @ 12.89 hrs, Volume= 1,925 cf, Atten= 90%, Lag= 48.4 min
Primary = 0.06 cfs @ 12.89 hrs, Volume= 1,925 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 26.09' @ 12.89 hrs Surf.Area= 1,162 sf Storage= 913 cf
Flood Elev= 27.73' Surf.Area= 1,162 sf Storage= 2,188 cf

Plug-Flow detention time= 210.8 min calculated for 1,925 cf (100% of inflow)
Center-of-Mass det. time= 210.5 min (986.2 - 775.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.10'	452 cf	**36.81'W x 31.56'L x 2.63'H Field A** 3,058 cf Overall - 1,928 cf Embedded = 1,130 cf x 40.0% Voids
#2A	25.10'	1,735 cf	**ACF R-Tank XD 13** x 280 Inside #1 Inside= 19.7"W x 25.6"H => 3.15 sf x 1.97'L = 6.2 cf Outside= 19.7"W x 25.6"H => 3.50 sf x 1.97'L = 6.9 cf 280 Chambers in 20 Rows
#3	25.10'	2 cf	**12.0" Round Pipe Storage** L= 2.0'
		2,189 cf	Total Available Storage

Storage Group A created with Chamber Wizard

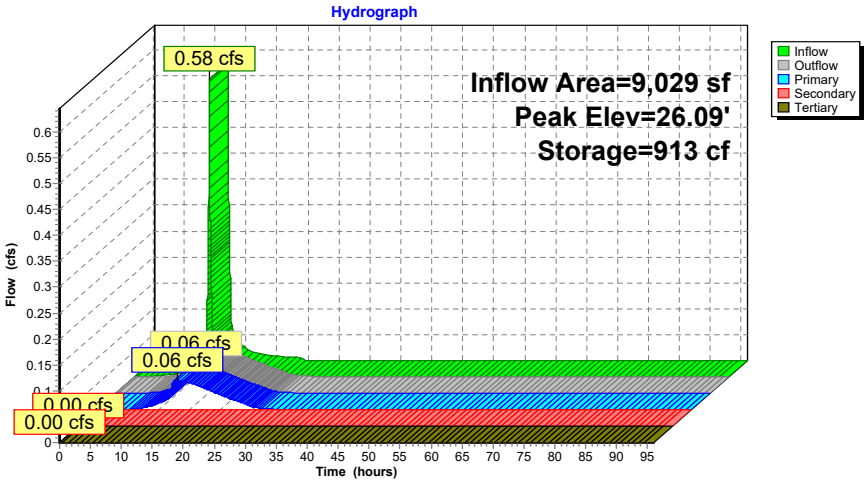
Device	Routing	Invert	Outlet Devices
#1	Primary	25.10'	**12.0" Round Culvert** L= 70.0' Ke= 0.500 Inlet / Outlet Invert= 25.10' / 24.07' S= 0.0147 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf
#2	Device 1	25.10'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**60.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	27.07'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	27.23'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.06 cfs @ 12.89 hrs HW=26.09' TW=23.15' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.06 cfs of 2.67 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.06 cfs @ 4.65 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.10' TW=17.40' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.10' TW=0.00' (Dynamic Tailwater)
└─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond DET 1: Detention System 1



Summary for Pond INF 1A: Infiltration System 1A

Inflow Area =	9,029 sf,	90.43% Impervious,	Inflow Depth >	2.56"	for 2 Year event
Inflow =	0.06 cfs @	12.89 hrs, Volume=	1,925 cf		
Outflow =	0.06 cfs @	12.80 hrs, Volume=	1,925 cf,	Atten= 0%,	Lag= 0.0 min
Discarded =	0.01 cfs @	9.65 hrs, Volume=	649 cf		
Primary =	0.05 cfs @	12.80 hrs, Volume=	1,276 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 23.43' @ 16.92 hrs Surf.Area= 157 sf Storage= 74 cf
Flood Elev= 26.12' Surf.Area= 157 sf Storage= 335 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 24.9 min (1,011.0 - 986.2)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	184 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 620 cf Overall - 161 cf Embedded = 459 cf x 40.0% Voids
#2	23.00'	145 cf	**ACF R-Tank XD 16** x 19 Inside #1 Inside= 19.7"W x 31.5"H => 3.88 sf x 1.97'L = 7.6 cf Outside= 19.7"W x 31.5"H => 4.31 sf x 1.97'L = 8.5 cf
#3	23.00'	2 cf	**12.0" Round Pipe Storage**-Impervious L= 3.0'
#4	23.00'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 31.0' S= 0.0673 '/'
		355 cf	Total Available Storage

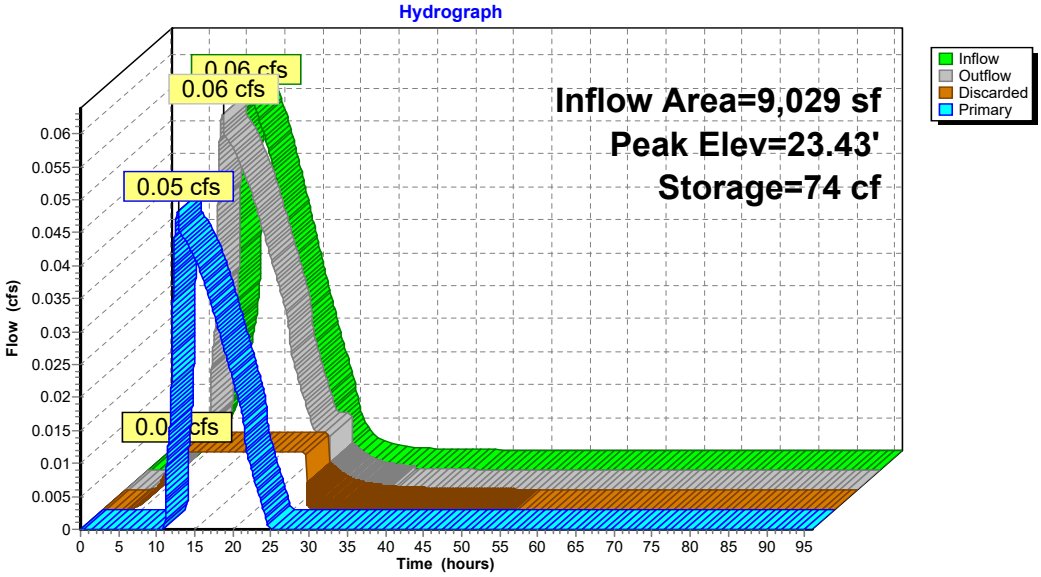
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	157	0	0
26.45	157	620	620

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.00'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 23.00' / 23.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.01 cfs @ 9.65 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.05 cfs @ 12.80 hrs HW=23.15' TW=23.11' (Dynamic Tailwater)
└**2=Culvert** (Outlet Controls 0.05 cfs @ 1.00 fps)

Pond INF 1A: Infiltration System 1A



Summary for Pond INF 1B: Infiltration System 1B

Inflow Area = 12,997 sf, 80.91% Impervious, Inflow Depth = 1.57" for 2 Year event
Inflow = 0.17 cfs @ 12.10 hrs, Volume= 1,704 cf
Outflow = 0.04 cfs @ 11.97 hrs, Volume= 1,704 cf, Atten= 76%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.97 hrs, Volume= 1,704 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 23.43' @ 16.91 hrs Surf.Area= 707 sf Storage= 346 cf
Flood Elev= 26.12' Surf.Area= 707 sf Storage= 1,582 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 98.7 min (1,043.5 - 944.7)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	671 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 2,793 cf Overall - 1,116 cf Embedded = 1,677 cf x 40.0% Voids
#2	23.00'	1,004 cf	**ACF R-Tank XD 18** x 117 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf
		1,675 cf	Total Available Storage

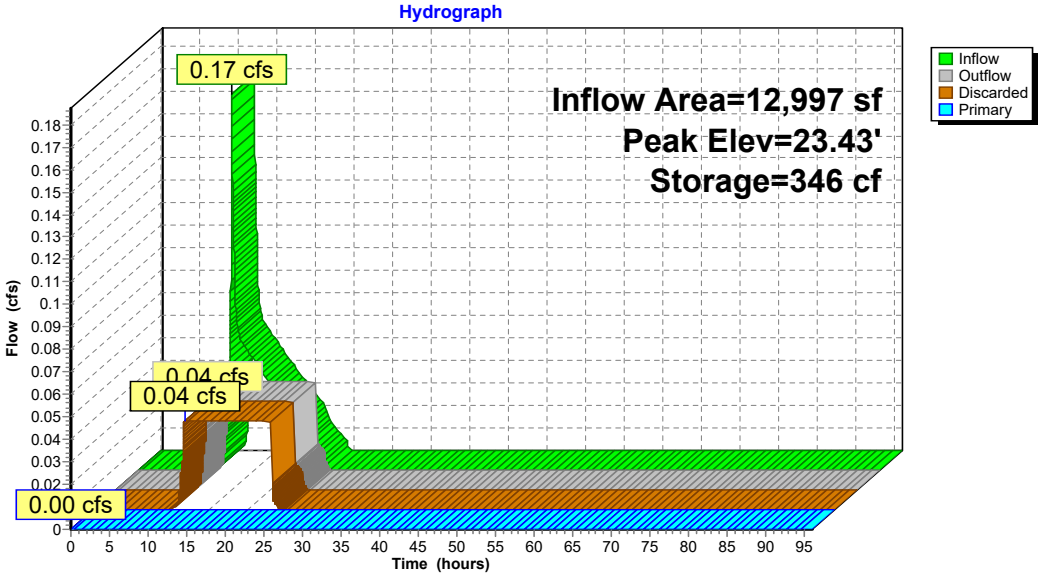
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	707	0	0
26.45	707	2,793	2,793

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	25.20'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 24.62' / 25.20' S= -0.0773 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 11.97 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.50' TW=24.40' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond INF 1B: Infiltration System 1B



Summary for Pond INF 2: Infiltration System 2

Inflow Area =	18,121 sf, 86.31% Impervious, Inflow Depth = 0.85" for 2 Year event				
Inflow =	0.42 cfs @	12.00 hrs, Volume=	1,280 cf		
Outflow =	0.03 cfs @	11.53 hrs, Volume=	1,280 cf, Atten= 93%, Lag= 0.0 min		
Discarded =	0.03 cfs @	11.53 hrs, Volume=	1,280 cf		
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 20.37' @ 12.99 hrs Surf.Area= 510 sf Storage= 473 cf
Flood Elev= 24.75' Surf.Area= 510 sf Storage= 1,826 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 120.9 min (872.2 - 751.3)

Volume	Invert	Avail.Storage	Storage Description
#1	18.67'	874 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 3,356 cf Overall - 1,171 cf Embedded = 2,185 cf x 40.0% Voids
#2	19.17'	1,054 cf	**ACF R-Tank XD 34** x 65 Inside #1 Inside= 19.7"W x 66.9"H => 8.23 sf x 1.97'L = 16.2 cf Outside= 19.7"W x 66.9"H => 9.15 sf x 1.97'L = 18.0 cf
		1,928 cf	Total Available Storage

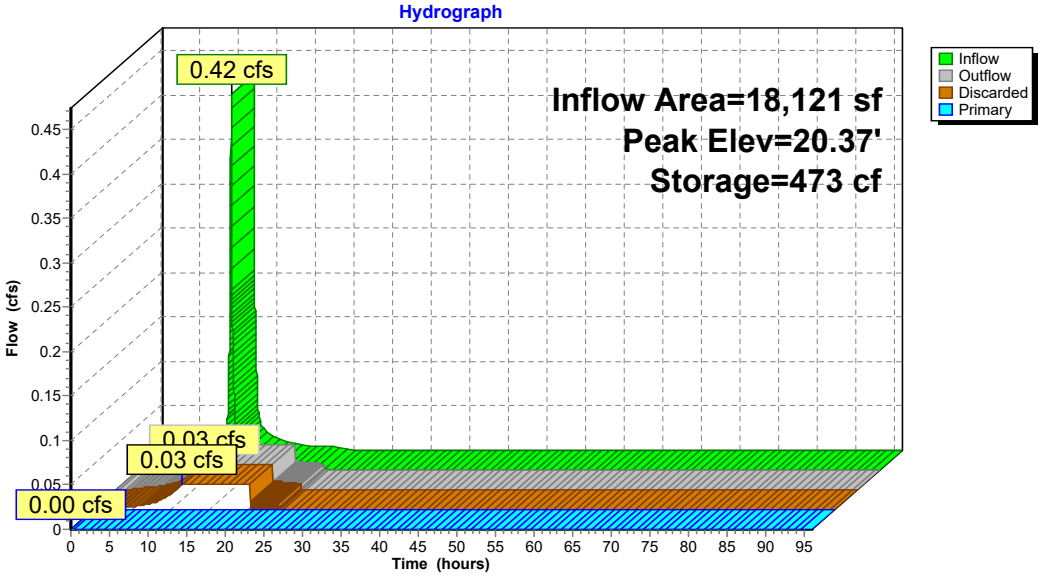
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.67	510	0	0
25.25	510	3,356	3,356

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.67'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.26'	**8.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 24.08' / 24.26' S= -0.0062 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Discarded OutFlow Max=0.03 cfs @ 11.53 hrs HW=18.74' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=18.67' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond INF 2: Infiltration System 2



Summary for Pond INF 3: Infiltration System 3

Inflow Area =	2,000 sf,100.00% Impervious,	Inflow Depth =	3.00"	for 2 Year event	
Inflow =	0.14 cfs @	12.08 hrs, Volume=	500 cf		
Outflow =	0.01 cfs @	11.64 hrs, Volume=	500 cf,	Atten= 92%,	Lag= 0.0 min
Discarded =	0.01 cfs @	11.64 hrs, Volume=	500 cf		
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 18.94' @ 13.01 hrs Surf.Area= 214 sf Storage= 179 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 106.2 min (862.4 - 756.2)

Volume	Invert	Avail.Storage	Storage Description
#1	17.40'	221 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 880 cf Overall - 326 cf Embedded = 553 cf x 40.0% Voids
#2	17.90'	294 cf	**ACF R-Tank XD 22** x 28 Inside #1 Inside= 19.7"W x 43.3"H => 5.33 sf x 1.97'L = 10.5 cf Outside= 19.7"W x 43.3"H => 5.92 sf x 1.97'L = 11.7 cf
		515 cf	Total Available Storage

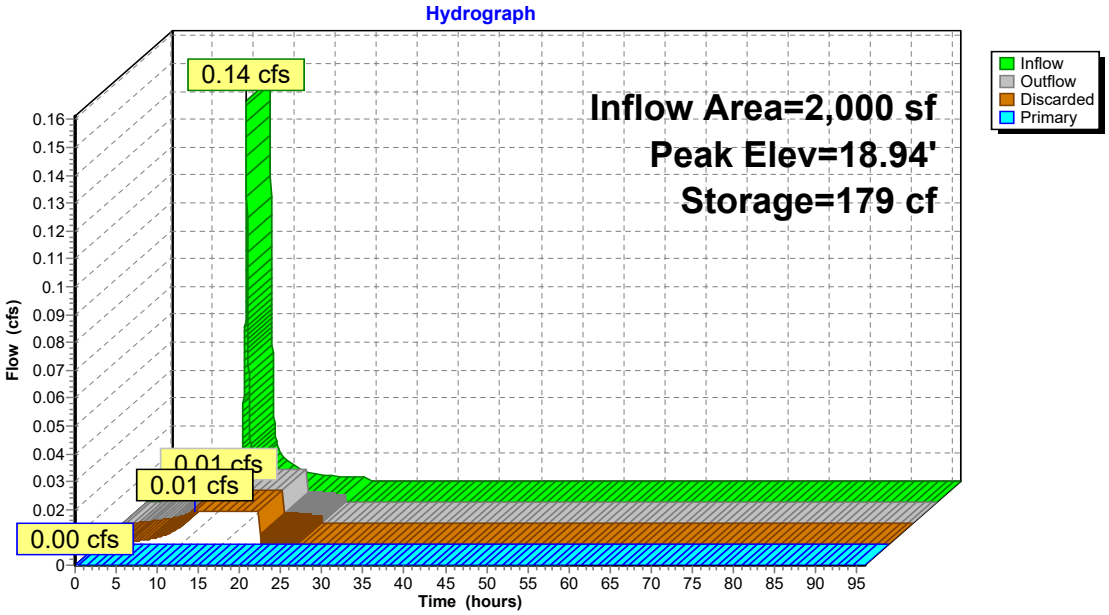
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.40	214	0	0
21.51	214	880	880

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.64 hrs HW=17.46' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.40' TW=0.00' (Dynamic Tailwater)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond INF 3: Infiltration System 3

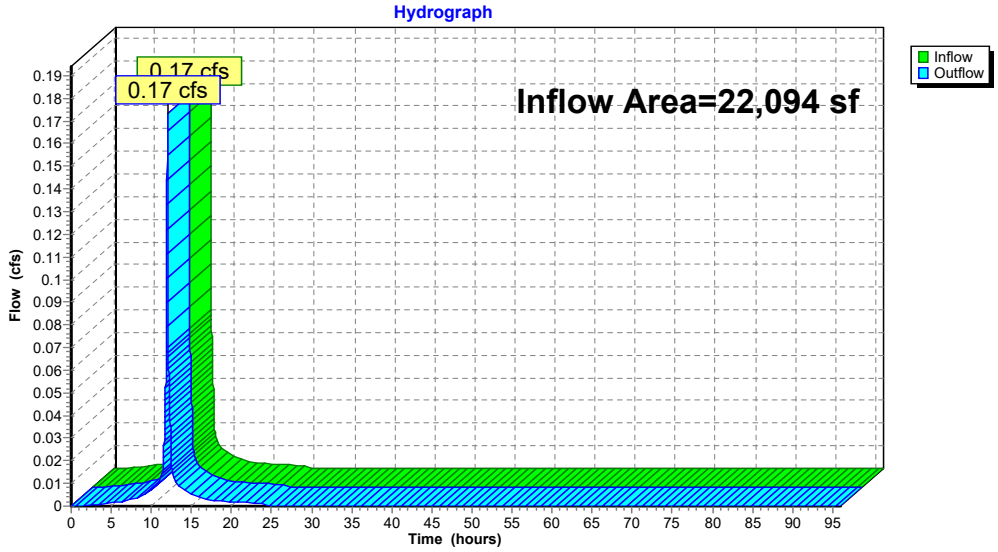


Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 22,094 sf, 88.77% Impervious, Inflow Depth = 0.27" for 2 Year event
Inflow = 0.17 cfs @ 12.00 hrs, Volume= 493 cf
Outflow = 0.17 cfs @ 12.00 hrs, Volume= 493 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1



