

Letter of Transmittal

Project Name: The Gutierrez Company - Residences at Ashland Crossing Project Number: 24142
 To: Town of Ashland – Conservation Commission Date: 10/29/2025
 101 Main Street
 Ashland, MA 01721
 Attention: Becca Solomon – Conservation Agent
 Regarding: Notice of Intent

These are transmitted as checked below:

- Submittals Drawings Specifications Samples Change Order
 Other Notice of Intent submission

These are transmitted via:

- US Mail Same Day Courier Priority (by 10:00AM) Standard Overnight (by 5:00PM)
 Second Day Ground Saturday Delivery

Copies	Date	Description
2	10/29/2025	Notice of Intent package (WPA Form 3, Wetland Fee Transmittal Form, Ashland Local Filing Fee Calculation Worksheet, Narrative, Locus Map, Wetland Border Report with wetland delineation forms, Certified Abutter List, Notification to Abutters, supporting calculations, O&M, Geotechnical Subsurface Evaluation)
2	10/29/2025	Site Plan drawings (two full size, two 11x17)
	10/15/2025	Application Fees (two checks to Town of Ashland enclosed, copy of check to State and transmittal form enclosed)

These are transmitted as checked below:

- For Approval For your use As requested For review and comment

Remarks

Applicant has submitted NOI package electronically to the State via eDEP and to the Town of Ashland via an email link.

Copies To: The Gutierrez Company Signed: Will Park, PE

If enclosures are not as noted, kindly notify us at once.

Letter of Transmittal

Project #: 24133
Date: 10/29/2025

Project: The Gutierrez Company – Residences at Ashland Crossing
To: Department of Environmental Protection
Box 4062
Boston, MA 02211

Attention:

Regarding: Notice of Intent (NOI) Filing Fee

These are transmitted as checked below:

Submittals Drawings Specifications Samples Change Order Other: NOI Wetland Fee

These are transmitted VIA:

US Mail Same Day Courier Priority Standard Overnight Second Day Ground
(by 10:00am) (by 5:00pm)

Saturday Delivery

Copies	Date	Description
1		NOI Wetland Fee Transmittal Form
1		NOI Wetland State Fee Payment (Check #004016 for \$512.50)

These are transmitted as checked below:

For approval For your use As requested For review and comment

REMARKS

Please let us know if you have any questions or comments 617-520-9210.

- Will

Copies To:	Israel Lopez - The Gutierrez Company, (MF)	Signed:	Will Park, PE
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If enclosures are not as noted, kindly notify us at once.

The Gutierrez Company
200 Summit Drive, Suite 400
Burlington, MA 01803

Cambridge Savings Bank

Date
10/15/2025

Check No.
004016

Check Amount
512.50

Five Hundred Twelve AND 50/100 Dollars

Pay to the order of:

Commonwealth of Massachusetts



SECURITY FEATURES INCLUDE MICROPRINTING • VOID PANTOGRAPH • ENDORSEMENT BACKER • BROWNSTAIN CHEMICAL REACTANT

The Gutierrez Company
200 Summit Drive, Suite 400
Burlington, MA 01803

Cambridge Savings Bank

Date
10/15/2025

Check No.
004017

Check Amount
537.50

Five Hundred Thirty Seven AND 50/100 Dollars

Pay to the order of:

Town of Ashland



SECURITY FEATURES INCLUDE MICROPRINTING • VOID PANTOGRAPH • ENDORSEMENT BACKER • BROWNSTAIN CHEMICAL REACTANT

The Gutierrez Company
200 Summit Drive, Suite 400
Burlington, MA 01803

Cambridge Savings Bank

Date
10/15/2025

Check No.
004015

Check Amount
3,050.00

Three Thousand Fifty AND 00/100 Dollars

Pay to the order of:

Town of Ashland



SECURITY FEATURES INCLUDE MICROPRINTING • VOID PANTOGRAPH • ENDORSEMENT BACKER • BROWNSTAIN CHEMICAL REACTANT

Notice of Intent

The Residences at Ashland Crossing

The Gutierrez Company

61 Waverly Street
Ashland, MA

October 29, 2025

01 Notice of Intent Forms

- 1.01 WPA Form 3
- 1.02 NOI Wetland Fee Transmittal Form
- 1.03 DEP Checklist for Stormwater Report
- 1.04 Town of Ashland Applicant Checklist

02 Notice of Intent Narrative

- 2.01 Introduction
 - a. Introduction
 - b. Project Summary
- 2.02 Existing Conditions
 - a. Project Site
 - b. Natural Resources
 - c. Floodplain
 - d. Geotechnical Investigation
- 2.03 Stormwater Management Report
 - a. DEP Stormwater Management Standards

03 Notice of Intent Figures

- 3.01 Locus Map
- 3.02 Aerial Map
- 3.03 Flood Insurance Rate Map (FIRM)

04 Appendices

- 4.01 Abutter Information
 - Notification Form
 - List of Abutters
- 4.02 Hydrologic Modeling and Supporting Information
 - Existing Hydrology Report
 - Proposed Hydrology Report
 - Existing Hydrology Map
 - Proposed Hydrology Map
 - Peak Discharge Rate Summary
 - Recharge & Drawdown
 - TMDL Calculations
 - TSS Removal
 - Water Quality Volume
- 4.03 Operation and Maintenance Plan
- 4.04 Wetland Border Report (prepared by Goddard Consulting)
- 4.05 Subsurface Evaluation for Stormwater (prepared by Sanborn Head)
- 4.06 Site Permit Plans

01

Notice of Intent Forms

- 1.01** WPA Form 3
- 1.02** NOI Wetland Fee Transmittal Form
- 1.03** DEP Checklist for Stormwater Report
- 1.04** Town of Ashland Local Filing Fee Calculation Worksheet

1.01 WPA Form 3



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

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):

<u>61 Waverly Street</u>	<u>Ashland</u>	<u>01721</u>
a. Street Address	b. City/Town	c. Zip Code
Latitude and Longitude:		
<u>15</u>	<u>42.264279</u>	<u>-71.445948</u>
f. Assessors Map/Plat Number	d. Latitude	e. Longitude
	<u>012-00-000</u>	
	g. Parcel /Lot Number	

2. Applicant:

<u>Israel</u>	<u>Lopez</u>	
a. First Name	b. Last Name	
<u>The Gutierrez Company</u>		
c. Organization		
<u>200 Summit Drive, Suite 400</u>		
d. Street Address		
<u>Burlington</u>	<u>MA</u>	<u>01803</u>
e. City/Town	f. State	g. Zip Code
<u>617-548-0399</u>	<u>ilopez@gutierrezco.com</u>	
h. Phone Number	i. Fax Number	j. Email Address

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

<u></u>	<u></u>	
a. First Name	b. Last Name	
<u>A and R Waverly LLC (c/o The Gutierrez Company)</u>		
c. Organization		
<u>200 Summit Drive, Suite 400</u>		
d. Street Address		
<u>Burlington</u>	<u>MA</u>	<u>01803</u>
e. City/Town	f. State	g. Zip Code
<u>617-548-0399</u>	<u>ilopez@gutierrezco.com</u>	
h. Phone Number	i. Fax Number	j. Email address

4. Representative (if any):

<u>Will</u>	<u>Park</u>	
a. First Name	b. Last Name	
<u>SMMA</u>		
c. Company		
<u>1000 Massachusetts Avenue</u>		
d. Street Address		
<u>Cambridge</u>	<u>MA</u>	<u>02138</u>
e. City/Town	f. State	g. Zip Code
<u>617-520-9210</u>	<u>wpark@smma.com</u>	
h. Phone Number	i. Fax Number	j. Email address

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

<u>\$1,050.00</u>	<u>\$512.50</u>	<u>\$537.50</u>
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid



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

Provided by MassDEP:
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A. General Information (continued)

6. General Project Description:

Development of one (1) multi-family five-story building containing 226 apartment units with associated earthwork, parking and circulation, utilities and stormwater management.