Summary for Subcatchment 1S: Subcatchment 1S

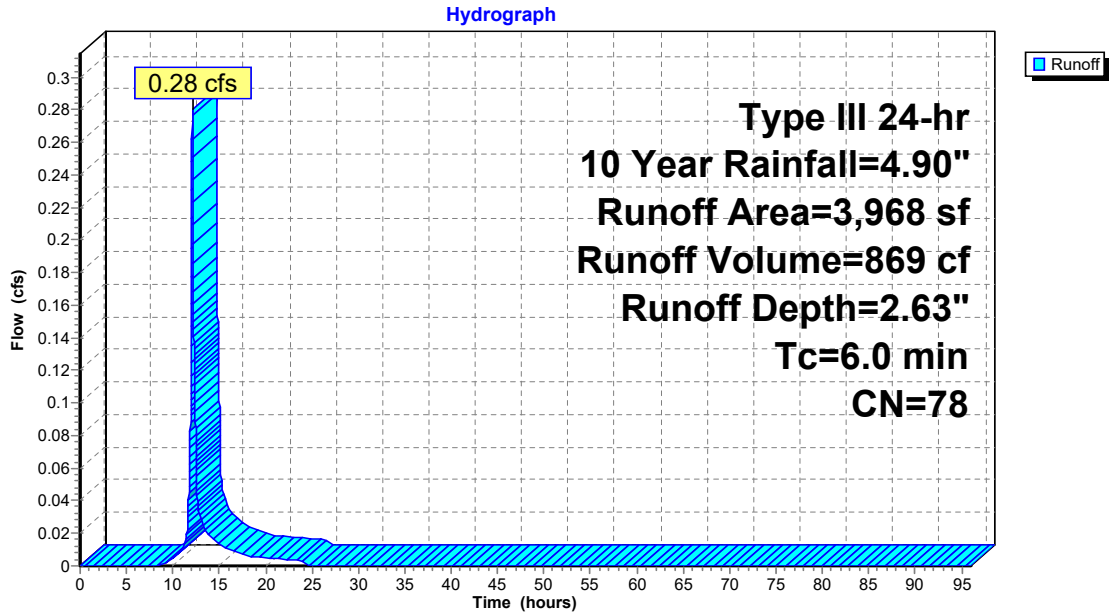
Runoff = 0.28 cfs @ 12.09 hrs, Volume= 869 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
*	1,098	98	Pavers
*	1,253	98	Impervious
	1,617	49	50-75% Grass cover, Fair, HSG A
	3,968	78	Weighted Average
	1,617		40.75% Pervious Area
	2,351		59.25% Impervious Area

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

Subcatchment 1S: Subcatchment 1S



Summary for Subcatchment 2S: Subcatchment 2S

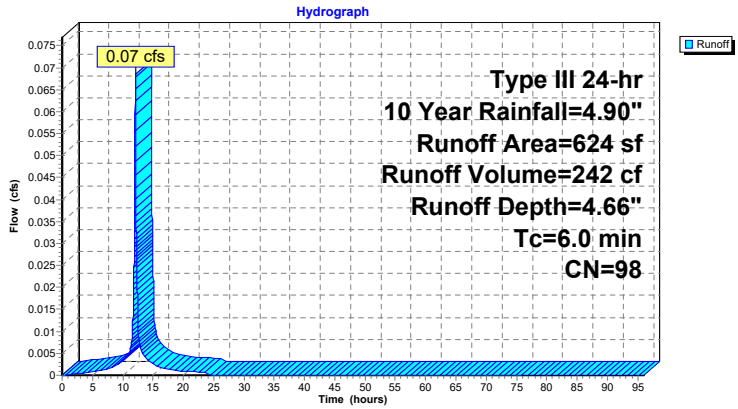
Runoff = 0.07 cfs @ 12.08 hrs, Volume= 242 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
*	624	98	Pavers
	624		100.00% Impervious Area

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

Subcatchment 2S: Subcatchment 2S



Summary for Subcatchment 3S: Subcatchment 3S

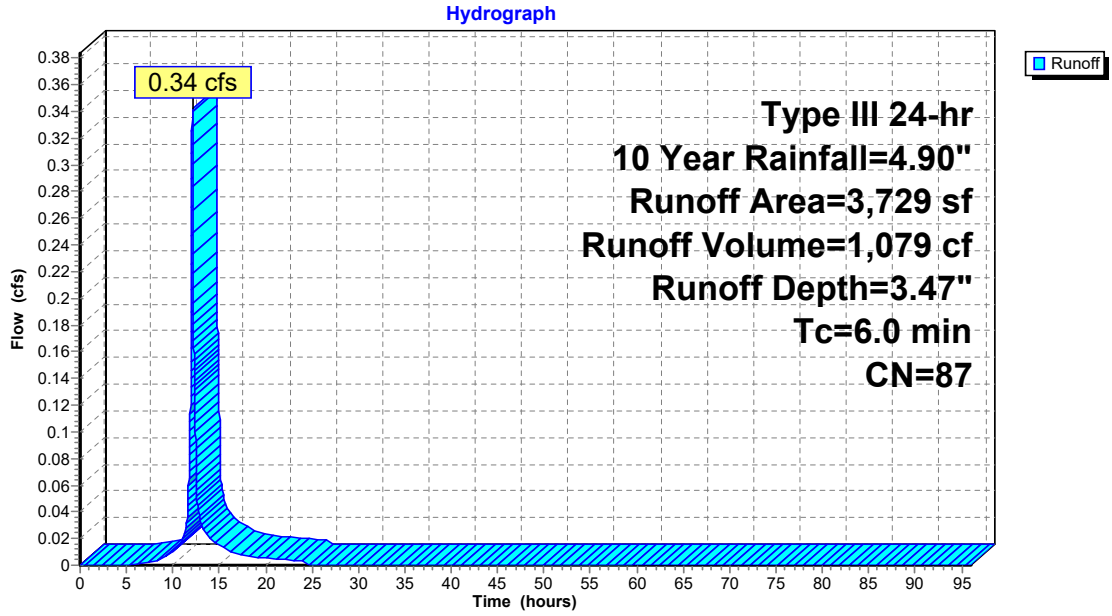
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 1,079 cf, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
*	2,260	98	Pavers
*	605	98	Building
	864	49	50-75% Grass cover, Fair, HSG A
	3,729	87	Weighted Average
	864		23.17% Pervious Area
	2,865		76.83% Impervious Area

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

Subcatchment 3S: Subcatchment 3S



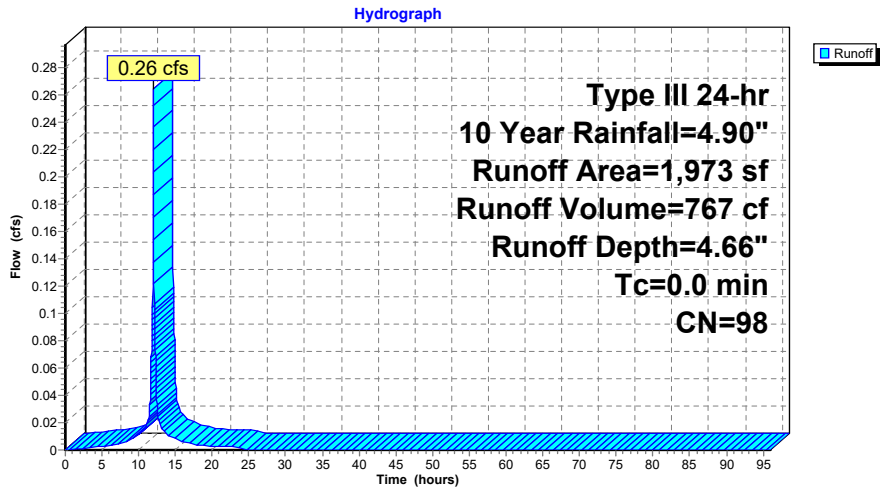
Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.26 cfs @ 12.00 hrs, Volume= 767 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
*	1,973	98	Impervious
	1,973		100.00% Impervious Area

Subcatchment 4S: Subcatchment 4S



Summary for Pond AD 3: Area Drain 3

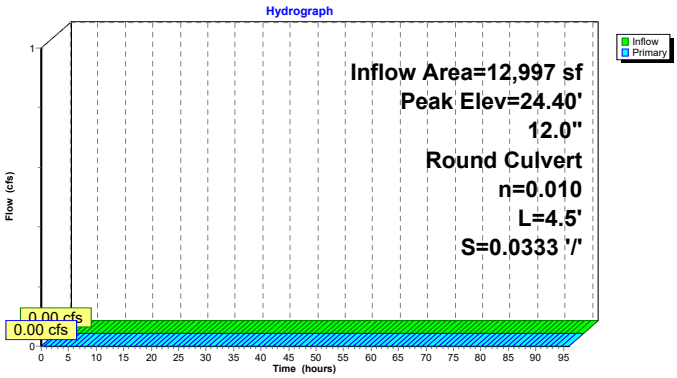
Inflow Area = 12,997 sf, 80.91% Impervious, Inflow Depth = 0.00" for 10 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.40' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	24.40'	**12.0" Round Culvert** L= 4.5' Ke= 0.500 Inlet / Outlet Invert= 24.40' / 24.25' S= 0.0333 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=24.40' TW=18.67' (Dynamic Tailwater)
└**1=Culvert** (Controls 0.00 cfs)

Pond AD 3: Area Drain 3



Summary for Subcatchment BLDG 1: BLDG 1

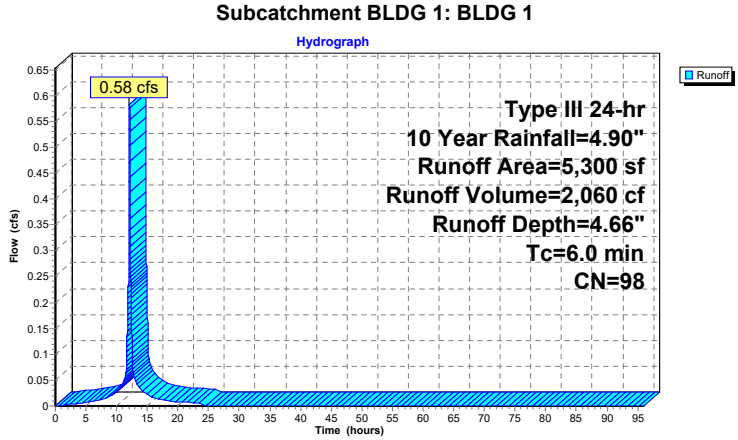
Runoff = 0.58 cfs @ 12.08 hrs, Volume= 2,060 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
*	5,300	98	Impervious
	5,300		100.00% Impervious Area

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

Subcatchment BLDG 1: BLDG 1



Summary for Subcatchment BLDG 2: BLDG 2

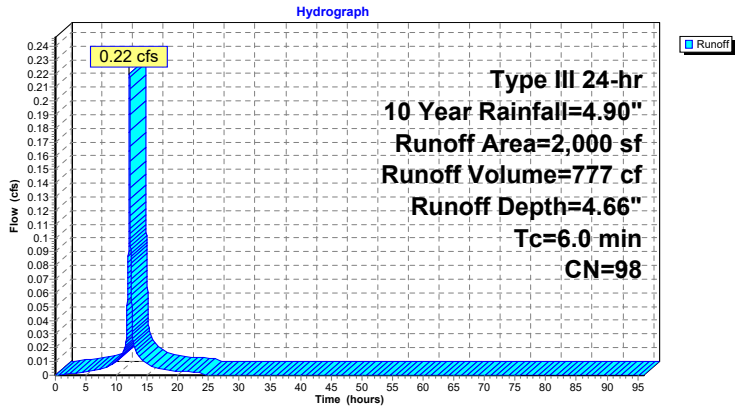
Runoff = 0.22 cfs @ 12.08 hrs, Volume= 777 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment BLDG 2: BLDG 2



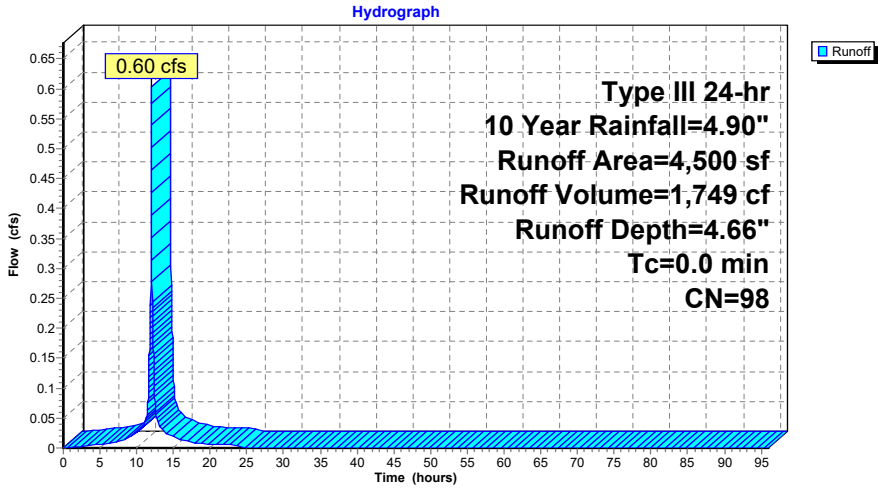
Summary for Subcatchment BLDG 3: BLDG 3

Runoff = 0.60 cfs @ 12.00 hrs, Volume= 1,749 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 Year Rainfall=4.90"

	Area (sf)	CN	Description
*	4,500	98	Impervious
	4,500		100.00% Impervious Area

Subcatchment BLDG 3: BLDG 3



Summary for Pond DET 1: Detention System 1

Inflow Area =	9,029 sf,	90.43% Impervious,	Inflow Depth =	4.17"	for 10 Year event
Inflow =	0.93 cfs @	12.08 hrs,	Volume=	3,139 cf	
Outflow =	0.08 cfs @	13.05 hrs,	Volume=	3,137 cf,	Atten= 92%, Lag= 57.9 min
Primary =	0.08 cfs @	13.05 hrs,	Volume=	3,137 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Tertiary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 26.80' @ 13.05 hrs Surf.Area= 1,162 sf Storage= 1,564 cf
Flood Elev= 27.73' Surf.Area= 1,162 sf Storage= 2,188 cf

Plug-Flow detention time= 258.5 min calculated for 3,137 cf (100% of inflow)
Center-of-Mass det. time= 258.0 min (1,024.8 - 766.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.10'	452 cf	**36.81'W x 31.56'L x 2.63'H Field A** 3,058 cf Overall - 1,928 cf Embedded = 1,130 cf x 40.0% Voids
#2A	25.10'	1,735 cf	**ACF R-Tank XD 13** x 280 Inside #1 Inside= 19.7"W x 25.6"H => 3.15 sf x 1.97'L = 6.2 cf Outside= 19.7"W x 25.6"H => 3.50 sf x 1.97'L = 6.9 cf 280 Chambers in 20 Rows
#3	25.10'	2 cf	**12.0" Round Pipe Storage** L= 2.0'
		2,189 cf	Total Available Storage

Storage Group A created with Chamber Wizard

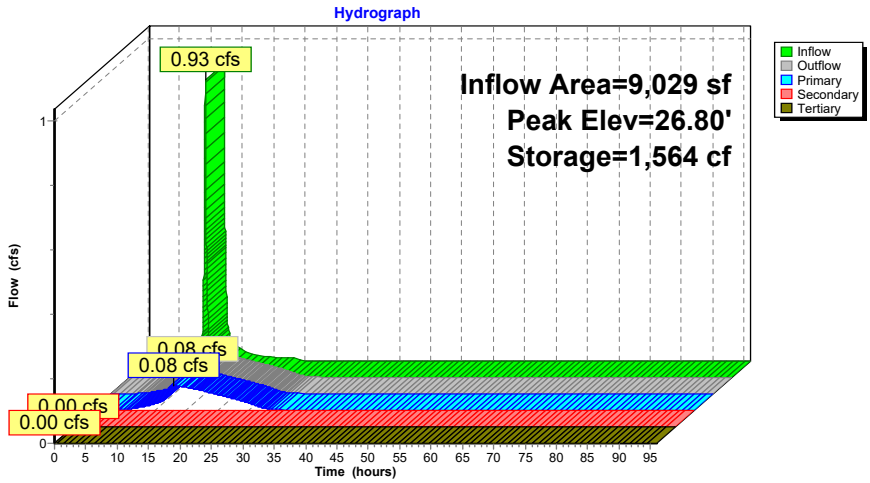
Device	Routing	Invert	Outlet Devices
#1	Primary	25.10'	**12.0" Round Culvert** L= 70.0' Ke= 0.500 Inlet / Outlet Invert= 25.10' / 24.07' S= 0.0147 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf
#2	Device 1	25.10'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**60.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	27.07'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	27.23'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.08 cfs @ 13.05 hrs HW=26.80' TW=23.72' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.08 cfs of 4.15 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 6.17 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.10' TW=17.40' (Dynamic Tailwater)
- **4=Orifice/Grate** (Controls 0.00 cfs)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.10' TW=0.00' (Dynamic Tailwater)
- **5=Orifice/Grate** (Controls 0.00 cfs)

Pond DET 1: Detention System 1



Summary for Pond INF 1A: Infiltration System 1A

Inflow Area =	9,029 sf, 90.43% Impervious, Inflow Depth > 4.17" for 10 Year event				
Inflow =	0.08 cfs @	13.05 hrs,	Volume=	3,137 cf	
Outflow =	0.07 cfs @	13.98 hrs,	Volume=	3,137 cf,	Atten= 12%, Lag= 55.8 min
Discarded =	0.01 cfs @	8.02 hrs,	Volume=	871 cf	
Primary =	0.06 cfs @	13.98 hrs,	Volume=	2,266 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.93' @ 21.06 hrs Surf.Area= 157 sf Storage= 231 cf
Flood Elev= 26.12' Surf.Area= 157 sf Storage= 335 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 65.0 min (1,089.8 - 1,024.8)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	184 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 620 cf Overall - 161 cf Embedded = 459 cf x 40.0% Voids
#2	23.00'	145 cf	**ACF R-Tank XD 16** x 19 Inside #1 Inside= 19.7"W x 31.5"H => 3.88 sf x 1.97'L = 7.6 cf Outside= 19.7"W x 31.5"H => 4.31 sf x 1.97'L = 8.5 cf
#3	23.00'	2 cf	**12.0" Round Pipe Storage**-Impervious L= 3.0'
#4	23.00'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 31.0' S= 0.0673 '/'
		355 cf	Total Available Storage

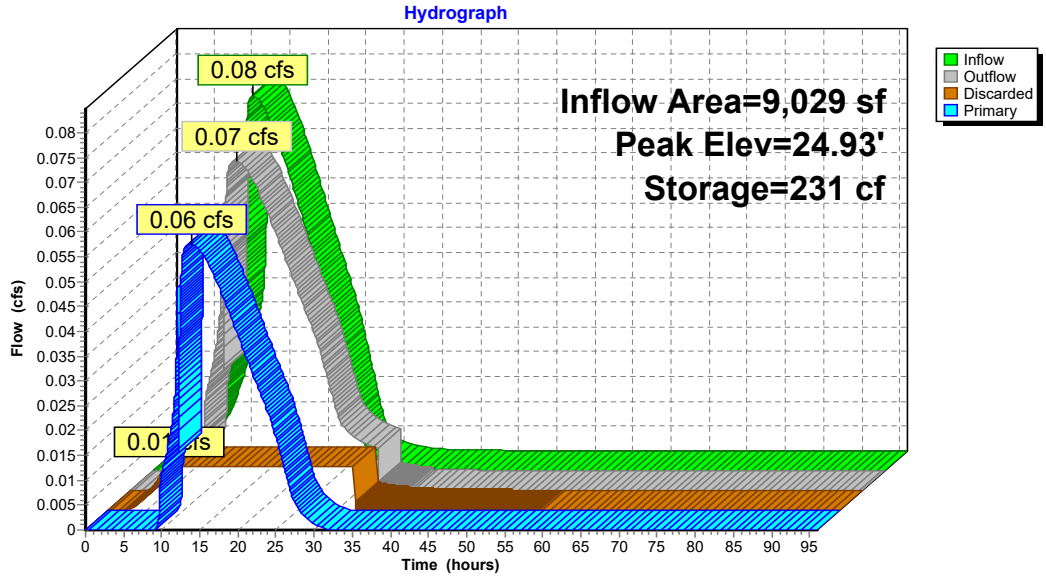
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	157	0	0
26.45	157	620	620

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.00'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 23.00' / 23.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.01 cfs @ 8.02 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 13.98 hrs HW=24.00' TW=24.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond INF 1A: Infiltration System 1A



Summary for Pond INF 1B: Infiltration System 1B

Inflow Area = 12,997 sf, 80.91% Impervious, Inflow Depth = 2.89" for 10 Year event
Inflow = 0.33 cfs @ 12.09 hrs, Volume= 3,134 cf
Outflow = 0.04 cfs @ 11.71 hrs, Volume= 3,134 cf, Atten= 88%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.71 hrs, Volume= 3,134 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.93' @ 21.05 hrs Surf.Area= 707 sf Storage= 1,051 cf
Flood Elev= 26.12' Surf.Area= 707 sf Storage= 1,582 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 287.1 min (1,281.3 - 994.2)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	671 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 2,793 cf Overall - 1,116 cf Embedded = 1,677 cf x 40.0% Voids
#2	23.00'	1,004 cf	**ACF R-Tank XD 18** x 117 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf
		1,675 cf	Total Available Storage

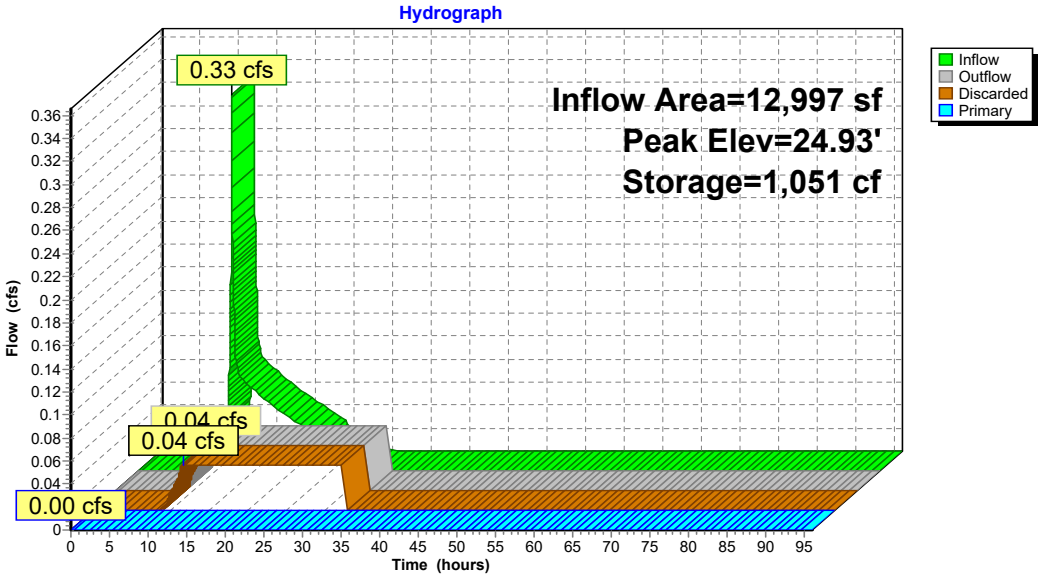
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	707	0	0
26.45	707	2,793	2,793

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	25.20'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 24.62' / 25.20' S= -0.0773 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 11.71 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.50' TW=24.40' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond INF 1B: Infiltration System 1B



Summary for Pond INF 2: Infiltration System 2

Inflow Area = 18,121 sf, 86.31% Impervious, Inflow Depth = 1.32" for 10 Year event
Inflow = 0.65 cfs @ 12.00 hrs, Volume= 1,991 cf
Outflow = 0.03 cfs @ 10.81 hrs, Volume= 1,991 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.03 cfs @ 10.81 hrs, Volume= 1,991 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 21.69' @ 14.02 hrs Surf.Area= 510 sf Storage= 880 cf
Flood Elev= 24.75' Surf.Area= 510 sf Storage= 1,826 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 249.5 min (993.0 - 743.5)

Volume	Invert	Avail.Storage	Storage Description
#1	18.67'	874 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 3,356 cf Overall - 1,171 cf Embedded = 2,185 cf x 40.0% Voids
#2	19.17'	1,054 cf	**ACF R-Tank XD 34** x 65 Inside #1 Inside= 19.7"W x 66.9"H => 8.23 sf x 1.97'L = 16.2 cf Outside= 19.7"W x 66.9"H => 9.15 sf x 1.97'L = 18.0 cf
		1,928 cf	Total Available Storage

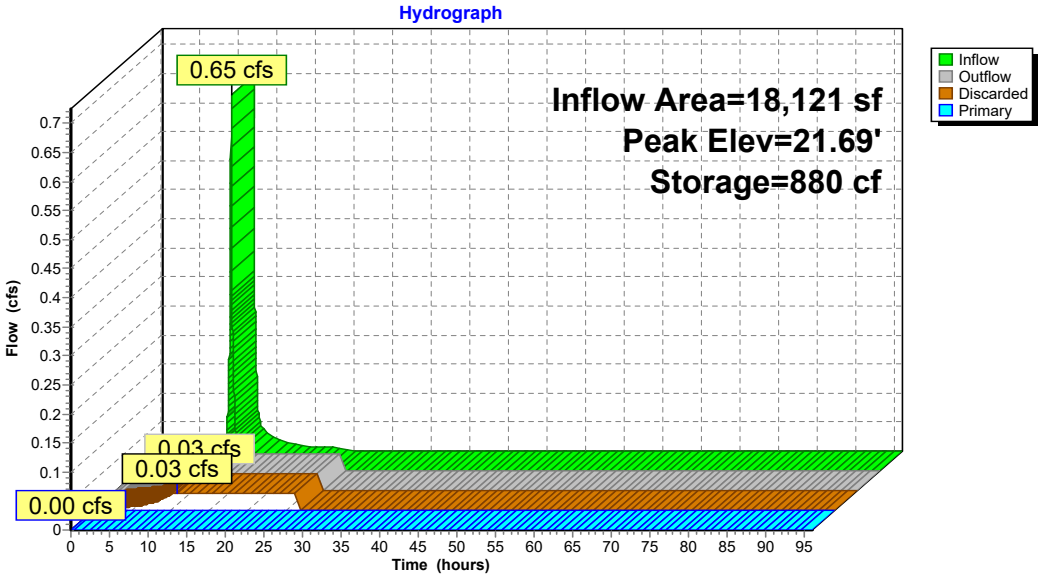
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.67	510	0	0
25.25	510	3,356	3,356

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.67'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.26'	**8.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 24.08' / 24.26' S= -0.0062 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Discarded OutFlow Max=0.03 cfs @ 10.81 hrs HW=18.74' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=18.67' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond INF 2: Infiltration System 2



Summary for Pond INF 3: Infiltration System 3

Inflow Area = 2,000 sf,100.00% Impervious, Inflow Depth = 4.66" for 10 Year event
Inflow = 0.22 cfs @ 12.08 hrs, Volume= 777 cf
Outflow = 0.01 cfs @ 11.05 hrs, Volume= 777 cf, Atten= 95%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.05 hrs, Volume= 777 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 20.11' @ 13.94 hrs Surf.Area= 214 sf Storage= 332 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 221.0 min (969.3 - 748.4)

Volume	Invert	Avail.Storage	Storage Description
#1	17.40'	221 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 880 cf Overall - 326 cf Embedded = 553 cf x 40.0% Voids
#2	17.90'	294 cf	**ACF R-Tank XD 22** x 28 Inside #1 Inside= 19.7"W x 43.3"H => 5.33 sf x 1.97'L = 10.5 cf Outside= 19.7"W x 43.3"H => 5.92 sf x 1.97'L = 11.7 cf
		515 cf	Total Available Storage

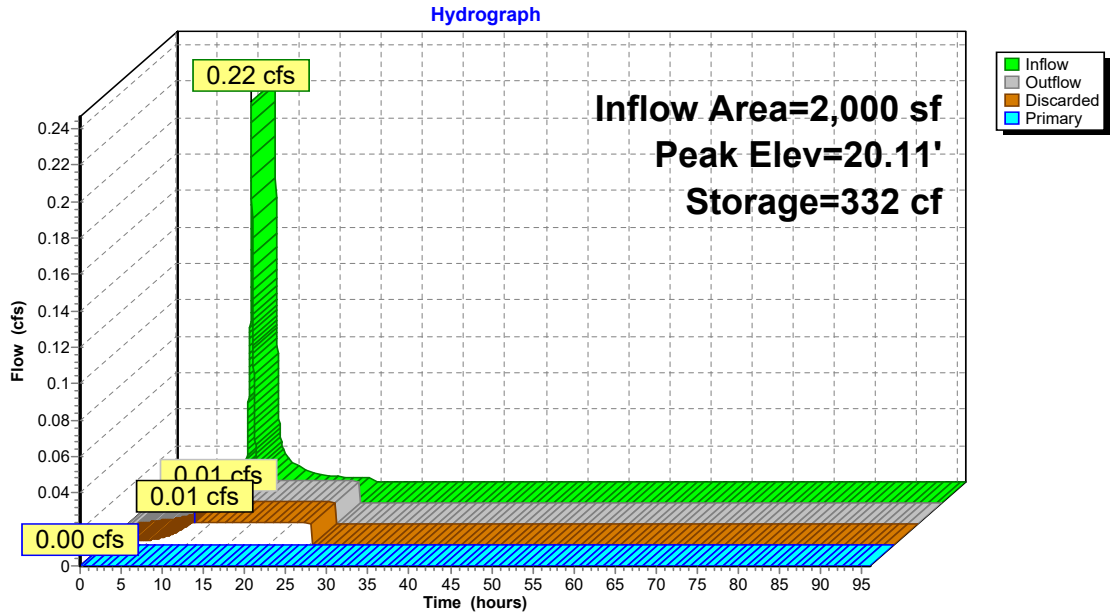
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.40	214	0	0
21.51	214	880	880

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 11.05 hrs HW=17.46' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.40' TW=0.00' (Dynamic Tailwater)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond INF 3: Infiltration System 3

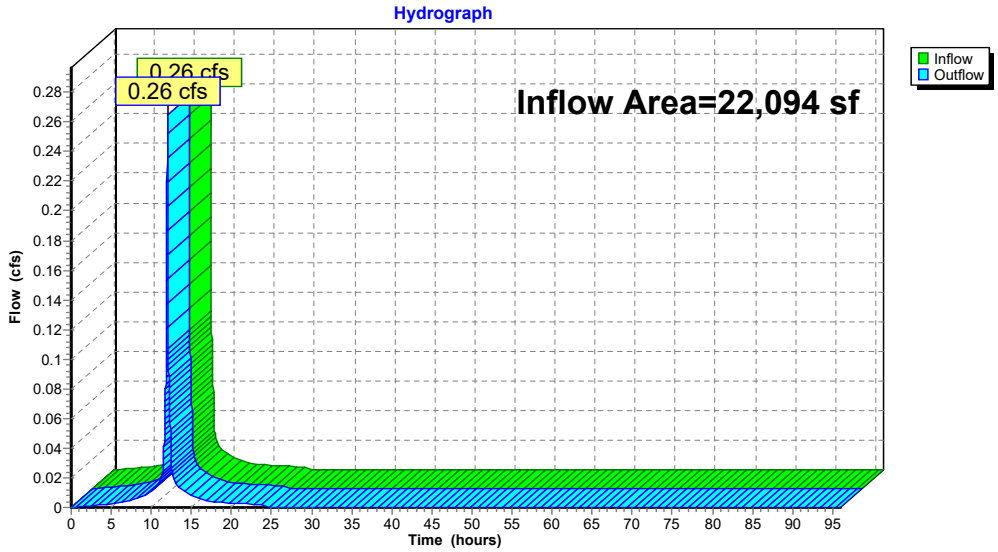


Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 22,094 sf, 88.77% Impervious, Inflow Depth = 0.42" for 10 Year event
Inflow = 0.26 cfs @ 12.00 hrs, Volume= 767 cf
Outflow = 0.26 cfs @ 12.00 hrs, Volume= 767 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1



Summary for Subcatchment 1S: Subcatchment 1S

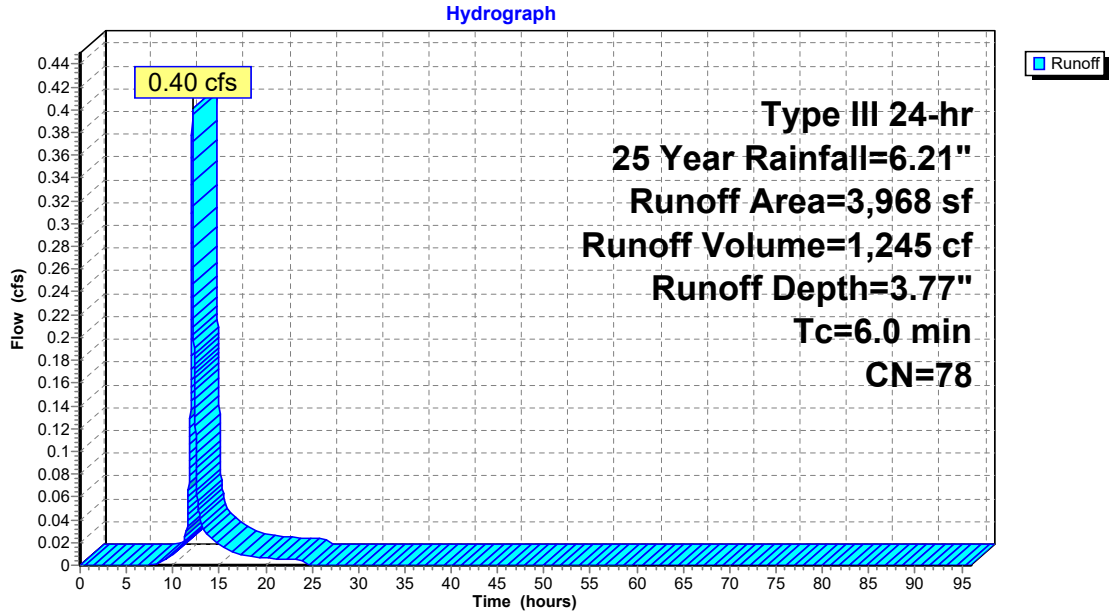
Runoff = 0.40 cfs @ 12.09 hrs, Volume= 1,245 cf, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
*	1,098	98	Pavers
*	1,253	98	Impervious
	1,617	49	50-75% Grass cover, Fair, HSG A
	3,968	78	Weighted Average
	1,617		40.75% Pervious Area
	2,351		59.25% Impervious Area