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 South Registry of Deeds

a. County

44359

c. Book

b. Certificate # (if registered land)

306-441

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.



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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

Provided by MassDEP:

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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. <input type="checkbox"/> Bank	1. linear feet	2. linear feet
b. <input type="checkbox"/> Bordering Vegetated Wetland	1. square feet	2. square feet
c. <input type="checkbox"/> Land Under Waterbodies and Waterways	1. square feet	2. square feet
	3. cubic yards dredged	

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. <input type="checkbox"/> Bordering Land Subject to Flooding	1. square feet	2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. <input type="checkbox"/> Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. <input type="checkbox"/> 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.
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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.



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

City/Town

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.

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input type="checkbox"/> Land Under the Ocean	_____	
	1. square feet	

	2. cubic yards dredged	
c. <input type="checkbox"/> Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. <input type="checkbox"/> Coastal Beaches	_____	_____
	1. square feet	2. cubic yards beach nourishment
e. <input type="checkbox"/> Coastal Dunes	_____	_____
	1. square feet	2. cubic yards dune nourishment

	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
f. <input type="checkbox"/> Coastal Banks	_____	
	1. linear feet	
g. <input type="checkbox"/> Rocky Intertidal Shores	_____	
	1. square feet	
h. <input type="checkbox"/> Salt Marshes	_____	_____
	1. square feet	2. sq ft restoration, rehab., creation
i. <input type="checkbox"/> Land Under Salt Ponds	_____	
	1. square feet	

	2. cubic yards dredged	
j. <input type="checkbox"/> Land Containing Shellfish	_____	
	1. square feet	
k. <input type="checkbox"/> 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. <input type="checkbox"/> 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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Provided by MassDEP:

MassDEP File Number

Document Transaction Number

City/Town

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

- 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**

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*

- Percentage/acreage of property to be altered:
 - (a) within wetland Resource Area _____ percentage/acreage
 - (b) outside Resource Area _____ percentage/acreage

- Assessor's Map or right-of-way plan of site

- 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

* 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.



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:

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City/Town

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 - Bourne to Rhode Island border, and the Cape & Islands:

North Shore - Plymouth to New Hampshire border:

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

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).



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

City/Town

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

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

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.



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

City/Town

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.

Notice of Intent

a. Plan Title

SMMA

Jennifer Howe, PE

b. Prepared By

c. Signed and Stamped by

10/17/2025

1"=40'

d. Final Revision Date

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:

004017

10/15/2025

2. Municipal Check Number

3. Check date

004016

10/15/2025

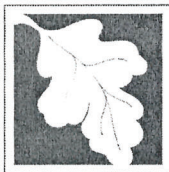
4. State Check Number

5. Check date

The Gutierrez Company

6. Payor name on check: First Name

7. Payor name on check: Last Name



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Provided by MassDEP:

WPA Form 3 – Notice of Intent

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

MassDEP File Number

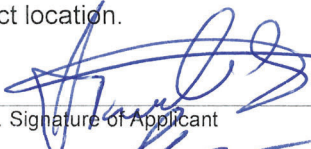

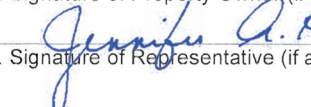
Document Transaction Number

City/Town

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	 MANAGING DIR. OF DEVELOPMENT THE GUTIERREZ COMPANY	2. Date	10/29/2025
3. Signature of Property Owner (if different)	 Manager A&R Waverly LLC	4. Date	10/29/2025
5. Signature of Representative (if any)	 Jennifer A. Howe	6. Date	10/29/2025

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.

1.02 NOI Wetland Fee Transmittal Form



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
NOI Wetland Fee Transmittal Form
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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



A. Applicant Information

1. Location of Project:

61 Waverly Street	Ashland
a. Street Address	b. City/Town
004016	\$512.50
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Israel	Lopez	
a. First Name	b. Last Name	
The Gutierrez Company		
c. Organization		
200 Summit Drive, Suite 400		
d. Mailing Address		
Burlington	MA	01803
e. City/Town	f. State	g. Zip Code
617-548-0399	ilopez@gutierrezco.com	
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name	b. Last Name	
A and R Waverly LLC (c/o The Gutierrez Company)		
c. Organization		
200 Summit Drive, Suite 400		
d. Mailing Address		
Burlington	MA	01803
e. City/Town	f. State	g. Zip Code
617-548-0399	ilopez@gutierrezco.com	
h. Phone Number	i. Fax Number	j. Email Address

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.

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



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
NOI Wetland Fee Transmittal Form
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Cat. 3b ea. bldg. for dev. incl. site	1	\$1,050	\$1,050
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

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

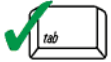
1.03 DEP Checklist for Stormwater Report



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 8²
- 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.



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.

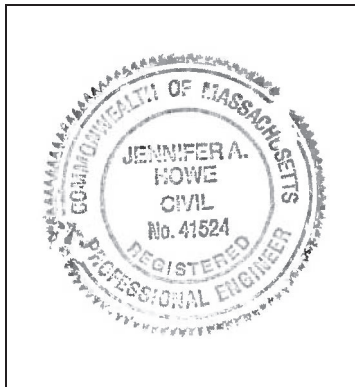
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Jennifer A. Howe
Signature and Date

10/28/2025

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): _____

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 Field¹
- 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.

1.04 Town of Ashland Local Filing Fee Calculation Worksheet

Town of Ashland Conservation Commission

LOCAL FILING FEE CALCULATION WORKSHEET

1. NOTICE OF INTENT (NOI)

C1: Work on Existing Single Family Lot This includes pools, additions, etc.	\$110.00	_____
C2: Construction of Single Family House, Crossings for Driveways, etc.	\$500.00	_____
C3: Commercial Building, Road Construction, etc.	\$1050.00	<u>\$1,050.00</u>
C4: Crossings for Development or Commercial Road, Bridge, etc.	\$1450.00	_____
C5: Work on Docks, Piers, Dikes, or other Engineering Structures in inland resource areas	_____ *\$4=	_____
	Linear Feet	
C6: Resource Area Delineation Review Includes boundary delineations for vegetated wetlands as part of a permit application (ANRAD/ RDA with delineations/ NOI with delineations)	max. 1,000 LF *\$2=	<u>\$2,000.00</u>
	Linear Feet	
*single family lots limited to \$200; \$2000 limit for all others		
All NOIs add 50% of the fee for work in Riverfront Area	_____ *\$0.5=	_____
	Above Fee	

2. STORMWATER MANAGEMENT PERMIT

Basic Residential Application	\$100.00	_____
Application for Residential Subdivision or Multifamily Development	\$500.00	_____
Commercial Application	\$750.00	<u>N/A - Comprehensive Permit</u>
Notice of Completion for Non-Basic Residential	\$150.00	_____
Permit Extension	\$150.00	_____

True Copy Attest \$50.00 _____

Re-Inspection \$50.00 _____

3. OTHER PERMITS AND APPLICATIONS

Request for Determination of Applicability \$125.00 _____
Without boundary delineation

Request for Permit Extension \$100.00 _____
Not for Stormwater Management Permits

Amended Notice of Intent SEE NOI _____
Significant Revisions

Certificate of Compliance Single Family Lots \$100.00 _____
Without boundary delineation All Other Projects \$250.00 _____

Reissuance/ True Copy Attest \$50.00 _____
Not for Stormwater Management Permits

6. FILING FEE CALCULATION

Town Share of State Fees (See NOI Wetland Fee Transmittal Form) **(Check No. 1)** \$ \$537.50

Local Filing Fee Calculated Above (Check No.2) \$ \$3,050.00

State Share of Filing Fee (See NOI Wetland Fee Transmittal Form)

TOTAL Due DEP (Check No. 3) \$ \$512.50

7. ADVERTISING FEE (Paid by phone to newspaper) TBD

The fee will be the exact amount the newspaper charges for that specific advertisement. Once the advertisement is placed with the paper by the Conservation Commission, the applicant will be notified of the cost and will be expected to contact the newspaper for payment within the specified deadline.