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

Subcatchment 1S: Subcatchment 1S



Summary for Subcatchment 2S: Subcatchment 2S

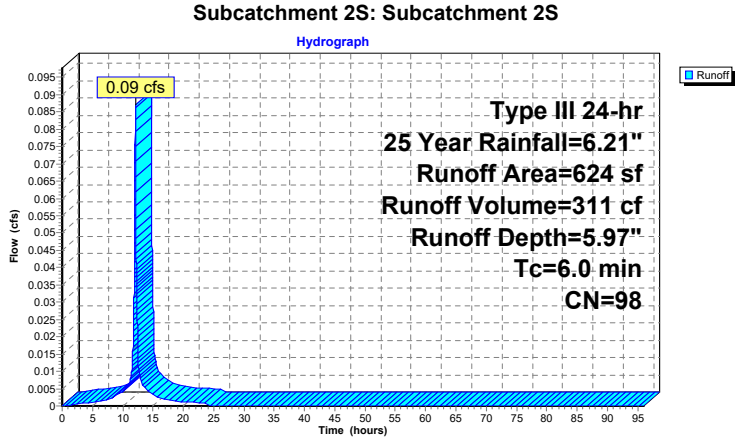
Runoff = 0.09 cfs @ 12.08 hrs, Volume= 311 cf, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
*	624	98	Pavers
	624		100.00% Impervious Area

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

Subcatchment 2S: Subcatchment 2S



Summary for Subcatchment 3S: Subcatchment 3S

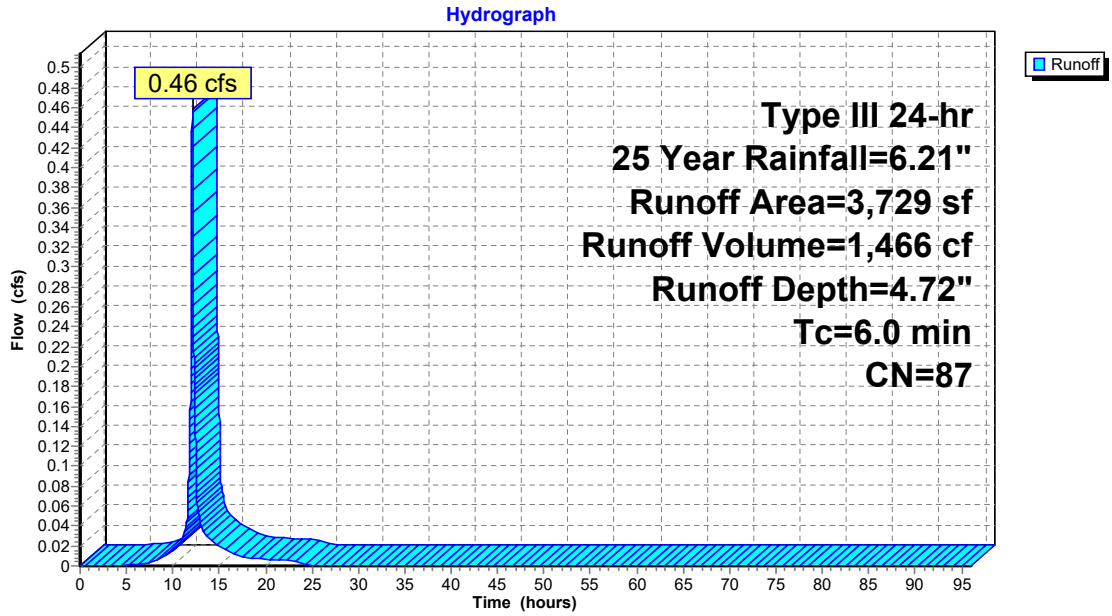
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 1,466 cf, Depth= 4.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
*	2,260	98	Pavers
*	605	98	Building
	864	49	50-75% Grass cover, Fair, HSG A
	3,729	87	Weighted Average
	864		23.17% Pervious Area
	2,865		76.83% Impervious Area

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

Subcatchment 3S: Subcatchment 3S



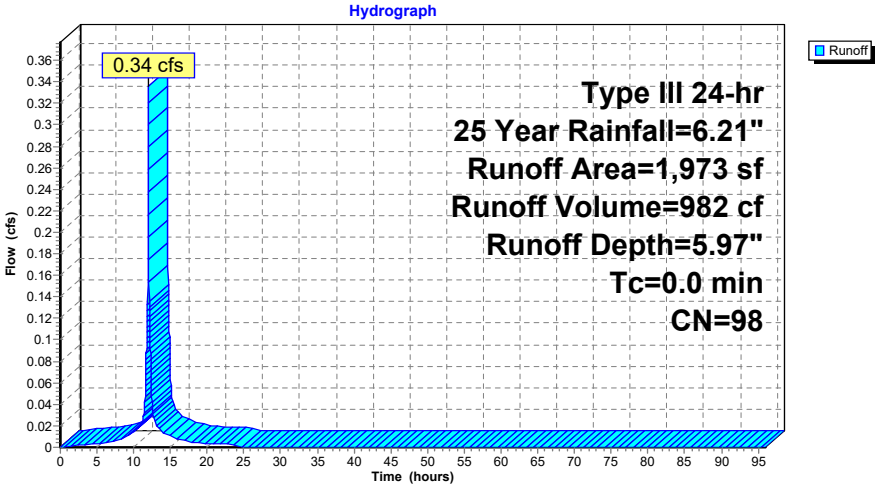
Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.34 cfs @ 12.00 hrs, Volume= 982 cf, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
*	1,973	98	Impervious
	1,973		100.00% Impervious Area

Subcatchment 4S: Subcatchment 4S



Summary for Pond AD 3: Area Drain 3

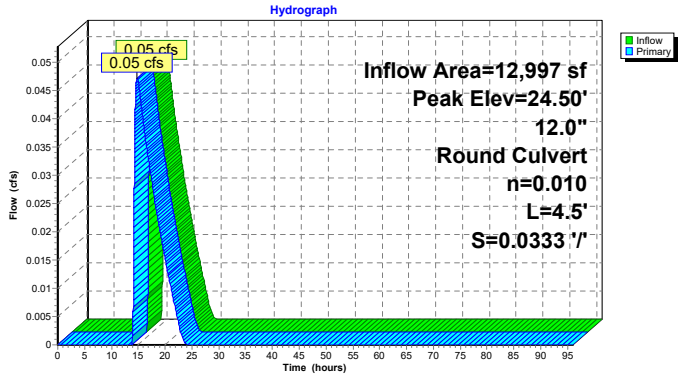
Inflow Area = 12,997 sf, 80.91% Impervious, Inflow Depth = 0.70" for 25 Year event
Inflow = 0.05 cfs @ 14.80 hrs, Volume= 756 cf
Outflow = 0.05 cfs @ 14.80 hrs, Volume= 756 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.05 cfs @ 14.80 hrs, Volume= 756 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.50' @ 14.80 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	24.40'	**12.0" Round Culvert** L= 4.5' Ke= 0.500 Inlet / Outlet Invert= 24.40' / 24.25' S= 0.0333 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.05 cfs @ 14.80 hrs HW=24.50' TW=23.20' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.05 cfs @ 1.10 fps)

Pond AD 3: Area Drain 3



Summary for Subcatchment BLDG 1: BLDG 1

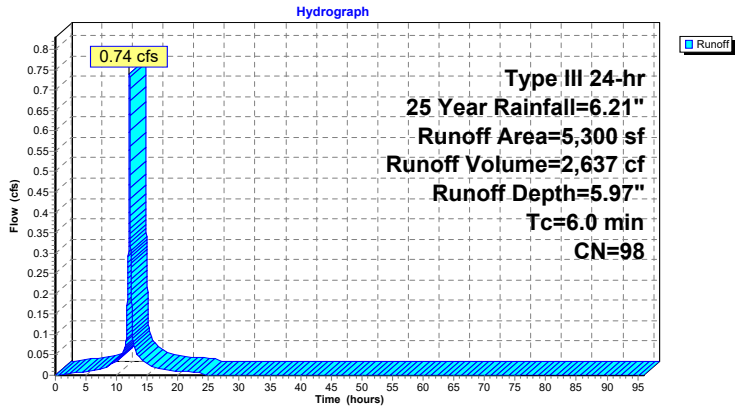
Runoff = 0.74 cfs @ 12.08 hrs, Volume= 2,637 cf, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
*	5,300	98	Impervious
	5,300		100.00% Impervious Area

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

Subcatchment BLDG 1: BLDG 1



Summary for Subcatchment BLDG 2: BLDG 2

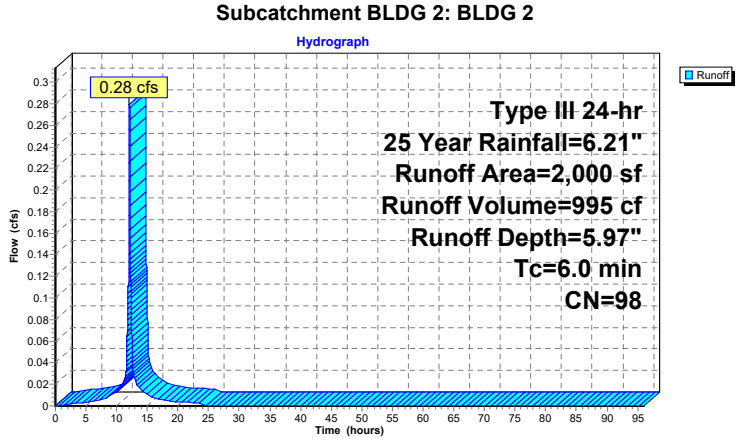
Runoff = 0.28 cfs @ 12.08 hrs, Volume= 995 cf, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment BLDG 2: BLDG 2



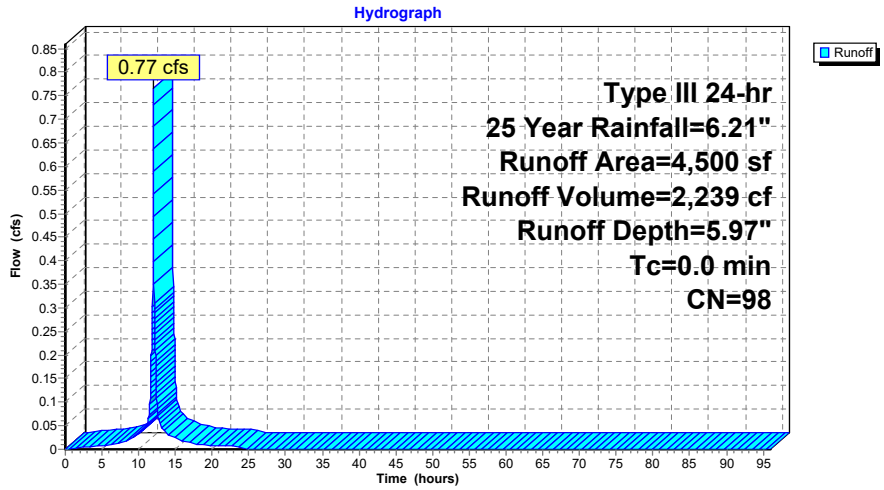
Summary for Subcatchment BLDG 3: BLDG 3

Runoff = 0.77 cfs @ 12.00 hrs, Volume= 2,239 cf, Depth= 5.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 Year Rainfall=6.21"

	Area (sf)	CN	Description
*	4,500	98	Impervious
	4,500		100.00% Impervious Area

Subcatchment BLDG 3: BLDG 3



Summary for Pond DET 1: Detention System 1

Inflow Area = 9,029 sf, 90.43% Impervious, Inflow Depth = 5.45" for 25 Year event
Inflow = 1.20 cfs @ 12.08 hrs, Volume= 4,104 cf
Outflow = 0.40 cfs @ 12.37 hrs, Volume= 4,102 cf, Atten= 67%, Lag= 17.1 min
Primary = 0.40 cfs @ 12.37 hrs, Volume= 4,101 cf
Secondary = 0.00 cfs @ 12.37 hrs, Volume= 0 cf
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 27.07' @ 12.37 hrs Surf.Area= 1,162 sf Storage= 1,810 cf
Flood Elev= 27.73' Surf.Area= 1,162 sf Storage= 2,188 cf

Plug-Flow detention time= 256.2 min calculated for 4,101 cf (100% of inflow)
Center-of-Mass det. time= 256.3 min (1,018.3 - 762.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.10'	452 cf	**36.81'W x 31.56'L x 2.63'H Field A** 3,058 cf Overall - 1,928 cf Embedded = 1,130 cf x 40.0% Voids
#2A	25.10'	1,735 cf	**ACF R-Tank XD 13** x 280 Inside #1 Inside= 19.7"W x 25.6"H => 3.15 sf x 1.97'L = 6.2 cf Outside= 19.7"W x 25.6"H => 3.50 sf x 1.97'L = 6.9 cf 280 Chambers in 20 Rows
#3	25.10'	2 cf	**12.0" Round Pipe Storage** L= 2.0'
		2,189 cf	Total Available Storage

Storage Group A created with Chamber Wizard

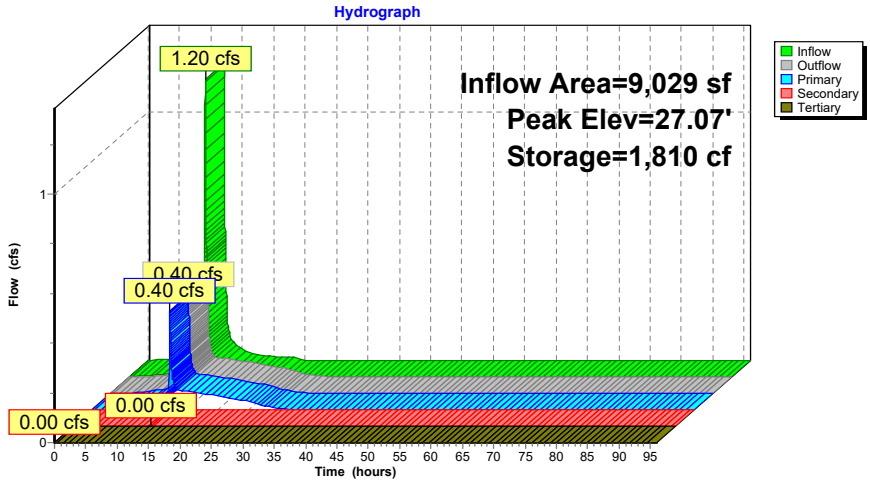
Device	Routing	Invert	Outlet Devices
#1	Primary	25.10'	**12.0" Round Culvert** L= 70.0' Ke= 0.500 Inlet / Outlet Invert= 25.10' / 24.07' S= 0.0147 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf
#2	Device 1	25.10'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**60.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	27.07'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	27.23'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.40 cfs @ 12.37 hrs HW=27.07' TW=23.89' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.40 cfs of 4.59 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 6.65 fps)
  └─**3=Orifice/Grate** (Orifice Controls 0.31 cfs @ 0.87 fps)

Secondary OutFlow Max=0.00 cfs @ 12.37 hrs HW=27.07' TW=20.48' (Dynamic Tailwater)
└─**4=Orifice/Grate** (Weir Controls 0.00 cfs @ 0.17 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.10' TW=0.00' (Dynamic Tailwater)
└─**5=Orifice/Grate** (Controls 0.00 cfs)

Pond DET 1: Detention System 1



Summary for Pond INF 1A: Infiltration System 1A

Inflow Area =	9,029 sf,	90.43% Impervious,	Inflow Depth =	5.45"	for 25 Year event
Inflow =	0.40 cfs @	12.37 hrs, Volume=	4,101 cf		
Outflow =	0.31 cfs @	12.37 hrs, Volume=	4,101 cf,	Atten= 23%,	Lag= 0.0 min
Discarded =	0.01 cfs @	6.95 hrs, Volume=	979 cf		
Primary =	0.30 cfs @	12.37 hrs, Volume=	3,122 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 25.30' @ 14.81 hrs Surf.Area= 157 sf Storage= 270 cf
Flood Elev= 26.12' Surf.Area= 157 sf Storage= 335 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 71.4 min (1,089.7 - 1,018.4)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	184 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 620 cf Overall - 161 cf Embedded = 459 cf x 40.0% Voids
#2	23.00'	145 cf	**ACF R-Tank XD 16** x 19 Inside #1 Inside= 19.7"W x 31.5"H => 3.88 sf x 1.97'L = 7.6 cf Outside= 19.7"W x 31.5"H => 4.31 sf x 1.97'L = 8.5 cf
#3	23.00'	2 cf	**12.0" Round Pipe Storage**-Impervious L= 3.0'
#4	23.00'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 31.0' S= 0.0673 '/'
		355 cf	Total Available Storage