02

Notice of Intent Narrative

- 2.01** Introduction
 - a. Introduction
 - b. Project Summary
- 2.02** Existing Conditions
 - a. Project Site
 - b. Natural Resources
 - c. Floodplain
 - d. Geotechnical Investigation
- 2.03** Stormwater Management Report
 - a. DEP Stormwater Management Standards

2.01 Introduction

02 Notice of Intent Narrative

2.01 Introduction

a. Introduction

The Residences at Ashland Crossing (the “Project”) consists of a proposed 226-unit residential development being permitted under the state’s Chapter 40B affordable housing guidelines. The project Applicant, The Gutierrez Company, submitted a Comprehensive Permit application to the Town of Ashland Zoning Board of Appeals (ZBA) in February 2025, and expects to successfully complete the ZBA process by December 2025. The ZBA engaged Hancock Associates to perform a comprehensive civil engineering review of the Project including a review of the stormwater management design for compliance with MA DEP Stormwater Management Standards and good engineering practices. During the ZBA review process, the Applicant made numerous revisions and clarifications to the plans incorporating Hancock’s recommendations. The enclosed materials incorporate comments from Hancock Associates’ satisfactory review of the project.

The proposed stormwater management system will consist of a street sweeping program, series of deep-sump catch basins, water quality units, a lined Low Impact Design (LID) bioretention system, two subsurface infiltration systems, and a surface infiltration basin. The portion of on-site runoff directed to the two subsurface infiltration systems will be treated and either infiltrated to provide groundwater recharge or sent to the on-site wetland located east of the proposed limit of work. The portion of on-site runoff directed to the surface infiltration basin will be treated and either infiltrated to provide groundwater recharge or directed to an existing culvert in Waverly Street that discharges to the Framingham Reservoir Number Two. The portion of on-site runoff that is directed to the bioretention system will be treated and directed to the existing culvert in Waverly Street. Additional groundwater recharge has been provided to offset all runoff from impervious areas that is not directed to an infiltrating system. Peak flowrates of runoff from the proposed project will be maintained or reduced in comparison with the existing conditions.

b. Project Summary

The proposed Project will be located at 61 Waverly Street in Ashland, Massachusetts. The Project’s main access driveway will be located off Waverly Street, with a secondary entrance along East Union Street. The Project consists of a 5-story multi-family residential building containing 226-units with associated outdoor amenities including a courtyard with patio and pool, an enclosed dog park, access drives, parking lots, and a stormwater management system. The Project will include a total of approximately 392 parking spaces (1.73 spaces per unit) provided through a combination of uncovered and covered parking spaces.

The proposed building layout takes advantage of the site’s topography by consolidating the building footprint at the center of the site and allowing the parking areas and driveways around the perimeter to slope gently with the topography. The location at the center of the site also allows for increased buffers between the project and abutting properties. The building’s finished floor at elevation 240 feet above mean sea level is only approximately 4 feet below Union Street, thereby minimizing earth work to the greatest extent practicable.

The Project is located almost entirely outside of the 100-foot Buffer Zone to Bordering Vegetated Wetland (BVW). Only a small portion of the proposed eastern parking lot and associated grading (accounting for 1.81% of the total site) is within the 100-foot Buffer Zone. The proposed Project will not alter land within 25-feet of the edge of the flagged BVW.

2.02 Existing Conditions

2.02 Existing Conditions

a. Project Site

The 15.9-acre site is located at 61 Waverly Street. The area of development within the site is bounded to the north by Waverly Street, to the east by a Bordering Vegetated Wetland (BVW), to the south by East Union Street, and to the west by a single-family residence. The site is undeveloped and consists of forested terrain with ledge outcrops. The site was formerly used as farmland dating back to the 1930's. The northern portion of the Site was formerly improved by an approximately 2,200-square foot, two-story house fronting Waverly Street. The former residence and other remaining structures were demolished in 2020. A Boston Edison Company (now Eversource) electrical transmission line easement (100 feet wide) runs north to south across the eastern portion of the Site.

The site's existing topography slopes predominantly up from north to south and ranges in elevation from 226 feet along Waverly Street to 242 feet along East Union Street. Any stormwater runoff that is not infiltrated within the site generally flows east towards the BVW or north towards Waverly Street.

The site is within the Lake Cochituate-Sudbury River Watershed and the Sudbury Reservoir-Sudbury River Watershed.

b. Natural Resources

The BVW was flagged by a licensed wetland scientist from Goddard Consulting on November 20, 2024. **Refer to Appendix 4.01 for Wetland Border Report.**

The Site contains a Bordering Vegetated Wetland (BVW) that was delineated by Goddard Consulting on November 20, 2024, on behalf of the Applicant, and is jurisdictional under the Massachusetts Wetland Protection act (WPA). This BVW system spans the majority of the eastern portion of the site. There is a high point in the middle of the BVW that divides the discharge to either the north through a 12" PVC pipe or to the south via overland flow and roadside swales. The BVW has a 100-foot Buffer Zone onto the site including portions of the proposed development. An additional BVW system is located south of the site across Union Street on the property of Ashland High School. The 100-foot Buffer Zone from this BVW reaches the southern portion of the site.

According to MassGIS, there are no Priority Habitats of Rare Species, Estimated Habitats of Rare Wildlife, or Areas of Critical Environmental Concern (ACEC) defined by NHESP located on or near the Site. Two potential vernal pools (PVPs) are mapped within the BVW. There is no confirmation on if these areas are actually vernal pools. The Site is not located within an Outstanding Resources Waters Area (ORW).

Refer to Appendix 4.04 for the complete "Wetland Border Report", prepared by Goddard Consulting, dated November 21, 2024, revised October 24, 2025.

c. Floodplain

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Map Number FM25017C0514F, updated June 4, 2014, show a FEMA Zone AE across Waverly Street along Reservoir Number 2. FEMA Zone AE is defined as a Special Flood Hazard Area (SFHA), having a 1-percent annual chance of flooding. Zone AE does not extend into the Site. Refer to Figure 3.03 for the FEMA FIRM map.

d. Geotechnical Investigation

Sanborn Head & Associates (SHA), on behalf of the Applicant, performed subsurface explorations to support the design of the stormwater management systems. Test pits were performed across the Site to confirm United States Department of Agriculture (USDA) Textural Classification and estimated seasonal high groundwater (ESHGW) elevations to determine the suitability of infiltrating Best Management Practices (BMPs).

The USDA Textural Classification for the on-site soils is Loamy Sand and Sandy Loam, Hydrologic Soil Group (HSG) A and B, respectively. The ESGHW elevation was determined based on the redoximorphic features that were observed at some of the test pits across the site. ESHGW elevation was based on adjacent test pits at some locations, due to the absence of redoximorphic features and refusal occurring at large boulders.

Refer to Appendix 4.06 for the complete “Subsurface Evaluation for Stormwater”, prepared by Sanborn Head, dated May 21, 2025.

2.03 Stormwater Management Report

2.03 Stormwater Management Report

Standard 1 – Untreated Stormwater

Standard 1: No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

On-site runoff will be conveyed to Best Management Practices (BMPs) that provide treatment and peak discharge rate attenuation to runoff before it is discharged through properly sized rip-rap flared end sections or conveyed through adequately sized pipes to the existing culvert in Waverly Street.