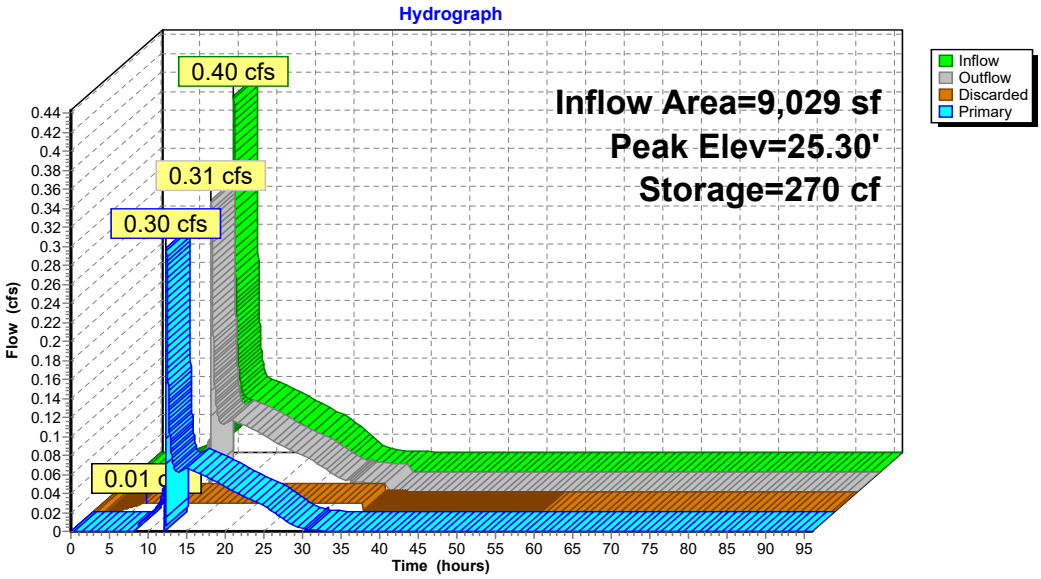
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	157	0	0
26.45	157	620	620

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.00'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 23.00' / 23.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.01 cfs @ 6.95 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 12.37 hrs HW=23.89' TW=23.92' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond INF 1A: Infiltration System 1A



Summary for Pond INF 1B: Infiltration System 1B

Inflow Area = 12,997 sf, 80.91% Impervious, Inflow Depth = 4.03" for 25 Year event
Inflow = 0.44 cfs @ 12.36 hrs, Volume= 4,367 cf
Outflow = 0.09 cfs @ 14.80 hrs, Volume= 4,367 cf, Atten= 81%, Lag= 146.6 min
Discarded = 0.04 cfs @ 11.35 hrs, Volume= 3,612 cf
Primary = 0.05 cfs @ 14.80 hrs, Volume= 756 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 25.30' @ 14.80 hrs Surf.Area= 707 sf Storage= 1,228 cf
Flood Elev= 26.12' Surf.Area= 707 sf Storage= 1,582 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 295.8 min (1,280.1 - 984.3)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	671 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 2,793 cf Overall - 1,116 cf Embedded = 1,677 cf x 40.0% Voids
#2	23.00'	1,004 cf	**ACF R-Tank XD 18** x 117 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf
		1,675 cf	Total Available Storage

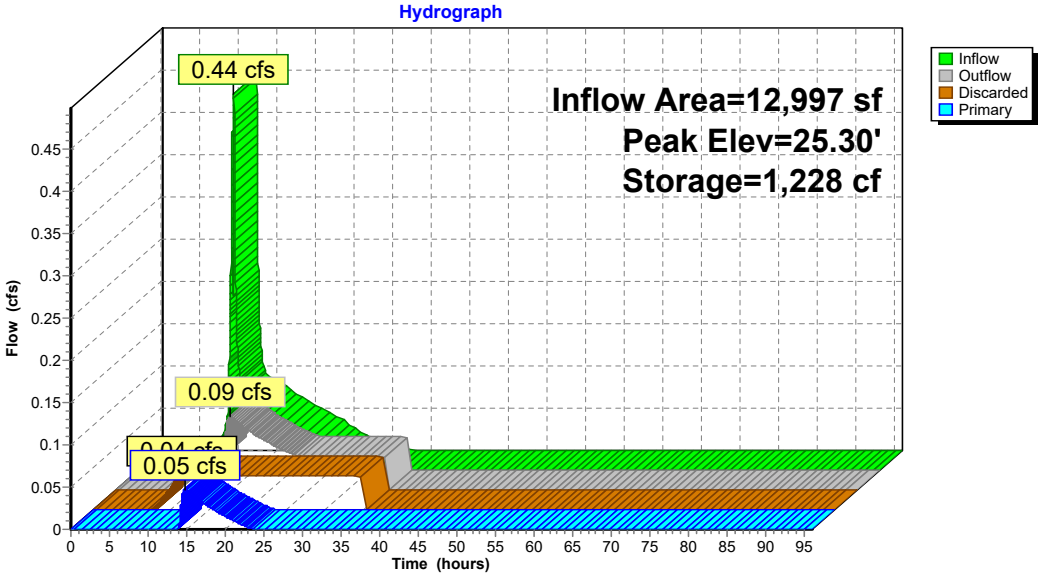
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	707	0	0
26.45	707	2,793	2,793

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	25.20'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 24.62' / 25.20' S= -0.0773 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 11.35 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.05 cfs @ 14.80 hrs HW=25.30' TW=24.50' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 0.05 cfs @ 1.10 fps)

Pond INF 1B: Infiltration System 1B



Summary for Pond INF 2: Infiltration System 2

Inflow Area =	18,121 sf, 86.31% Impervious, Inflow Depth = 2.19" for 25 Year event				
Inflow =	0.82 cfs @	12.00 hrs, Volume=	3,305 cf		
Outflow =	0.03 cfs @	19.33 hrs, Volume=	3,306 cf, Atten= 96%, Lag= 439.8 min		
Discarded =	0.03 cfs @	10.15 hrs, Volume=	3,304 cf		
Primary =	0.00 cfs @	19.33 hrs, Volume=	1 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.27' @ 19.33 hrs Surf.Area= 510 sf Storage= 1,678 cf
Flood Elev= 24.75' Surf.Area= 510 sf Storage= 1,826 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 521.5 min (1,327.3 - 805.7)

Volume	Invert	Avail.Storage	Storage Description
#1	18.67'	874 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 3,356 cf Overall - 1,171 cf Embedded = 2,185 cf x 40.0% Voids
#2	19.17'	1,054 cf	**ACF R-Tank XD 34** x 65 Inside #1 Inside= 19.7"W x 66.9"H => 8.23 sf x 1.97'L = 16.2 cf Outside= 19.7"W x 66.9"H => 9.15 sf x 1.97'L = 18.0 cf
		1,928 cf	Total Available Storage

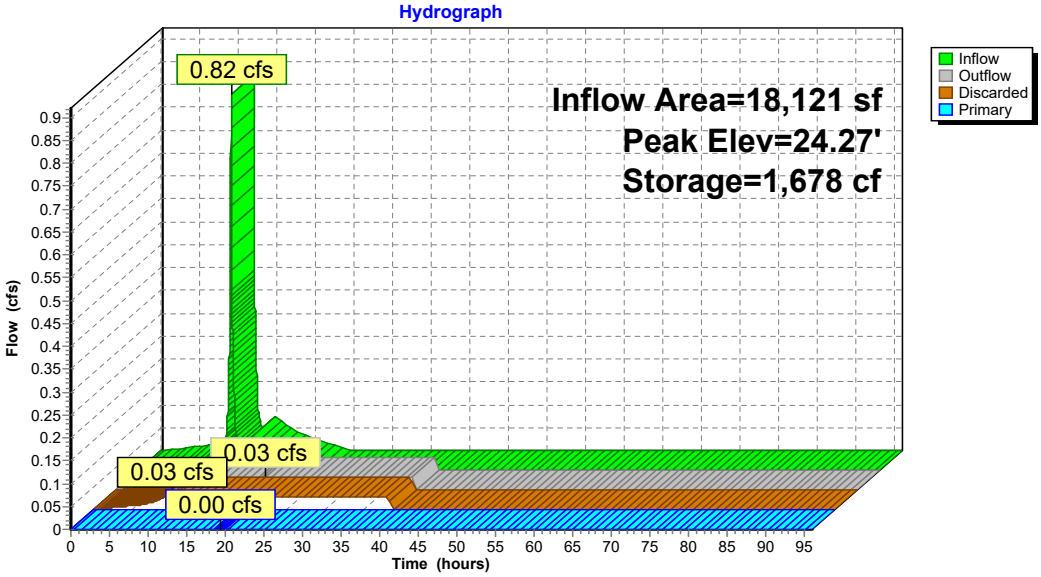
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.67	510	0	0
25.25	510	3,356	3,356

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.67'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.26'	**8.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 24.08' / 24.26' S= -0.0062 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Discarded OutFlow Max=0.03 cfs @ 10.15 hrs HW=18.74' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 19.33 hrs HW=24.27' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 0.00 cfs @ 0.38 fps)

Pond INF 2: Infiltration System 2



Summary for Pond INF 3: Infiltration System 3

Inflow Area =	2,000 sf,100.00% Impervious,	Inflow Depth =	5.97"	for 25 Year event	
Inflow =	0.28 cfs @	12.08 hrs, Volume=	995 cf		
Outflow =	0.01 cfs @	10.42 hrs, Volume=	996 cf,	Atten= 96%,	Lag= 0.0 min
Discarded =	0.01 cfs @	10.42 hrs, Volume=	996 cf		
Primary =	0.00 cfs @	0.00 hrs, Volume=	0 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 21.18' @ 14.74 hrs Surf.Area= 214 sf Storage= 472 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 325.3 min (1,070.0 - 744.6)

Volume	Invert	Avail.Storage	Storage Description
#1	17.40'	221 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 880 cf Overall - 326 cf Embedded = 553 cf x 40.0% Voids
#2	17.90'	294 cf	**ACF R-Tank XD 22** x 28 Inside #1 Inside= 19.7"W x 43.3"H => 5.33 sf x 1.97'L = 10.5 cf Outside= 19.7"W x 43.3"H => 5.92 sf x 1.97'L = 11.7 cf
		515 cf	Total Available Storage

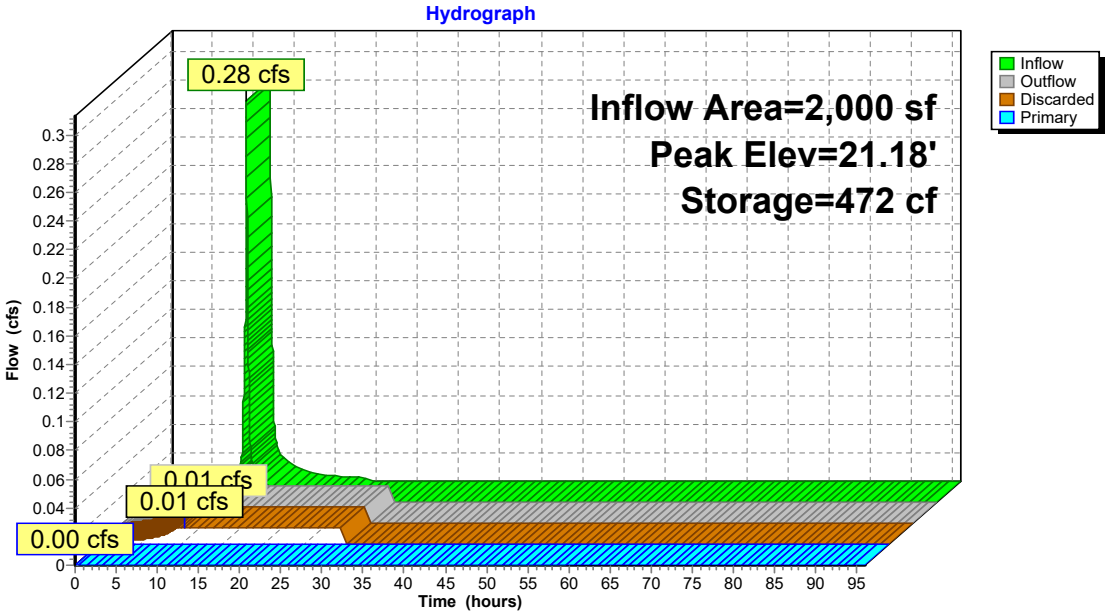
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.40	214	0	0
21.51	214	880	880

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 10.42 hrs HW=17.46' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.40' TW=0.00' (Dynamic Tailwater)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond INF 3: Infiltration System 3

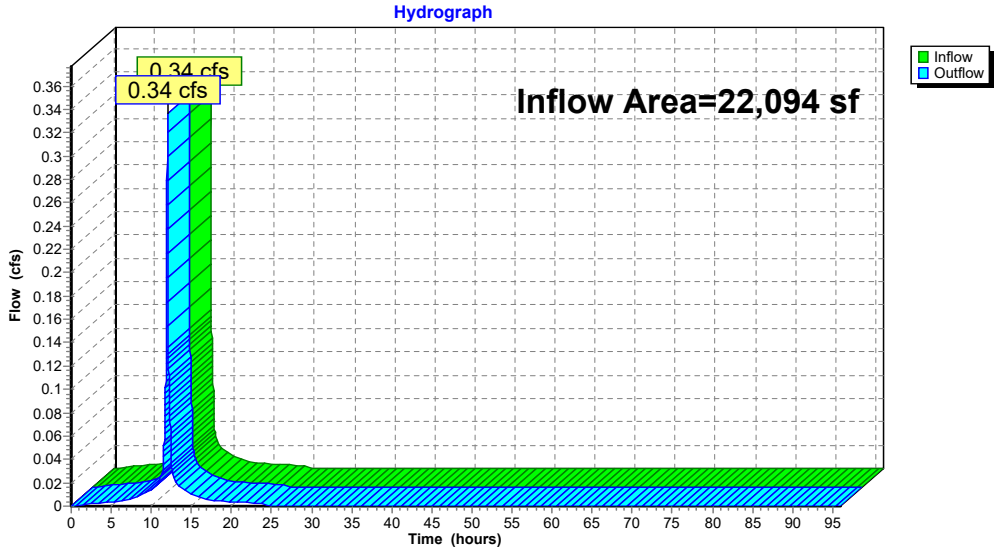


Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 22,094 sf, 88.77% Impervious, Inflow Depth = 0.53" for 25 Year event
Inflow = 0.34 cfs @ 12.00 hrs, Volume= 983 cf
Outflow = 0.34 cfs @ 12.00 hrs, Volume= 983 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1



Summary for Subcatchment 1S: Subcatchment 1S

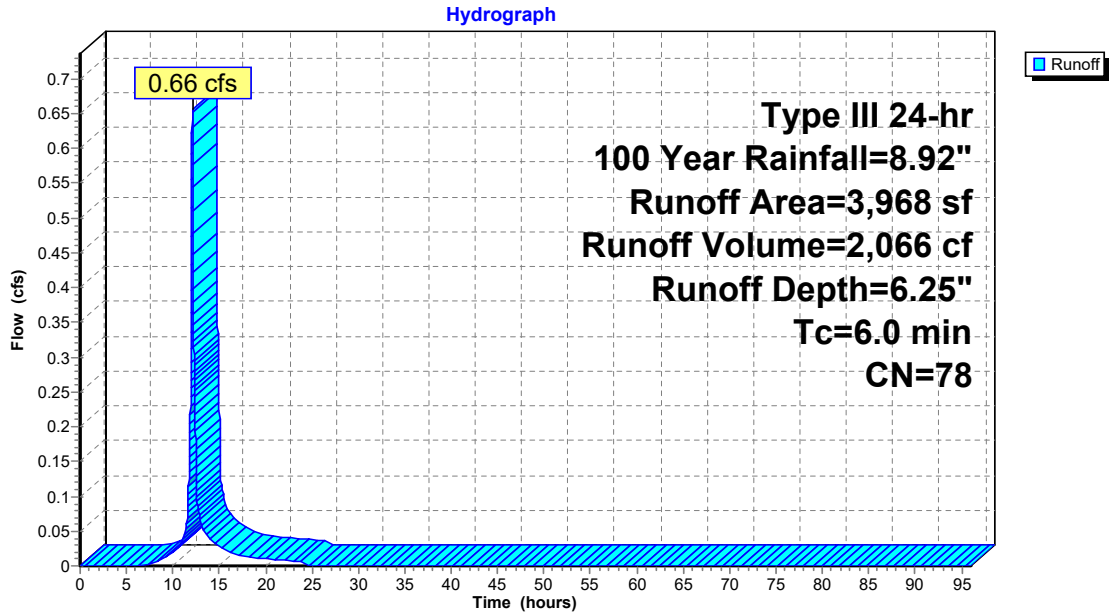
Runoff = 0.66 cfs @ 12.09 hrs, Volume= 2,066 cf, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
*	1,098	98	Pavers
*	1,253	98	Impervious
	1,617	49	50-75% Grass cover, Fair, HSG A
	3,968	78	Weighted Average
	1,617		40.75% Pervious Area
	2,351		59.25% Impervious Area

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

Subcatchment 1S: Subcatchment 1S



Summary for Subcatchment 2S: Subcatchment 2S

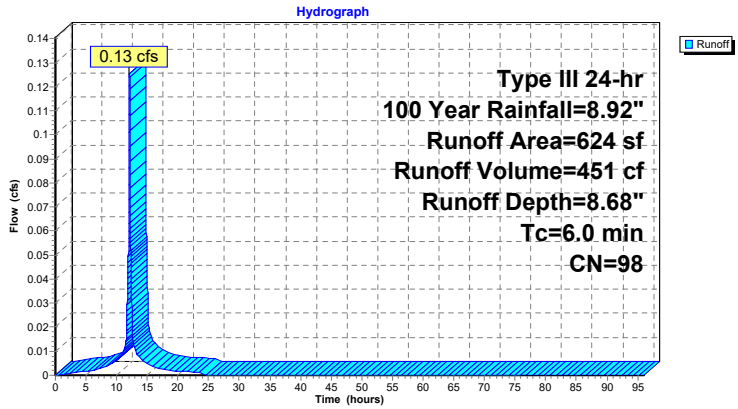
Runoff = 0.13 cfs @ 12.08 hrs, Volume= 451 cf, Depth= 8.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
*	624	98	Pavers
	624		100.00% Impervious Area