Due to the sloping grade along Waverly Street in relation to the Project's entrance driveway, runoff from approximately 2,000 square feet of the Project's driveway cannot be captured and treated on-site but will flow off-site into an existing catch basin in Waverly Street. Weighted TSS removal has been provided to supplement this area. TMDL calculations have been provided to show phosphorus and nitrogen pollutant removal exceeds the target reduction. See Appendix 4.02 Hydrologic Modeling and Supporting Information.

The project's proposed stormwater treatment and scour controls are in compliance with Standard 1.

Standard 2 – Post-Development Peak Discharge Rates

Standard 2: Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.

Post-development peak discharge rates for the 2-year, 10-year, and 100-year 24 hour storms are less than or equal to pre-development peak discharge rates for two design points, DP-1 and DP-2.

For DP-3, the post-development peak discharge rate for the 2-year and 10-year 24 hour storms are less than or equal to pre-development peak discharge rates. For the 100-year 24-hour storm, the peak discharge rate increased minimally by 0.10 cfs and will not increase the chance of off-site flooding. The existing and proposed hydrology were modeled using HydroCAD. See Appendix 4.02 Hydrologic Modeling and Supporting Information.

The post-development peak rates are in compliance with Standard 2.

Standard 3 – Recharge to Groundwater

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of 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.

The NRCS soil survey identified on-site soils to be Hydrologic Soil Group (HSG) A and B. In December 2024 and May 2025, test pits were performed in accordance with Volume 3 Chapter 1 of the Massachusetts Stormwater Handbook to confirm USDA Textural Classification of soils to be Loamy Sand and Sandy Loam, HSG A and B, respectively.

The Rawl's Rate used to calculate groundwater recharge and drawdown for each BMP was based on the USDA soil texture in accordance with the Massachusetts Stormwater Handbook.

The required recharge to be provided by the two (2) subsurface infiltration systems as well as the surface infiltration basin was calculated using HSG A soils and the “static method”. The required recharge volume, adjusted for all impervious not directed to an infiltrating BMP, is 11,401 CF. The recharge volume provided by Subsurface Basin (B-1A), Subsurface Basin (B-2A), and Surface Basin (B-1B), measured as the volume below the lowest orifice according to HydroCAD stage-storage data is 18,781 CF, 18,313 CF, and 6,025 CF, respectively.

Calculations have been provided to ensure drawdown will occur within 72 hours of the conclusion of the storm event for each system. See Appendix 4.02 Hydrologic Modeling and Supporting Information

The provided post-development recharge volume is in compliance with Standard 3.

Standard 4 – Removal of Total Suspended Solids

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when: a) Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained; b) Structural stormwater best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Stormwater Handbook; and c) Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

Utilizing structural and non-structural BMPs such as bioretention areas, street sweeping, deep sump catch basins, water quality units (WQUs), and infiltration basins, TSS removal of greater than 80% is achieved for the proposed site.

As the infiltration rates across the Site, determined by the USDA soil texture in accordance with the Massachusetts Stormwater Handbook, are greater than 2.4 inches per hour they are considered to be rapid infiltration rates. Therefore, the runoff volume that is treated for TSS removal is greater than 1” times the proposed impervious area for each structural BMP.

As the site is considered to have rapid infiltration rates, 44% TSS pretreatment is provided for the surface and subsurface infiltration basins by deep sump catch basins and WQUs. See Appendix 4.02 Hydrologic Modeling and Supporting Information.

The TSS removal, water quality volume treated, and pretreatment provided by proposed structural and non-structural BMPs are in compliance with Standard 4.

Standard 5 – Land Uses with Higher Potential Pollutant Loads

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

Langan Engineering & Environmental Services, LLC, on behalf of the Applicant, prepared a Traffic Impact Assessment (TIA), to evaluate the impact to traffic of the proposed Residences at Ashland. The TIA concluded the proposed development will generate approximately 1,032 trips per day and therefore is designated a Land Use of Higher Potential Pollutant Load (LUHPPL).

Greater than 44% TSS pretreatment is provided for the infiltration basins by deep sump catch basins and WQUs. Utilizing structural BMPs determined to be suitable for treating runoff from a LUHPPL, the bioretention system and infiltration basins, in addition to the pretreatment BMPs, TSS removal of greater than 80% is achieved for the proposed site.

All BMPs are designed in accordance with the Massachusetts Stormwater Handbook Volumes 2 and 3 and are sized to treat a water quality volume of 1" times the proposed impervious area. See Appendix 4.02 Hydrologic Modeling and Supporting Information.

Treatment provided by the proposed structural and non-structural BMPs are in compliance with Standard 5 for Land Uses with Higher Potential Pollutant Loads.

Standard 6 – Critical Areas

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices.

The Site stormwater does not discharge within the Zone II or Interim Wellhead Protection Area of a public water supply or to a critical area. Therefore, Standard 6 is not applicable.

Standard 7 – Redevelopment Projects

Standard 7: A redevelopment project is required to meet the Stormwater Management Standards only to the maximum extent practicable.

The proposed project is not a redevelopment. Therefore, Standard 7 is not applicable.

Standard 8 – Erosion and Sedimentation Controls

Standard 8: A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities shall be developed and implemented.

The following erosion and sediment control measures will be implemented and maintained throughout construction:

- Silt fence barriers with compost socks
- Temporary diversions swales and sedimentation basins
- Temporary construction entrances
- Sediment bags at existing and proposed catch basins

A Stormwater Pollution Prevention Plan (SWPPP) will be provided as part of the National Pollutant Discharge Elimination System (NPDES) permit process.

The proposed erosion and sediment control measures are in compliance with Standard 8.

Standard 9 – Operation and Maintenance Plan

Standard 9: A Long -Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A Long-Term Operation and Maintenance Plan has been submitted as part of this application and will be implemented for the proposed project. See Appendix 4.03 Operation and Maintenance Plan.

The Operation and Maintenance Plan for the proposed development is in compliance with Standard 9.

Standard 10 – Illicit Discharges

Standard 10: All illicit discharges to the stormwater management system are prohibited.

The proposed development includes separate sanitary sewer and storm drainage systems as well as deep sump catch basins and water quality treatment units to prevent illicit discharge.

Additionally, an Illicit Discharge Compliance Statement and supporting documents will be submitted as part of the SWPPP provided during the NPDES permit process.

03

Notice of Intent Figures

- 3.01** Locus Map
- 3.02** Aerial Map
- 3.03** Flood Insurance Rate Map (FIRM)