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

Subcatchment 2S: Subcatchment 2S



Summary for Subcatchment 3S: Subcatchment 3S

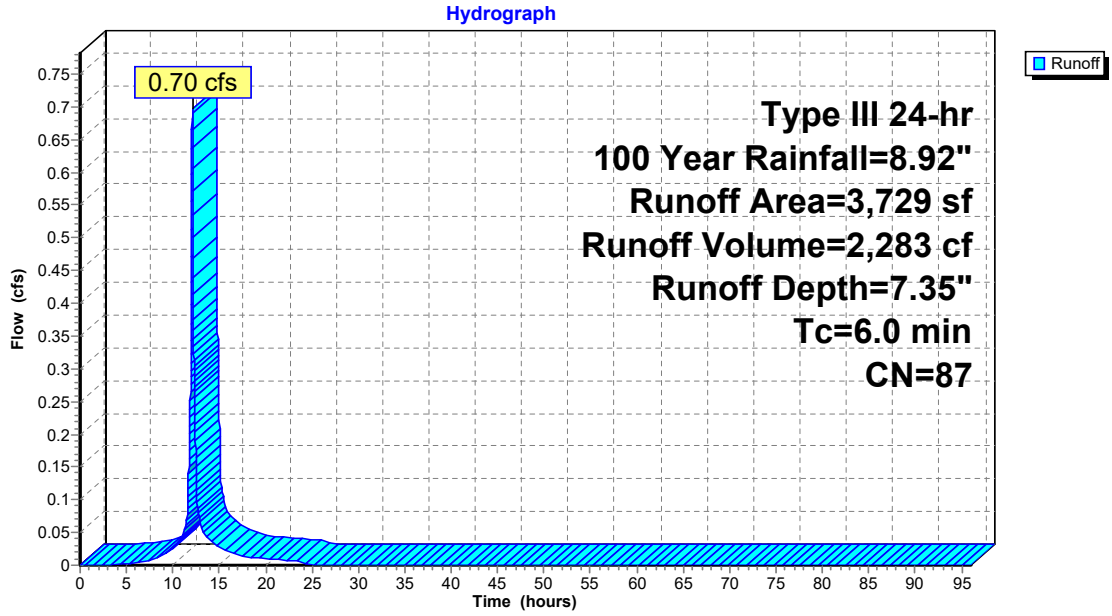
Runoff = 0.70 cfs @ 12.08 hrs, Volume= 2,283 cf, Depth= 7.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
*	2,260	98	Pavers
*	605	98	Building
	864	49	50-75% Grass cover, Fair, HSG A
	3,729	87	Weighted Average
	864		23.17% Pervious Area
	2,865		76.83% Impervious Area

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

Subcatchment 3S: Subcatchment 3S



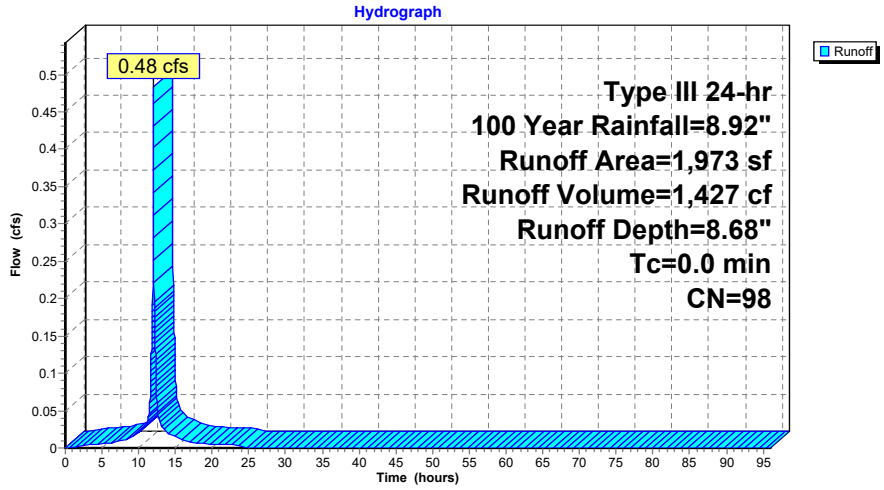
Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 1,427 cf, Depth= 8.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
*	1,973	98	Impervious
	1,973		100.00% Impervious Area

Subcatchment 4S: Subcatchment 4S



Summary for Pond AD 3: Area Drain 3

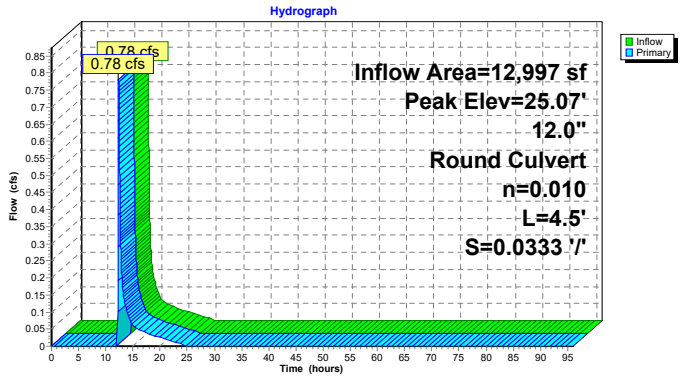
Inflow Area = 12,997 sf, 80.91% Impervious, Inflow Depth = 2.69" for 100 Year event
Inflow = 0.78 cfs @ 12.35 hrs, Volume= 2,915 cf
Outflow = 0.78 cfs @ 12.35 hrs, Volume= 2,915 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.35 hrs, Volume= 2,915 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 25.07' @ 12.43 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	24.40'	**12.0" Round Culvert** L= 4.5' Ke= 0.500 Inlet / Outlet Invert= 24.40' / 24.25' S= 0.0333 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.35 hrs HW=24.95' TW=24.84' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.63 cfs @ 2.09 fps)

Pond AD 3: Area Drain 3



Summary for Subcatchment BLDG 1: BLDG 1

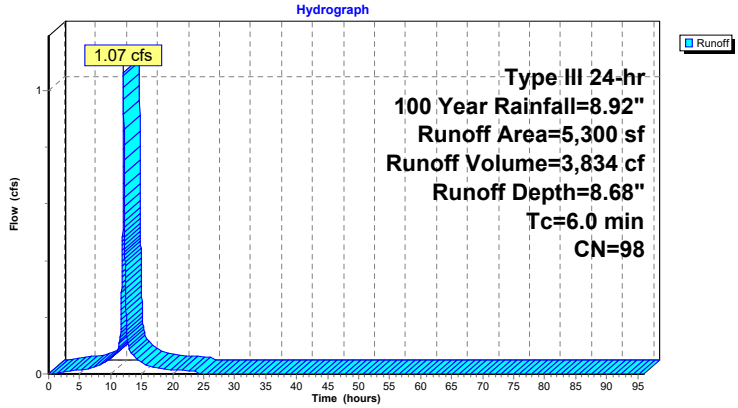
Runoff = 1.07 cfs @ 12.08 hrs, Volume= 3,834 cf, Depth= 8.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
*	5,300	98	Impervious
	5,300		100.00% Impervious Area

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

Subcatchment BLDG 1: BLDG 1



Summary for Subcatchment BLDG 2: BLDG 2

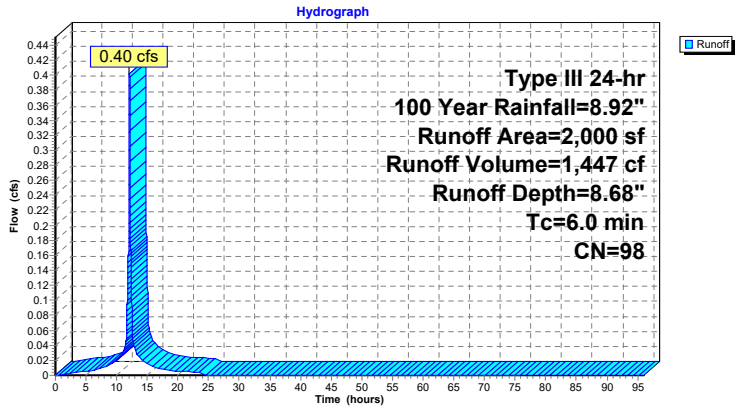
Runoff = 0.40 cfs @ 12.08 hrs, Volume= 1,447 cf, Depth= 8.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
*	2,000	98	
	2,000		100.00% Impervious Area

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

Subcatchment BLDG 2: BLDG 2



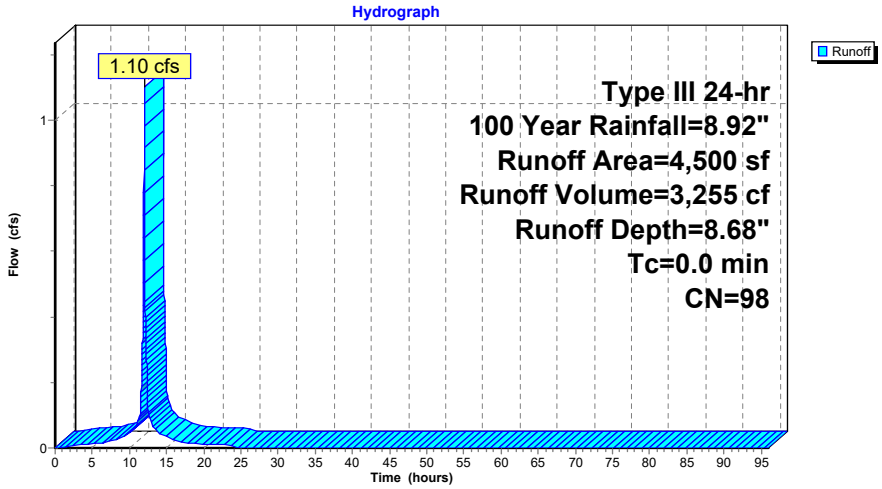
Summary for Subcatchment BLDG 3: BLDG 3

Runoff = 1.10 cfs @ 12.00 hrs, Volume= 3,255 cf, Depth= 8.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 Year Rainfall=8.92"

	Area (sf)	CN	Description
*	4,500	98	Impervious
	4,500		100.00% Impervious Area

Subcatchment BLDG 3: BLDG 3



Summary for Pond DET 1: Detention System 1

Inflow Area =	9,029 sf,	90.43% Impervious,	Inflow Depth =	8.13"	for 100 Year event
Inflow =	1.76 cfs @	12.08 hrs,	Volume=	6,117 cf	
Outflow =	1.65 cfs @	12.11 hrs,	Volume=	6,115 cf,	Atten= 6%, Lag= 1.9 min
Primary =	1.29 cfs @	12.11 hrs,	Volume=	5,904 cf	
Secondary =	0.36 cfs @	12.11 hrs,	Volume=	211 cf	
Tertiary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 27.18' @ 12.11 hrs Surf.Area= 1,162 sf Storage= 1,906 cf
Flood Elev= 27.73' Surf.Area= 1,162 sf Storage= 2,188 cf

Plug-Flow detention time= 207.5 min calculated for 6,114 cf (100% of inflow)
Center-of-Mass det. time= 207.6 min (963.0 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	25.10'	452 cf	**36.81'W x 31.56'L x 2.63'H Field A** 3,058 cf Overall - 1,928 cf Embedded = 1,130 cf x 40.0% Voids
#2A	25.10'	1,735 cf	**ACF R-Tank XD 13** x 280 Inside #1 Inside= 19.7"W x 25.6"H => 3.15 sf x 1.97'L = 6.2 cf Outside= 19.7"W x 25.6"H => 3.50 sf x 1.97'L = 6.9 cf 280 Chambers in 20 Rows
#3	25.10'	2 cf	**12.0" Round Pipe Storage** L= 2.0'
		2,189 cf	Total Available Storage

Storage Group A created with Chamber Wizard

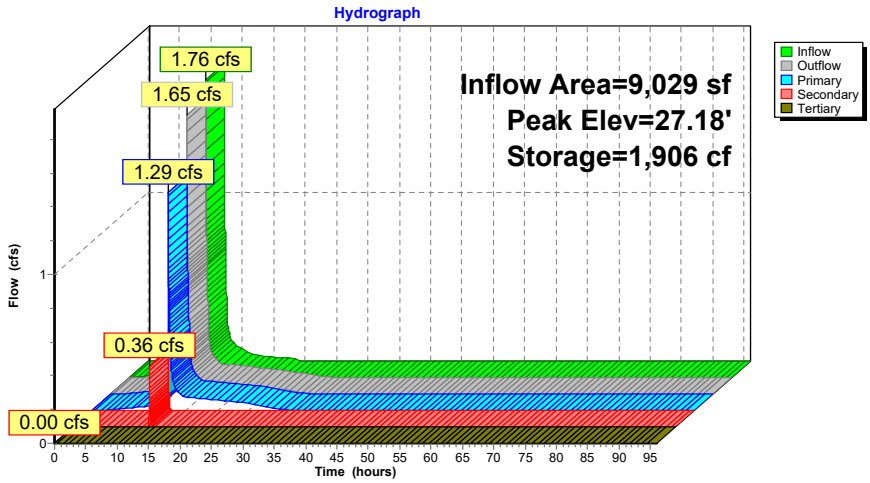
Device	Routing	Invert	Outlet Devices
#1	Primary	25.10'	**12.0" Round Culvert** L= 70.0' Ke= 0.500 Inlet / Outlet Invert= 25.10' / 24.07' S= 0.0147 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf
#2	Device 1	25.10'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	27.00'	**60.0" W x 12.0" H Vert. Orifice/Grate** C= 0.600
#4	Secondary	27.07'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	27.23'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.28 cfs @ 12.11 hrs HW=27.18' TW=24.33' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.28 cfs of 4.75 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 6.83 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.20 cfs @ 1.35 fps)

Secondary OutFlow Max=0.36 cfs @ 12.11 hrs HW=27.18' TW=21.25' (Dynamic Tailwater)
- **4=Orifice/Grate** (Weir Controls 0.36 cfs @ 1.07 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.10' TW=0.00' (Dynamic Tailwater)
- **5=Orifice/Grate** (Controls 0.00 cfs)

Pond DET 1: Detention System 1



Summary for Pond INF 1A: Infiltration System 1A

Inflow Area =	9,029 sf,	90.43% Impervious,	Inflow Depth =	7.85"	for 100 Year event
Inflow =	1.29 cfs @	12.11 hrs,	Volume=	5,904 cf	
Outflow =	0.95 cfs @	12.12 hrs,	Volume=	5,904 cf,	Atten= 27%, Lag= 0.2 min
Discarded =	0.01 cfs @	5.10 hrs,	Volume=	1,060 cf	
Primary =	0.94 cfs @	12.12 hrs,	Volume=	4,844 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 25.67' @ 12.36 hrs Surf.Area= 157 sf Storage= 306 cf
Flood Elev= 26.12' Surf.Area= 157 sf Storage= 335 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 55.6 min (1,026.9 - 971.3)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	184 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 620 cf Overall - 161 cf Embedded = 459 cf x 40.0% Voids
#2	23.00'	145 cf	**ACF R-Tank XD 16** x 19 Inside #1 Inside= 19.7"W x 31.5"H => 3.88 sf x 1.97'L = 7.6 cf Outside= 19.7"W x 31.5"H => 4.31 sf x 1.97'L = 8.5 cf
#3	23.00'	2 cf	**12.0" Round Pipe Storage**-Impervious L= 3.0'
#4	23.00'	24 cf	**12.0" Round Pipe Storage**-Impervious L= 31.0' S= 0.0673 '/'
		355 cf	Total Available Storage

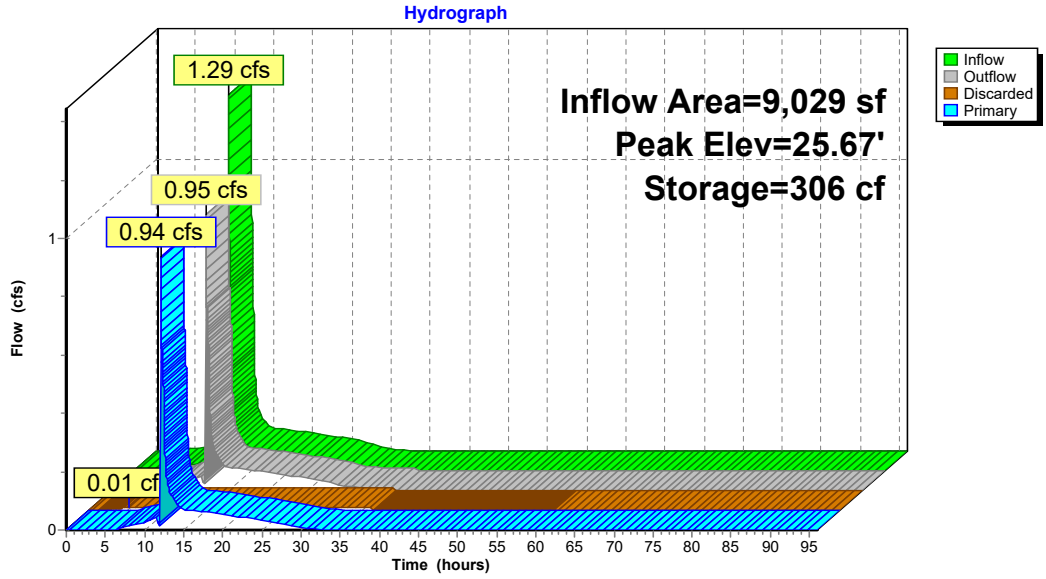
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	157	0	0
26.45	157	620	620

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.00'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 23.00' / 23.00' S= 0.0000 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.01 cfs @ 5.10 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 12.12 hrs HW=24.36' TW=24.41' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond INF 1A: Infiltration System 1A