3.01 Locus Map

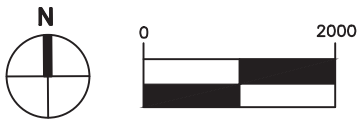
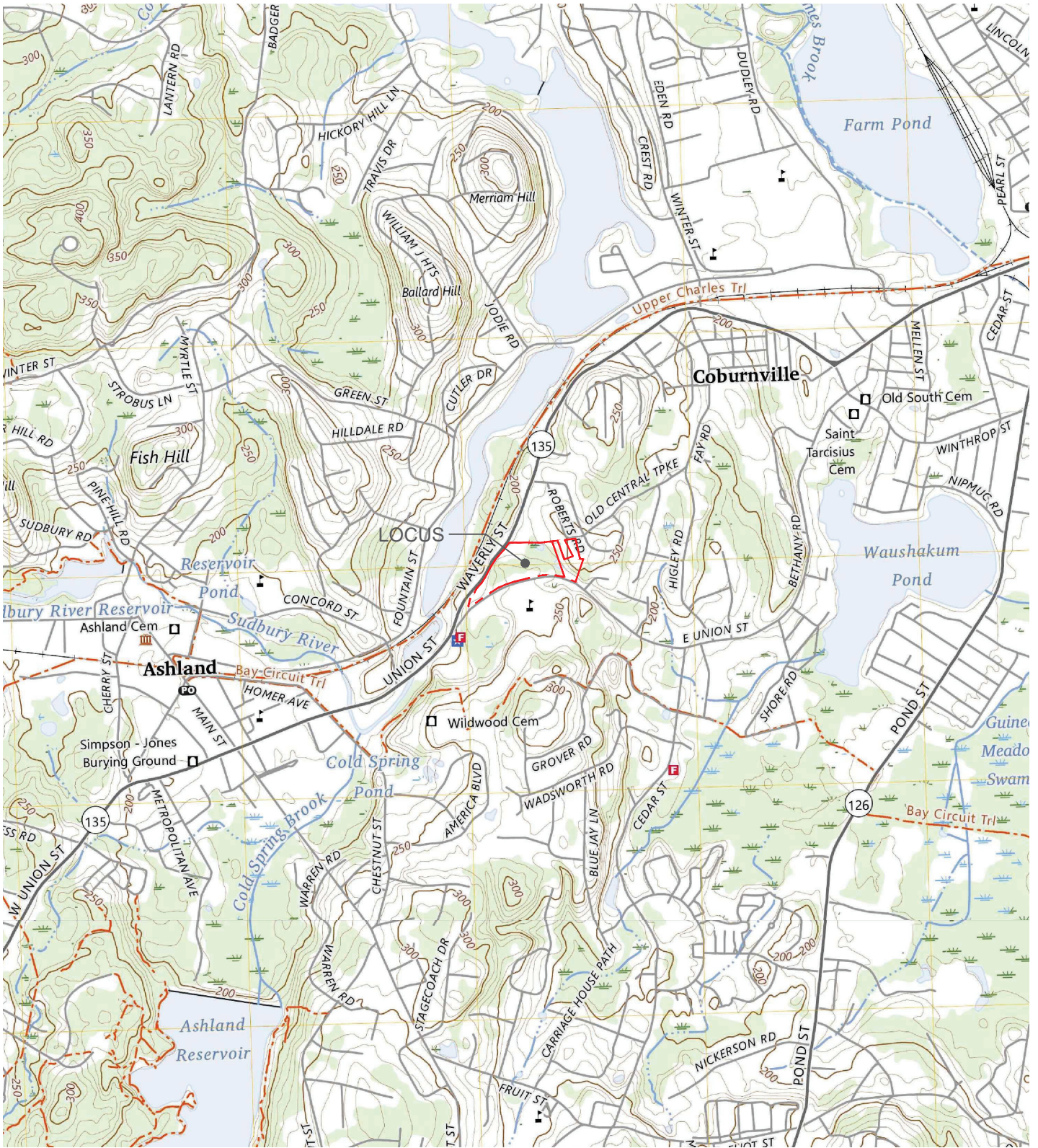


Figure 1

LOCUS MAP

DATE: 10/17/2025
 ISSUE:
 SCALE: 1"=2000'±
 REF:
 DR BY: KIC
 CK BY: WWP

RESIDENCES AT ASHLAND

61 WAVERLY STREET
 ASHLAND, MA

JOB NO.: 24142

smma

SMMA
 1000 Massachusetts Ave.
 Cambridge, MA 02138
 Phone: 617.547.5400
 Fax: 617.507.7885