Summary for Pond INF 1B: Infiltration System 1B

Inflow Area =	12,997 sf,	80.91% Impervious,	Inflow Depth =	6.38"	for 100 Year event
Inflow =	1.56 cfs @	12.11 hrs,	Volume=	6,910 cf	
Outflow =	0.82 cfs @	12.35 hrs,	Volume=	6,910 cf,	Atten= 48%, Lag= 14.6 min
Discarded =	0.04 cfs @	10.25 hrs,	Volume=	3,996 cf	
Primary =	0.78 cfs @	12.35 hrs,	Volume=	2,915 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 25.65' @ 12.35 hrs Surf.Area= 707 sf Storage= 1,391 cf
Flood Elev= 26.12' Surf.Area= 707 sf Storage= 1,582 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 208.2 min (1,139.7 - 931.5)

Volume	Invert	Avail.Storage	Storage Description
#1	22.50'	671 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 2,793 cf Overall - 1,116 cf Embedded = 1,677 cf x 40.0% Voids
#2	23.00'	1,004 cf	**ACF R-Tank XD 18** x 117 Inside #1 Inside= 19.7"W x 35.4"H => 4.36 sf x 1.97'L = 8.6 cf Outside= 19.7"W x 35.4"H => 4.84 sf x 1.97'L = 9.5 cf
		1,675 cf	Total Available Storage

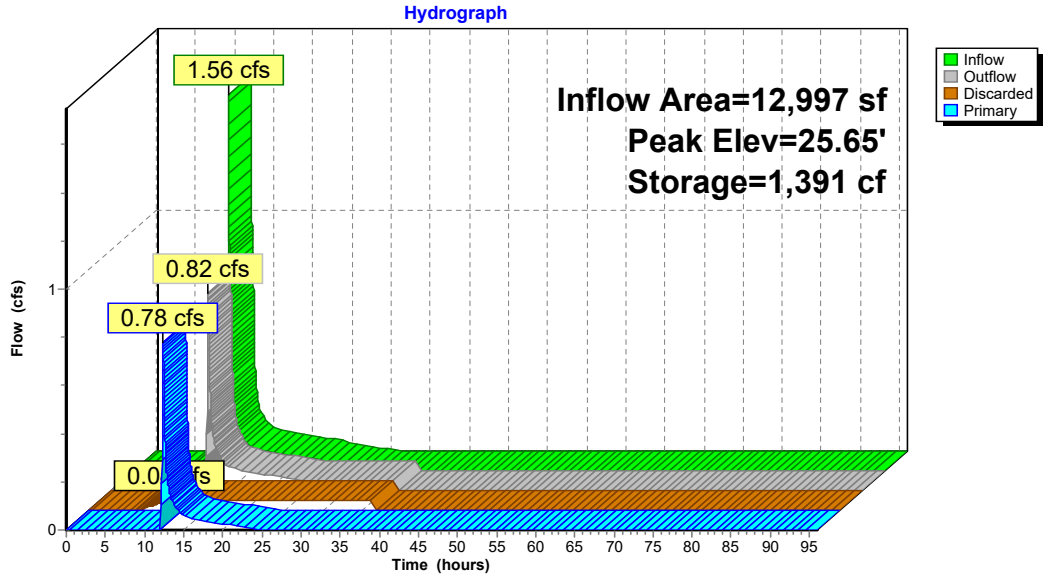
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.50	707	0	0
26.45	707	2,793	2,793

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.50'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	25.20'	**12.0" Round Culvert** L= 7.5' Ke= 0.500 Inlet / Outlet Invert= 24.62' / 25.20' S= -0.0773 '/' Cc= 0.900 n= 0.010, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 10.25 hrs HW=22.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.78 cfs @ 12.35 hrs HW=25.65' TW=24.95' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 0.78 cfs @ 2.28 fps)

Pond INF 1B: Infiltration System 1B



Summary for Pond INF 2: Infiltration System 2

Inflow Area = 18,121 sf, 86.31% Impervious, Inflow Depth = 4.38" for 100 Year event
Inflow = 1.18 cfs @ 12.00 hrs, Volume= 6,621 cf
Outflow = 0.92 cfs @ 12.43 hrs, Volume= 6,621 cf, Atten= 22%, Lag= 25.5 min
Discarded = 0.03 cfs @ 8.94 hrs, Volume= 3,616 cf
Primary = 0.89 cfs @ 12.43 hrs, Volume= 3,005 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.99' @ 12.43 hrs Surf.Area= 510 sf Storage= 1,875 cf
Flood Elev= 24.75' Surf.Area= 510 sf Storage= 1,826 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 308.1 min (1,108.2 - 800.1)

Volume	Invert	Avail.Storage	Storage Description
#1	18.67'	874 cf	**Crushed Stone (Prismatic)**Listed below (Recalc) 3,356 cf Overall - 1,171 cf Embedded = 2,185 cf x 40.0% Voids
#2	19.17'	1,054 cf	**ACF R-Tank XD 34** x 65 Inside #1 Inside= 19.7"W x 66.9"H => 8.23 sf x 1.97'L = 16.2 cf Outside= 19.7"W x 66.9"H => 9.15 sf x 1.97'L = 18.0 cf
		1,928 cf	Total Available Storage

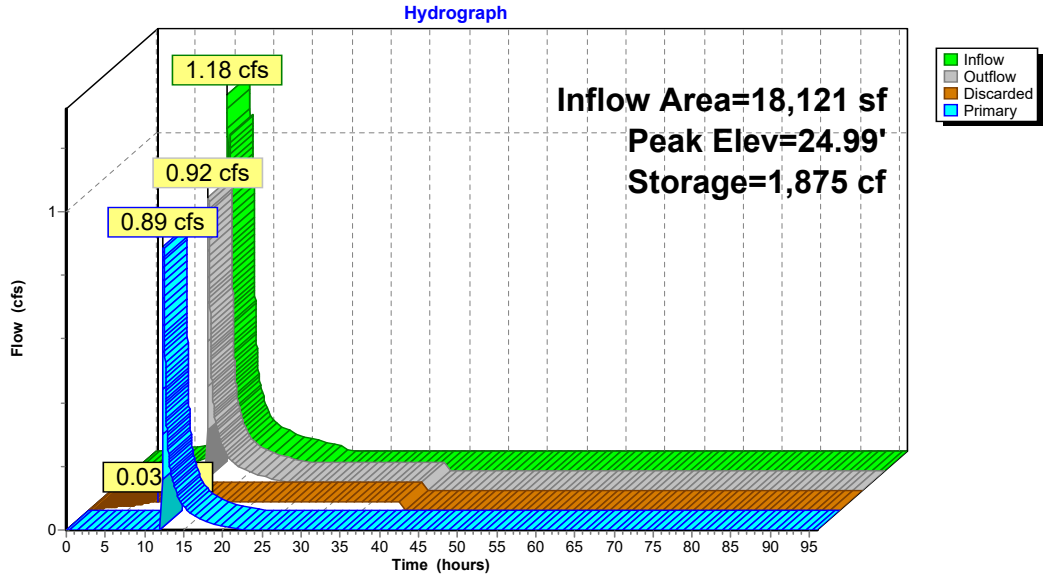
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.67	510	0	0
25.25	510	3,356	3,356

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.67'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	24.26'	**8.0" Round Culvert** L= 29.0' Ke= 0.500 Inlet / Outlet Invert= 24.08' / 24.26' S= -0.0062 '/' Cc= 0.900 n= 0.010, Flow Area= 0.35 sf

Discarded OutFlow Max=0.03 cfs @ 8.94 hrs HW=18.74' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.89 cfs @ 12.43 hrs HW=24.99' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 0.89 cfs @ 2.56 fps)

Pond INF 2: Infiltration System 2



Summary for Pond INF 3: Infiltration System 3

Inflow Area =	2,000 sf,	100.00% Impervious,	Inflow Depth =	9.94"	for	100 Year event
Inflow =	0.74 cfs @	12.11 hrs,	Volume=	1,657 cf		
Outflow =	1.08 cfs @	12.14 hrs,	Volume=	1,657 cf,	Atten= 0%,	Lag= 2.0 min
Discarded =	0.01 cfs @	9.20 hrs,	Volume=	1,161 cf		
Primary =	1.06 cfs @	12.14 hrs,	Volume=	496 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 23.72' @ 12.14 hrs Surf.Area= 214 sf Storage= 515 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 258.9 min (997.7 - 738.8)

Volume	Invert	Avail.Storage	Storage Description
#1	17.40'	221 cf	**Crushed Stone (Prismatic)** Listed below (Recalc) 880 cf Overall - 326 cf Embedded = 553 cf x 40.0% Voids
#2	17.90'	294 cf	**ACF R-Tank XD 22** x 28 Inside #1 Inside= 19.7"W x 43.3"H => 5.33 sf x 1.97'L = 10.5 cf Outside= 19.7"W x 43.3"H => 5.92 sf x 1.97'L = 11.7 cf
		515 cf	Total Available Storage

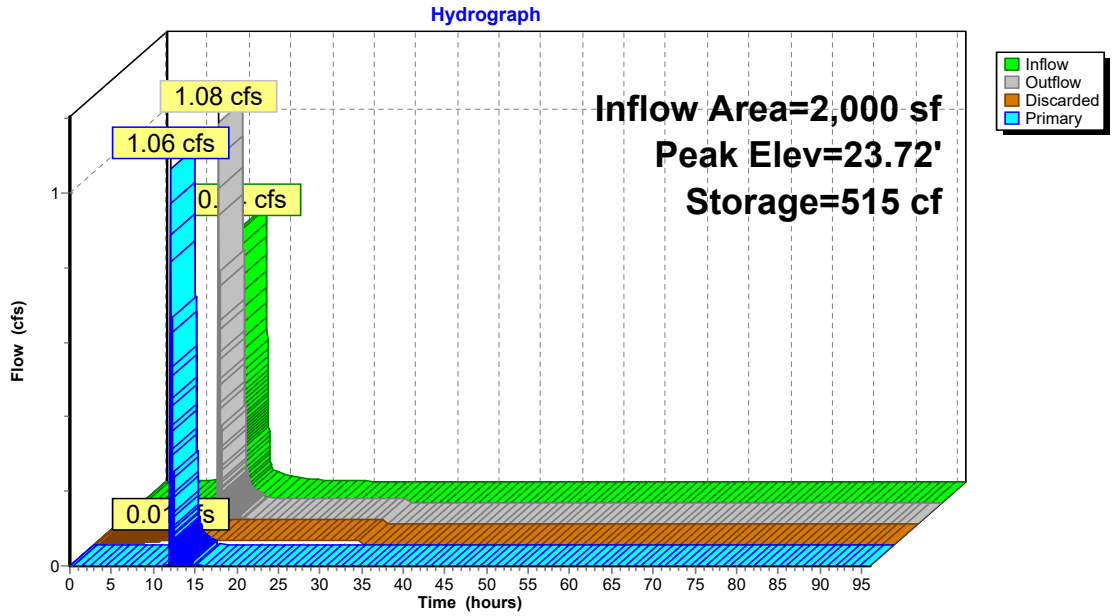
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.40	214	0	0
21.51	214	880	880

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	23.50'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.01 cfs @ 9.20 hrs HW=17.46' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.04 cfs @ 12.14 hrs HW=23.72' TW=0.00' (Dynamic Tailwater)
└**2=Orifice/Grate** (Weir Controls 1.04 cfs @ 1.52 fps)

Pond INF 3: Infiltration System 3

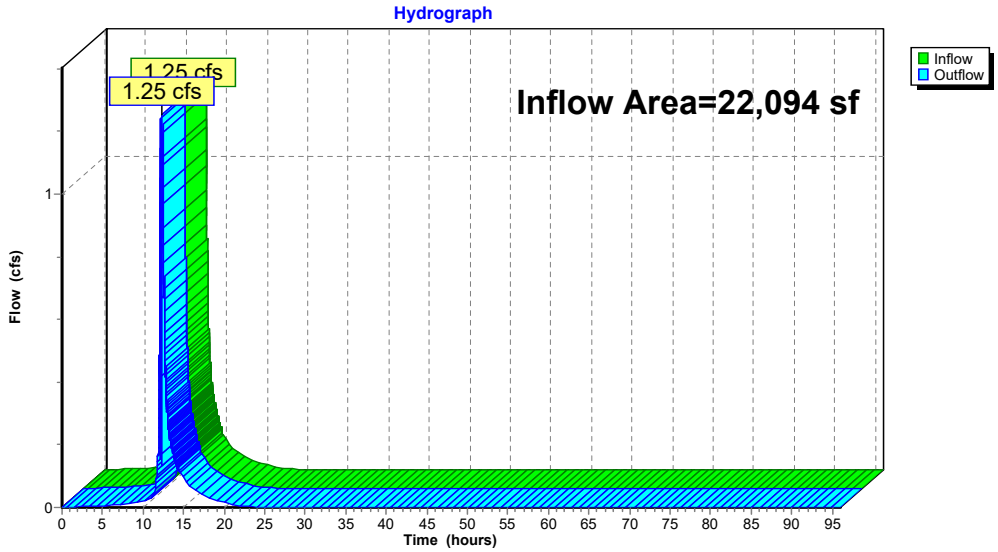


Summary for Reach P.O.A. 1: P.O.A. #1

Inflow Area = 22,094 sf, 88.77% Impervious, Inflow Depth = 2.68" for 100 Year event
Inflow = 1.25 cfs @ 12.38 hrs, Volume= 4,928 cf
Outflow = 1.25 cfs @ 12.38 hrs, Volume= 4,928 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Reach P.O.A. 1: P.O.A. #1



BEALS · ASSOCIATES INC.
2 Park Plaza, Suite 200, Boston, MA 02116
Phone: 617-242-1120

Project ID	Prepared By	Checked By	Date
C-942	DPH	TPM	August 18, 2020

Title Groundwater Mounding Analysis Supporting Calculations

Infiltration System 1A

Recharge Volume
=237 CF

Base Surface Area
=157 SF

Duration
=1 Day (24-hour storm, system drains within timeframe)

Infiltration Rate 'R'
=(Recharge Volume/(Area x Duration)
=237 CF / (157 SF x 1 Day)
=1.51 Ft/Day

Infiltration System 1B

Recharge Volume
=1,179 CF

Base Surface Area
=707 SF

Duration
=1 Day (24-hour storm, system drains within timeframe)

Infiltration Rate
=(Recharge Volume/(Area x Duration)
=1179 CF / (707 SF x 1 Day)
=1.67 Ft/Day

Infiltration System 2

Recharge Volume
=1,674 CF

Base Surface Area
=510 SF

Duration
=1 Day (24-hour storm, system drains within timeframe)

Infiltration Rate
=(Recharge Volume/(Area x Duration)
=1,674 CF / (510 SF x 1 Day)
=3.28 Ft/Day

Infiltration System 3

Recharge Volume
=515 CF

Base Surface Area
=214 SF

Duration
=1 Day (24-hour storm, system drains within timeframe)

Infiltration Rate
=(Recharge Volume/(Area x Duration)
=515 CF / (2142 SF x 1 Day)
=2.41 Ft/Day

Required Recharge
HSG A = 0.60 Inches of Runoff

Specific Yield Values 'Sy'	
Coarse Gravel	0.23
Medium Gravel	0.24
Fine Gravel	0.25
Coarse Sand	0.27
Medium Sand	0.28
Fine Sand	0.23
Silt	0.08
Clay	0.03

Hydraulic Conductivity Values (ft/day) 'K'		
Material	Average	Range
Fine Gravel	1476	1181-3280
Medium Gravel	886	689-1181
Coarse Gravel	492	328-689
Coarse Sand	148	65-328
Medium Sand	39	16-65
Fine Sand	9	3-16
Silt	0.3	0.03-3
Clay	0.0007	<0.03
S & G Mix	172	16-328
S & G Glacial Till	- -	<100
Glacial Till	- -	<10

Infiltration System 1A

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values

1.5100	*R*	**Recharge (infiltration) rate (feet/day)**
0.230	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
18.000	x	**1/2 length of basin (x direction, in feet)**
3.000	y	**1/2 width of basin (y direction, in feet)**
1.000	t	**duration of infiltration period (days)**
51.400	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

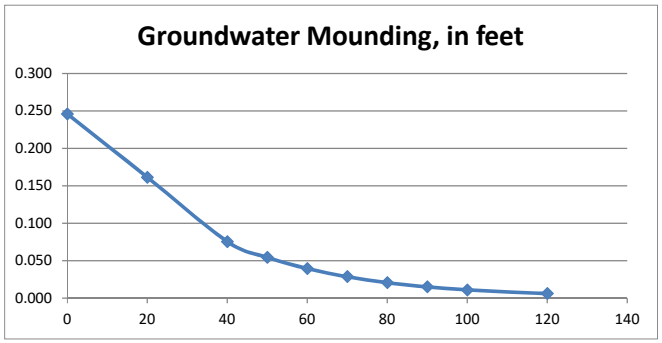
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

51.646	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.246	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.246	0
0.162	20
0.076	40
0.054	50
0.040	60
0.029	70
0.021	80
0.015	90
0.011	100
0.006	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Infiltration System 1B

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values

1.6700	*R*	**Recharge (infiltration) rate (feet/day)**
0.230	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
35.500	x	**1/2 length of basin (x direction, in feet)**
5.250	y	**1/2 width of basin (y direction, in feet)**
1.000	t	**duration of infiltration period (days)**
51.400	hi(0)	**initial thickness of saturated zone (feet)**

52.062	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.662	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Conversion Table

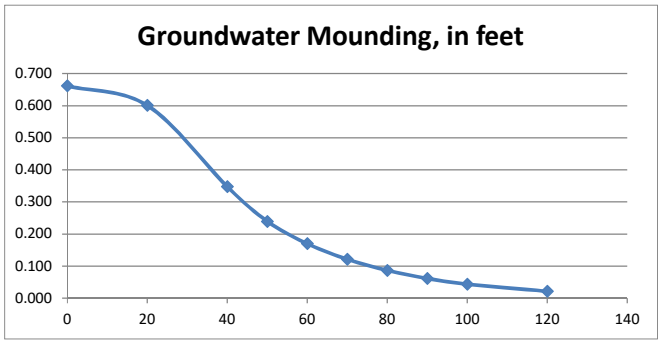
inch/hour	**feet/day**
0.67	1.33
2.00	4.00

hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
0.662	**0**
0.601	**20**
0.347	**40**
0.239	**50**
0.170	**60**
0.121	**70**
0.087	**80**
0.062	**90**
0.044	**100**
0.022	**120**

Re-Calculate Now



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Infiltration System 2

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values

3.2800	*R*	**Recharge (infiltration) rate (feet/day)**
0.230	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
28.000	x	**1/2 length of basin (x direction, in feet)**
6.000	y	**1/2 width of basin (y direction, in feet)**
1.000	t	**duration of infiltration period (days)**
51.400	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00

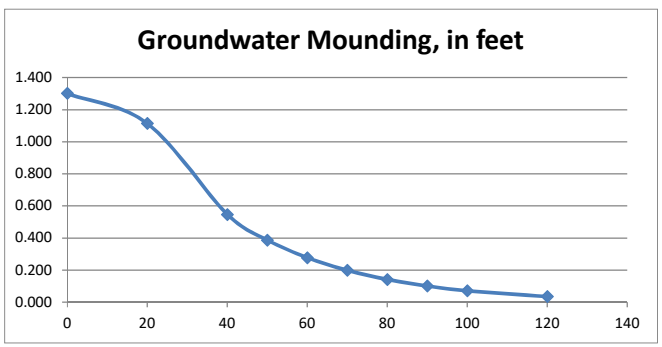
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

52.701	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.301	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.301	**0**
1.114	**20**
0.547	**40**
0.387	**50**
0.277	**60**
0.199	**70**
0.142	**80**
0.101	**90**
0.071	**100**
0.035	**120**

Re-Calculate Now



Disclaimer

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Infiltration System 3

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values

2.4100	*R*	**Recharge (infiltration) rate (feet/day)**
0.230	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
9.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
13.500	x	**1/2 length of basin (x direction, in feet)**
4.000	y	**1/2 width of basin (y direction, in feet)**
1.000	t	**duration of infiltration period (days)**
44.200	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

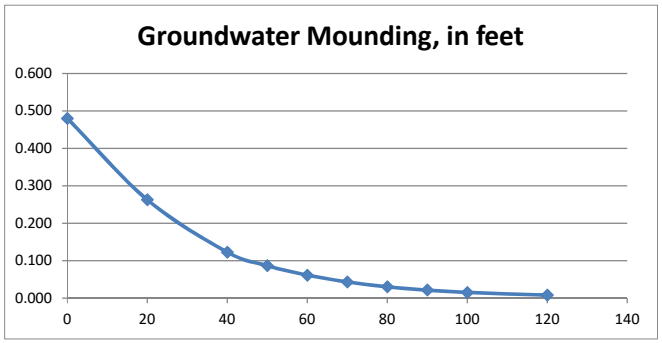
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

44.680	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.480	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.480	0
0.263	20
0.123	40
0.087	50
0.061	60
0.043	70
0.031	80
0.022	90
0.015	100
0.008	120

Re-Calculate Now



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654 MAIN STREET
WINCHESTER, MASSACHUSETTS
Operation and Maintenance Control Plan

Submitted Pursuant to Massachusetts Stormwater Standards &
The Winchester Comprehensive Stormwater Management Regulations

Submitted for:
654 Main Street, LLC
10 Converse Place
Winchester, MA 01890

Prepared by:
Beals Associates, Inc.
2 Park Plaza, Suite 200
Boston, MA 02116

In Association with:
Fells Realty, Inc.
654 Main Street
Winchester, MA 01890

August 18, 2020

BEALS · ASSOCIATES INC.

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0. Introduction

The proposed project consists of a four-story mixed-use building containing approximately 6,200 square feet of retail space (including basement storage) along Main Street and 36 residential units in the rear and upper floors of the building. The larger of the two retail spaces will contain the Fells True Value Hardware store that exists onsite today. Parking for the residential units will be provided under the building and will be accessed via an automatic parking system. An interior courtyard will be enclosed by the proposed building and by a repositioned and renovated historic structure currently at 63 Vine Street. This single-family-sized building will also complement the adjacent residential neighborhood.

This long-term Stormwater Management System Operations and Maintenance (O&M) Manual, filed with the Town of Winchester, shall be implemented at the 654 Main Street development site to ensure that the stormwater management system functions as designed. The Owner possesses the primary responsibility for overseeing and implementing the O&M plan and assigning a property manager who will be responsible for the proper operation and maintenance of the stormwater structures. In case of the transfer of property ownership, future property owners shall be notified of the presence of the stormwater management system and the requirements for proper implementation of the O&M plan.

It is the intent of this document to provide guidance and detail for the long term inspection and maintenance requirements of the project site to ensure the overall stormwater management system functions as intended for the life of the system. This manual provides basic criteria and schedules for inspection and trigger points for required maintenance. Included in this manual is an overall site plan which identifies the locations of the key components of the stormwater management system and a log for tracking the inspections and maintenance.

1. Program Administration

A reliable administrative structure must be established to assure implementation of the maintenance programs described in the foregoing section. Key factors that must be considered in establishing a responsive administrative structure include:

1. Administrative body must be responsible for long-term operation and maintenance of the facilities.
2. Administrative body must have the financial resources to accomplish the inspection and maintenance program over the life of the facility.
3. The administrative body must have a responsible administrator to manage the inspection and maintenance programs.
4. The administrative body must have the staff to accomplish the inspection and maintenance programs, or must have authority to contract for the required services.
5. The administrative body must have a management information system sufficient to file, retain, and retrieve all inspection and maintenance records associated with the inspection and maintenance programs.

If any of the above criteria cannot be met by the entity assigned inspection and maintenance responsibilities, it is likely that the system will fail to meet its water quality objectives at some point during its life. While each of the above criteria may be met by a variety of formats, it is critical to clearly establish the assigned administrative body in a responsible and sustainable manner.

2. Responsibility

The purpose of the Stormwater Operations and Maintenance Manual is to ensure the inspection of the system, removal of accumulated sediments, oils and debris, and implementation of corrective action and record keeping activities. The ongoing responsibility is the Owner, its successors and assigns. Adequate maintenance is defined in this document as good working condition.

Contact information is provided below:

Responsibility for Operation and Maintenance of 654 Main Street

Name: Fells Realty Inc.
Address: 654 Main Street
City, State: Winchester, MA
Contact: Property Manager

_____
Signature

3. Documentation

An Inspection and Maintenance Record Log and Schedule shall be kept by the Owner or Property Manager summarizing inspections, maintenance, repairs and any corrective actions taken. The log will include the date on which each inspection or maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. Inspection and Maintenance Logs shall be kept on file at the property management office.

3.1. Maintenance Program and Budget

The Owner, Property Manager and maintenance staff shall conduct the Operation and Maintenance program set forth in this document. The Owner or Property Manager will ensure that inspections and record keeping are timely and accurate and that cleaning and maintenance are performed in accordance with the recommended frequency for each stormwater component. Inspection and Maintenance Log Forms (provided herein) shall include the date and amount of the last significant storm event in excess of on (1) inch of rain in a 24-hour period, physical conditions of structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. The estimated annual cost of the Maintenance Program is $5,000.

A list of the individual inspection/maintenance elements is provided in the table of contents. The guidelines are proposed for initial use with adjustments made as appropriate based upon specific project experience.

4. Project Overview

Key permits issued (or applied for) on the project include:

- Site Plan Review
- Notice of Intent
- Building Permit
- NPDES Construction General Permit

The permit applications for the project include the design information for the stormwater system.

The Owner/Operator of the stormwater management system should review these permits for a general description and background of the project, as well as any specific permit conditions or requirements of the project.

The applicant has retained Beals Associates, Inc. for civil engineering for the proposed site design at the 654 Main Street Project. Beals Associates, Inc. has prepared the design for the stormwater management facilities for this project and may be contacted at:

Beals Associates, Inc.
2 Park Plaza, Suite 200
Boston, Massachusetts 02116
(617) 242.1120

It is recommended any particular questions on the design intent or similar issues be directed to the designer of the system.

The applicable plans/design documents which apply to the project are:

1. Civil Site Plans/Permit Applications
2. The Erosion Control/Sedimentation Control Plan for the project.
3. The Stormwater Management Plan for the project.
4. O&M Stormwater Maintenance Plan for the project.

A copy of these documents should be retained with the manual.

5. Routine Maintenance Tasks

Routine maintenance of lawns and other landscaped areas shall occur as necessary to maintain the property in a neat and orderly fashion. Clippings and/or mulch shall not be washed into the drainage infrastructure.

Maintenance of the Stormwater Management System shall be in accordance with the Operations and Maintenance Checklist below.

Snow shall be stored in designated areas prior to removal from the site.

Good housekeeping – all areas should be kept free of trash and debris. Any storage of materials and waste products shall be inside or under cover. Fertilizers, herbicides and pesticides, if stored on site, shall be stored properly contained and under over. Storage of salt or deicing chemicals, if any, shall be on impervious area, covered and protected from runoff.

5.1. Area Drain

Area drains collect and convey stormwater runoff to the subsurface infiltration systems. There are five (5) area drains located within the site limits. The area drains should be inspected for sediment or debris a least twice per year. Area drains 2, 3, and 4 should be cleaned out the sump is 2' full. Area drains 1 and 5 should be cleaned of any accumulated sediment or debris

5.2. Manhole Outlet Control Structures

Outlet control structures control the flow out of a stormwater component. The 654 Main Street Project contains one outlet control structures that contain a bulkhead located in a manhole structure. Any debris observed obstructing the inlet and outlet should be removed immediately, and any sediment built up within the outlet control structure should be removed to prevent clogging of orifices. Sediment and debris should be removed at least once per year. The structure contains a small 1 1/2" orifice hole at the bottom of the bulkhead, and inspections should be carefully performed to ensure these small orifice is not clogged.

5.3. Subsurface Infiltration/Detention Systems – R-Tank Stormwater Modules

Regular inspection and maintenance are essential to assure a properly functioning system. Inspection is accomplished through the inspection ports. These inspection ports allow inspection to be accomplished from the surface without the need for confined space entry. A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding six (6) inches, the system should be back-flushed.

The system should be initially inspected immediately after the completion of the site's construction. While every effort should be made to prevent sediment from entering the system during construction, it is during this time that excess amounts of sediments are most likely to enter and stormwater system. Inspection and maintenance, if necessary should be performed prior to the contractor passing responsibility over to the site's owner. Once in normal service, the system should be inspected bi-annually until an understanding of the site's characteristics is developed. The site's maintenance manager can then revise the inspection schedule based on experience or local requirements.

The system proposed for this site does not include an isolator row. Because of the lack of an isolator row, cleaning of the system in general will be very difficult due to minimal access to the majority of the components. The key component to ensuring the long-term performance of the system is to remain diligent about the maintenance of the stormwater BMP's located upstream of the infiltration system, in this case the area drains and roof leaders. Ensuring these upstream units function as intended will help to eliminate the inflow of debris and sediment into the infiltration system.

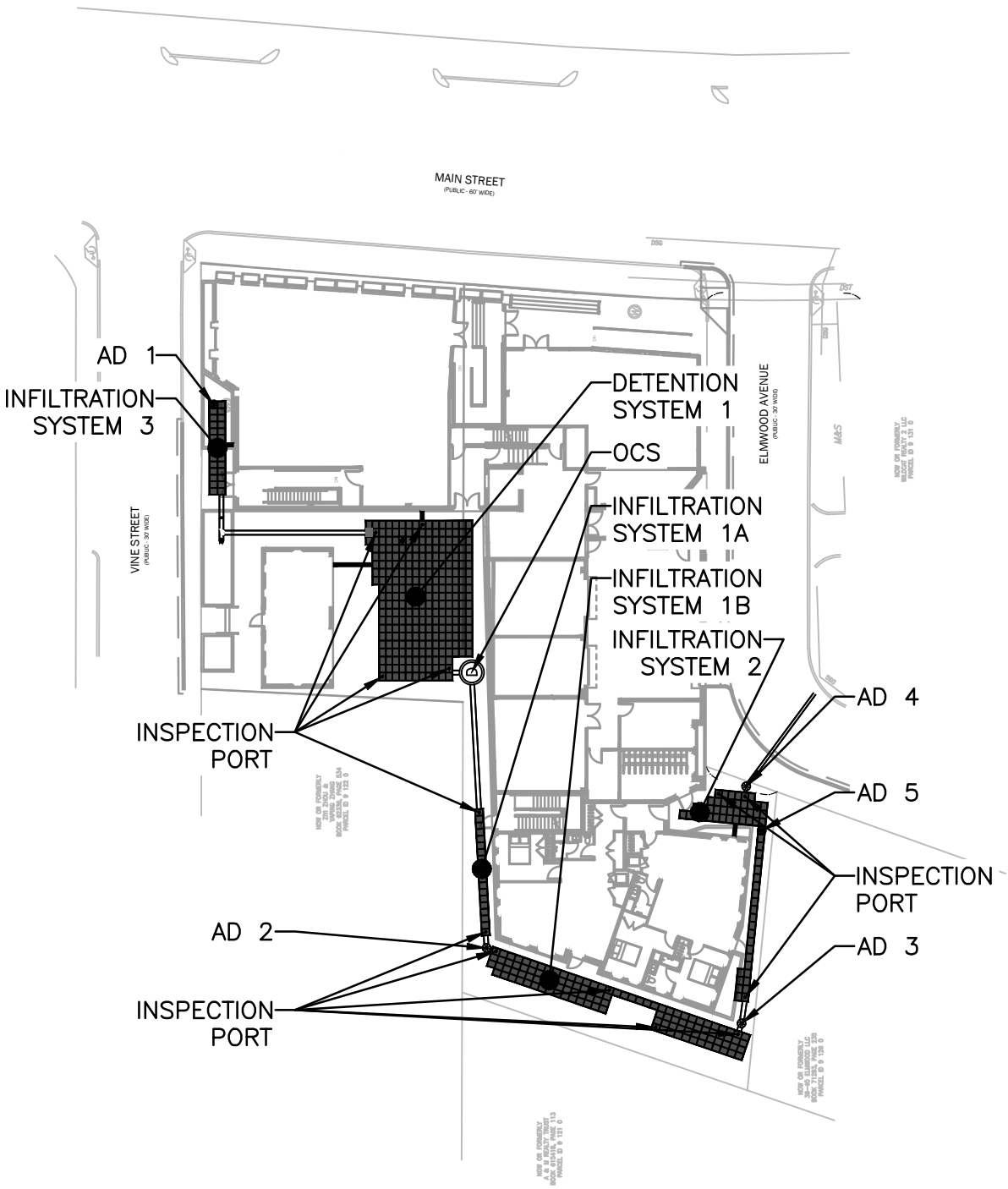
6. Fertilizer Selection

Fertilizer will not be used on the project site.

7. Herbicides and Pesticides Selection

Herbicides and Pesticides of any kind shall not be used on the project site.

Appendix A: Stormwater Management System Site Plan



LEGEND
AD – AREA DRAIN
OCS – OUTLET CONTROL STRUCTURE

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BEALS · ASSOCIATES INC.
2 PARK PLAZA SUITE 200 BOSTON, MA 02116
PHONE: 617-242-1120
•PLANNING •ENGINEERING •PERMITTING •MANAGEMENT

654 Main Street LLC.

Operation and Maintenance Plan

Winchester
Massachusetts

OM-1
August 18, 2020

SCALE: 1"=40'
0 20 40

Appendix B: Stormwater Management System Maintenance Program Summary Checklist

Stormwater Management System Maintenance Program Summary Checklist					
		Frequency			
Item	Commentary	Monthly	Quarterly	Semi-Annually	Annually
Manhole Outlet Control Structures	Inspect and remove sediment and debris annually.				X
Subsurface Infiltration Systems – R-Tank Stormwater Module	A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding six (6) inches, cleanout is required. The system should be initially inspected immediately after the completion of the site's construction. Once in normal service, the system should be inspected bi-annually until an understanding of the site's characteristics is developed. The site's maintenance manager can then revise the inspection schedule based on experience or local requirements.			X	X
Area Drain	Inspect and remove sediment and debris annually.			X	

Appendix C: Stormwater Management System Operation and Maintenance Forms

STORM WATER MANAGEMENT SYSTEM
OPERATIONS AND MAINTENANCE MANUAL
MANHOLE OUTLET CONTROL STRUCTURES

654 MAIN STREET

Name of Inspector: _____Title of Inspector: _____

Inspector's Signature: _____

Inspection Date	Satisfactory			Location	Maintenance Needed and Description	Implementation Date of Maintenance
	Yes	No	N/A			

STORM WATER MANAGEMENT SYSTEM
OPERATIONS AND MAINTENANCE MANUAL
SUBSURFACE INFILTRATION SYSTEMS – R-TANK STORMWATER MODULES

654 MAIN STREET

Name of Inspector: _____Title of Inspector: _____

Inspector's Signature: _____

Inspection Date	Satisfactory			Location	Maintenance Needed and Description	Implementation Date of Maintenance
	Yes	No	N/A			

STORM WATER MANAGEMENT SYSTEM
OPERATIONS AND MAINTENANCE MANUAL
AREA DRAIN

654 MAIN STREET

Name of Inspector: _____Title of Inspector: _____

Inspector's Signature: _____

Inspection Date	Satisfactory			Location	Maintenance Needed and Description	Implementation Date of Maintenance
	Yes	No	N/A			