3.02 Aerial Map

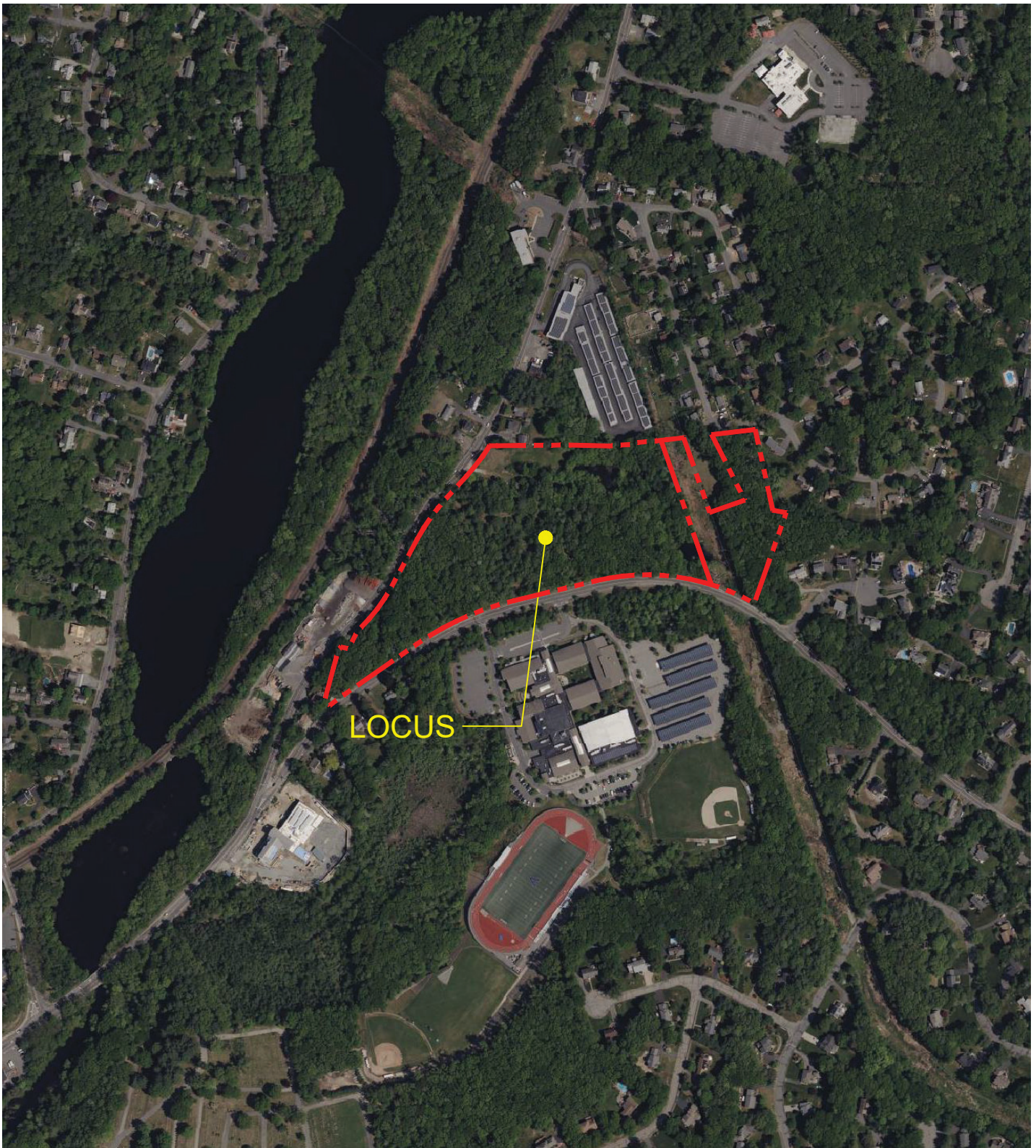


Figure 2

AERIAL MAP

DATE: 10/17/2025
 ISSUE:
 SCALE: 1"=500'±
 REF:
 DR BY: KIC
 CK BY: WWP

RESIDENCES AT ASHLAND

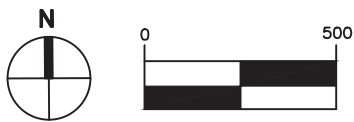
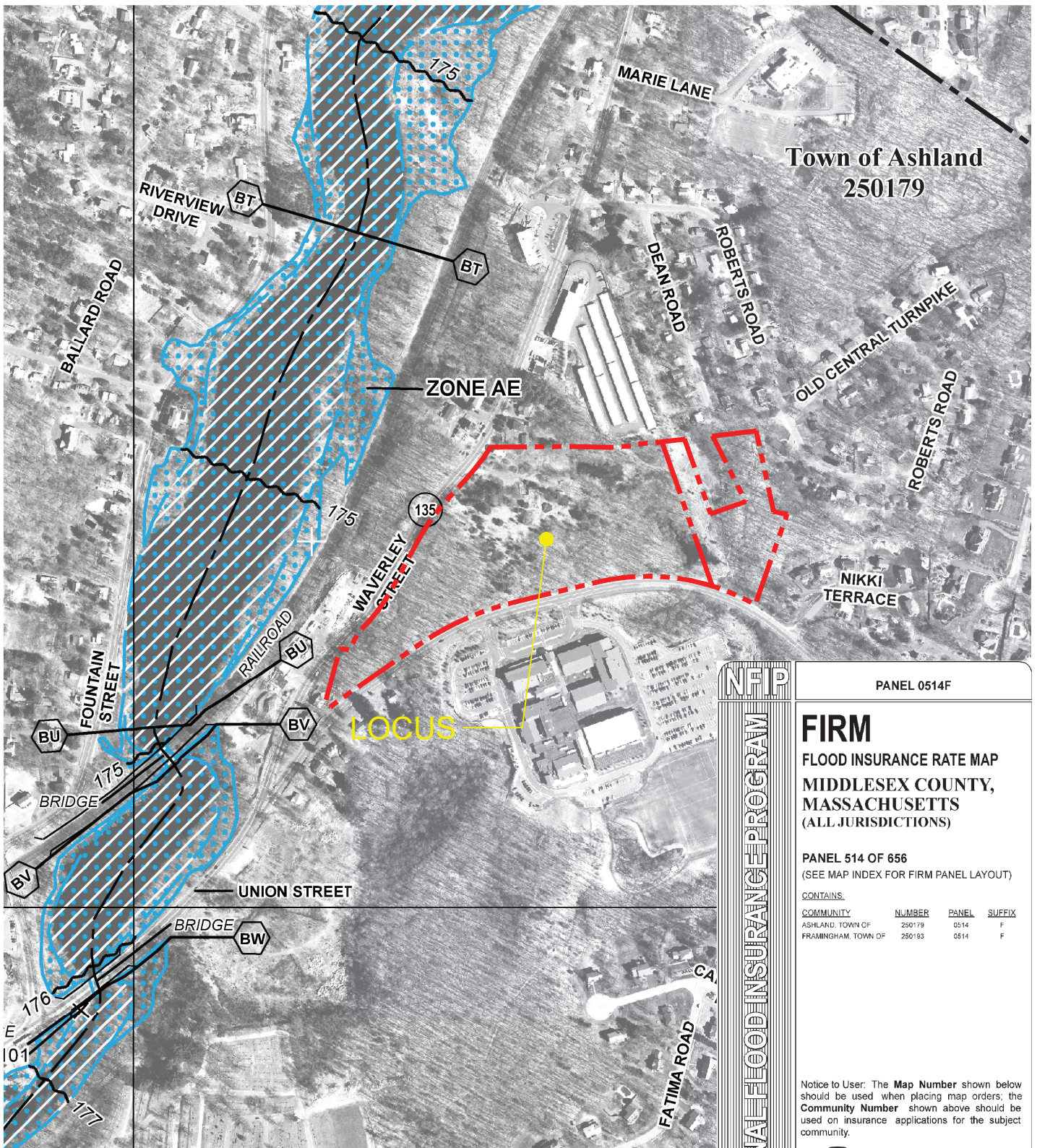
61 WAVERLY STREET
 ASHLAND, MA

JOB NO.: 24142

smma

SMMA
 1000 Massachusetts Ave.
 Cambridge, MA 02138
 Phone: 617.547.5400
 Fax: 617.507.7885

3.03 Flood Insurance Rate Map (FIRM)



TOWN OF ASHLAND
250179

PANEL 0514F

FIRM
FLOOD INSURANCE RATE MAP
MIDDLESEX COUNTY,
MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 514 OF 656
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ASHLAND, TOWN OF	250179	0514	F
FRAMINGHAM, TOWN OF	250193	0514	F

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

MAP NUMBER
25017C0514F
MAP REVISED
JULY 7, 2014

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

Figure 3

FLOOD INSURANCE RATE MAP
(FIRM)

DATE: 10/17/2025
 ISSUE:
 SCALE: 1"=500±
 REF:
 DR BY: KIC
 CK BY: WWP

RESIDENCES AT ASHLAND

61 WAVERLEY STREET
ASHLAND, MA

JOB NO.: 24142



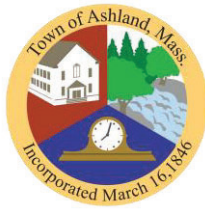
SMMA
1000 Massachusetts Ave.
Cambridge, MA 02138
Phone: 617.547.5400
Fax: 617.507.7885

04

Appendices

- 4.01** Abutter Information
 - Notification Form
 - List of Abutters
- 4.02** Hydrologic Modeling and Supporting Information
 - Existing Hydrology Report
 - Proposed Hydrology Report
 - Existing Hydrology Map
 - Proposed Hydrology Map
 - Peak Discharge Rate Summary
 - Recharge & Drawdown
 - TMDL Calculations
 - TSS Removal
 - Water Quality Volume
- 4.03** Operation and Maintenance Plan
- 4.04** Wetland Border Report (prepared by Goddard Consulting)
- 4.05** Subsurface Evaluation for Stormwater (prepared by Sanborn Head)
- 4.06** Site Permit Plans

4.01 Abutter Information



Town of Ashland, Office of Conservation

NOTIFICATION TO ABUTTERS

A/An Notice of Intent
has been filed with the **Ashland Conservation Commission** pursuant to the *Wetlands Protection Act (M.G.L. c. 131 §40)*, *Wetlands Protection Act Regulations 310 C.M.R. 10.05 (4)(a)* and the *Wetlands Protection Bylaw Chapter 280 Section 9*, and/or the *Stormwater Management Regulations Chapter 343*.

The applicant is The Gutierrez Company

The proposed project is located at 61 Waverly Street
in Ashland, Massachusetts. The proposed project is:
a residential building being permitted under the state's Chapter 40B guidelines consisting of 226 apartment units and related parking and amenity areas.

The filing may be examined by electronic means only. For more information, or to request a pdf filing submittal, please call 508-532-7924, and ask for the Conservation Agent.

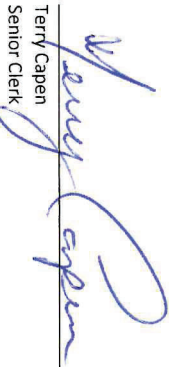
The public hearing is scheduled for **Monday, November 17, 2025, at 7:05 p.m.** (*Note that all hearings are posted for 7:05 unless otherwise specified on the agenda. Hearings are taken in order of the posted agenda*). The hearing will be held using a **REMOTE format**, online via Zoom. The link for the meeting can be found on the posted agenda 48 hours before the hearing is scheduled to meet. Otherwise, further information of the public hearing can be obtained from the Ashland Conservation Commission, by calling 508-532-7924.

10/7/25

To The Conservation Commission
61 Waverly Street
A and R Waverly LLC
Abutters To Map 15 Parcel 12

PARCEL ID	PARCEL ADDRESS	OWNER NAME 1	OWNER NAME 2	MAILING ADDRESS	CITY/TOWN	STATE	ZIP
014/010-0-0069-0000.0	68 WAVERLY ST	SANTOS SEBASTIAN MUCH		68 WAVERLY ST	ASHLAND	MA	01721
014/010-0-0109-0000.0	67 WAVERLY ST	HICKEY JAMES R & STEVEN A	TRUSTEES OF 67 WAVERLY RLTY TR	PO BOX 539	ASHLAND	MA	01721
014/010-0-0111-0000.0	89 WAVERLY ST	EXTRA SPACE PROPERTIES 101 LLC		P O BOX 71870 6890 S 2300 E	SALT LAKE CITY	UT	84171
014/010-0-0121-0000.0	27 DEAN RD	CABRERA MIRIAM		27 DEAN RD	ASHLAND	MA	01721
014/010-0-0122-0000.0	30 DEAN RD	HEWITT MARK A	TRUSTEE HEWITT FAMILY HOUSE TRUST	30 DEAN RD	ASHLAND	MA	01721
014/010-0-0135-0000.0	47 ROBERTS RD	MCCARTHY ALLISON		47 ROBERTS RD	ASHLAND	MA	01721
014/015-0-0003-0000.0	18 WAVERLY ST	ASHLAND LANDSCAPE SUPPLY LLC		18 WAVERLY ST	ASHLAND	MA	01721
014/015-0-0005-0000.0	0 WAVERLY ST	A AND R WAVERLY LLC		PO BOX 539	ASHLAND	MA	01721
014/015-0-0006-0000.0	58 WAVERLY ST	ROSETTI KAYANN		58-62 WAVERLY ST	ASHLAND	MA	01721
014/015-0-0007-0000.0	64 WAVERLY ST	CAMILLE SUSANNE A		64 WAVERLY ST	ASHLAND	MA	01721
014/015-0-0009-0000.0	13 WAVERLY ST	SCHOFIELD NICHOLAS		13 WAVERLY ST	ASHLAND	MA	01721
014/015-0-0010-0000.0	15 WAVERLY ST	BELL KRISTEN		15 WAVERLY ST	ASHLAND	MA	01721
014/015-0-0011-0000.0	0 WAVERLY ST	KADRA JAMES		29 DEAN RD	ASHLAND	MA	01721
014/015-0-0013-0000.0	63 WAVERLY ST	FLAHERTY PAUL G JR	DONNA M FLAHERTY	18 SOUTH ST	UPTON	MA	01568
014/015-0-0014-0000.0	29 DEAN RD	RHODES ANDREW RYAN	ASHLEE ELZABETH RHODES	29 DEAN RD	ASHLAND	MA	01721
014/015-0-0015-0000.0	0 EAST UNION ST	FLAHERTY R & KADRA J & MILLER T	TRSTS KADRA CEMETERY REAL ESTATE	49 CHERRY TREE LN	GROTON	MA	01450
014/015-0-0021-0000.0	51 ROBERTS RD	GIULIANA DEREK	ANDERSON JILL	51 ROBERTS RD	ASHLAND	MA	01721
014/015-0-0022-0000.0	57 ROBERTS RD	BLACKLER WILLIAM H	JEANNETTE C BLACKLER	57 ROBERTS RD	ASHLAND	MA	01721
014/015-0-0023-0000.0	61 ROBERTS RD	ARIAS JOSE E	MANCHE RAQUEL	61 ROBERTS RD	ASHLAND	MA	01721
014/015-0-0023-0000.0	8 NIKKI TERRACE	BENVAMINI SARA		8 NIKKI TERRACE	ASHLAND	MA	01721
014/015-0-0074-0000.0	4 NIKKI TERRACE	LECHAN JEREMY E	MARA R LECHAN	4 NIKKI TERRACE	ASHLAND	MA	01721
014/015-0-0075-0000.0	0 NIKKI TERRACE	NOBILINI DAVID D & PIECEWICZ STANLEY A	TJS OF PARKURST ACRES RLTY TR	36 CHECKERBERRY LN	FRAMMINGHAM	MA	01701
014/015-0-0080-0000.0	11 EAST UNION ST	NORRIS PETER J	COLLEEN M NORRIS	11 EAST UNION ST	ASHLAND	MA	01721
014/015-0-0081-0000.0	17 EAST UNION ST	COWERN DONALD H JR	JULIE B COWERN	17 EAST UNION ST	ASHLAND	MA	01721
014/015-0-0082-0000.0	23 EAST UNION ST	MUNOZ MARIANO	ROBERTA MUNOZ	23 EAST UNION ST	ASHLAND	MA	01721
014/015-0-0083-0000.0	65 EAST UNION ST	TOWN OF ASHLAND	ASHLAND HIGH SCHOOL	101 MAIN ST	ASHLAND	MA	01721

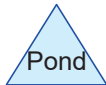
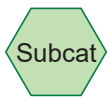
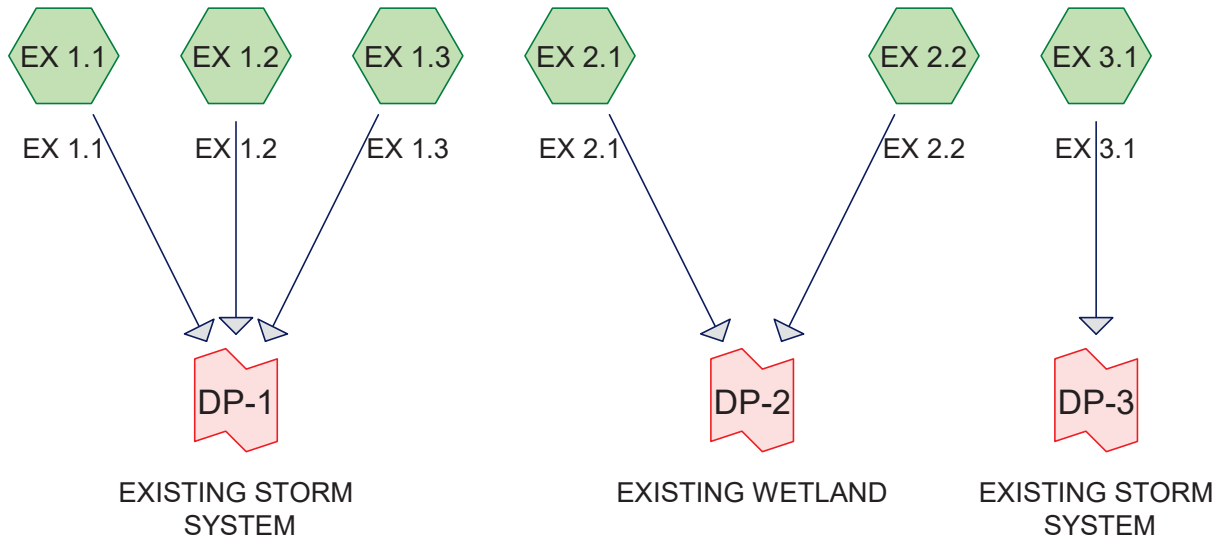
The above reflects the latest information available on our records.


Terry Capen
Senior Clerk


Date 10/7/25

26 parcels/abutters

4.02 Hydrologic Modeling and Supporting Information



Existing Hydro

Prepared by Symmes, Maini & McKee

HydroCAD® 10.20-5c s/n 00853 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-yr Rainfall=3.34"

Printed 6/16/2025

Page 2

Summary for Link DP-1: EXISTING STORM SYSTEM

Inflow Area = 8.937 ac, 0.42% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: EXISTING WETLAND

Inflow Area = 0.897 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: EXISTING STORM SYSTEM

Inflow Area = 0.234 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-yr event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Subcatchment EX 1.1: EX 1.1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=3.34"

Area (sf)	CN	Description
157,998	32	Woods/grass comb., Good, HSG A
157,998		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	368	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.6	418	Total			

Existing Hydro

Prepared by Symmes, Maini & McKee

HydroCAD® 10.20-5c s/n 00853 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-yr Rainfall=3.34"

Printed 6/16/2025

Page 3

Summary for Subcatchment EX 1.2: EX 1.2

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=3.34"

Area (sf)	CN	Description
82,748	32	Woods/grass comb., Good, HSG A
3,818	61	>75% Grass cover, Good, HSG B
1,626	98	Paved parking, HSG A
28,892	39	>75% Grass cover, Good, HSG A
117,084	36	Weighted Average
115,458		98.61% Pervious Area
1,626		1.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0350	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	314	0.1000	1.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	150	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.0	514	Total			

Summary for Subcatchment EX 1.3: EX 1.3

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=3.34"

Area (sf)	CN	Description
106,676	32	Woods/grass comb., Good, HSG A
7,532	39	>75% Grass cover, Good, HSG A
114,208	32	Weighted Average
114,208		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	270	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.7	320	Total			

Existing Hydro

Prepared by Symmes, Maini & McKee

HydroCAD® 10.20-5c s/n 00853 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-yr Rainfall=3.34"

Printed 6/16/2025

Page 4

Summary for Subcatchment EX 2.1: EX 2.1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-2 : EXISTING WETLAND

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-yr Rainfall=3.34"

Area (sf)	CN	Description
26,810	32	Woods/grass comb., Good, HSG A
26,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	107	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.6	157	Total			

Summary for Subcatchment EX 2.2: EX 2.2

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-2 : EXISTING WETLAND

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-yr Rainfall=3.34"

Area (sf)	CN	Description
12,253	32	Woods/grass comb., Good, HSG A
12,253		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.1000	1.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	50	0.2000	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
5.4	94	Total			

Summary for Subcatchment EX 3.1: EX 3.1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-3 : EXISTING STORM SYSTEM

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-yr Rainfall=3.34"

Existing Hydro

Prepared by Symmes, Maini & McKee

HydroCAD® 10.20-5c s/n 00853 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 2-yr Rainfall=3.34"

Printed 6/16/2025

Page 5

Area (sf)	CN	Description
10,198	32	Woods/grass comb., Good, HSG A
10,198		100.00% Pervious Area

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

Existing Hydro

Prepared by Symmes, Maini & McKee

HydroCAD® 10.20-5c s/n 00853 © 2023 HydroCAD Software Solutions LLC

Type III 24-hr 10-yr Rainfall=5.23"

Printed 6/16/2025

Page 6

Summary for Link DP-1: EXISTING STORM SYSTEM

Inflow Area = 8.937 ac, 0.42% Impervious, Inflow Depth = 0.07" for 10-yr event
Inflow = 0.08 cfs @ 15.51 hrs, Volume= 0.055 af
Primary = 0.08 cfs @ 15.51 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: EXISTING WETLAND

Inflow Area = 0.897 ac, 0.00% Impervious, Inflow Depth = 0.04" for 10-yr event
Inflow = 0.00 cfs @ 17.00 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 17.00 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: EXISTING STORM SYSTEM

Inflow Area = 0.234 ac, 0.00% Impervious, Inflow Depth = 0.04" for 10-yr event
Inflow = 0.00 cfs @ 16.87 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 16.87 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Subcatchment EX 1.1: EX 1.1

Runoff = 0.02 cfs @ 17.03 hrs, Volume= 0.013 af, Depth= 0.04"
Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=5.23"

Area (sf)	CN	Description
157,998	32	Woods/grass comb., Good, HSG A
157,998		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	368	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.6	418	Total			

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Type III 24-hr 10-yr Rainfall=5.23"

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Summary for Subcatchment EX 1.2: EX 1.2

Runoff = 0.05 cfs @ 14.70 hrs, Volume= 0.032 af, Depth= 0.14"
 Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=5.23"

Area (sf)	CN	Description
82,748	32	Woods/grass comb., Good, HSG A
3,818	61	>75% Grass cover, Good, HSG B
1,626	98	Paved parking, HSG A
28,892	39	>75% Grass cover, Good, HSG A
117,084	36	Weighted Average
115,458		98.61% Pervious Area
1,626		1.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0350	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	314	0.1000	1.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	150	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.0	514	Total			

Summary for Subcatchment EX 1.3: EX 1.3

Runoff = 0.01 cfs @ 17.03 hrs, Volume= 0.009 af, Depth= 0.04"
 Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=5.23"

Area (sf)	CN	Description
106,676	32	Woods/grass comb., Good, HSG A
7,532	39	>75% Grass cover, Good, HSG A
114,208	32	Weighted Average
114,208		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	270	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.7	320	Total			

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Type III 24-hr 10-yr Rainfall=5.23"

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Summary for Subcatchment EX 2.1: EX 2.1

Runoff = 0.00 cfs @ 17.03 hrs, Volume= 0.002 af, Depth= 0.04"
Routed to Link DP-2 : EXISTING WETLAND

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-yr Rainfall=5.23"

Area (sf)	CN	Description
26,810	32	Woods/grass comb., Good, HSG A
26,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	107	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.6	157	Total			

Summary for Subcatchment EX 2.2: EX 2.2

Runoff = 0.00 cfs @ 16.89 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Link DP-2 : EXISTING WETLAND

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-yr Rainfall=5.23"

Area (sf)	CN	Description
12,253	32	Woods/grass comb., Good, HSG A
12,253		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.1000	1.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	50	0.2000	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
5.4	94	Total			

Summary for Subcatchment EX 3.1: EX 3.1

Runoff = 0.00 cfs @ 16.87 hrs, Volume= 0.001 af, Depth= 0.04"
Routed to Link DP-3 : EXISTING STORM SYSTEM

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-yr Rainfall=5.23"

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Type III 24-hr 10-yr Rainfall=5.23"

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Area (sf)	CN	Description
10,198	32	Woods/grass comb., Good, HSG A
10,198		100.00% Pervious Area

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

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Link DP-1: EXISTING STORM SYSTEM

Inflow Area = 8.937 ac, 0.42% Impervious, Inflow Depth = 0.73" for 100-yr event
Inflow = 2.72 cfs @ 12.42 hrs, Volume= 0.543 af
Primary = 2.72 cfs @ 12.42 hrs, Volume= 0.543 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: EXISTING WETLAND

Inflow Area = 0.897 ac, 0.00% Impervious, Inflow Depth = 0.62" for 100-yr event
Inflow = 0.21 cfs @ 12.42 hrs, Volume= 0.047 af
Primary = 0.21 cfs @ 12.42 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: EXISTING STORM SYSTEM

Inflow Area = 0.234 ac, 0.00% Impervious, Inflow Depth = 0.62" for 100-yr event
Inflow = 0.06 cfs @ 12.32 hrs, Volume= 0.012 af
Primary = 0.06 cfs @ 12.32 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Subcatchment EX 1.1: EX 1.1

Runoff = 0.84 cfs @ 12.46 hrs, Volume= 0.189 af, Depth= 0.62"
Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=8.22"

Area (sf)	CN	Description
157,998	32	Woods/grass comb., Good, HSG A
157,998		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	368	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.6	418	Total			

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Subcatchment EX 1.2: EX 1.2

Runoff = 1.31 cfs @ 12.34 hrs, Volume= 0.217 af, Depth= 0.97"
Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=8.22"

Area (sf)	CN	Description
82,748	32	Woods/grass comb., Good, HSG A
3,818	61	>75% Grass cover, Good, HSG B
1,626	98	Paved parking, HSG A
28,892	39	>75% Grass cover, Good, HSG A
117,084	36	Weighted Average
115,458		98.61% Pervious Area
1,626		1.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	50	0.0350	0.08		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
3.3	314	0.1000	1.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	150	0.0400	3.22		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.0	514	Total			

Summary for Subcatchment EX 1.3: EX 1.3

Runoff = 0.62 cfs @ 12.44 hrs, Volume= 0.137 af, Depth= 0.62"
Routed to Link DP-1 : EXISTING STORM SYSTEM

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-yr Rainfall=8.22"

Area (sf)	CN	Description
106,676	32	Woods/grass comb., Good, HSG A
7,532	39	>75% Grass cover, Good, HSG A
114,208	32	Weighted Average
114,208		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
3.4	270	0.0700	1.32		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
12.7	320	Total			

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Subcatchment EX 2.1: EX 2.1

Runoff = 0.14 cfs @ 12.46 hrs, Volume= 0.032 af, Depth= 0.62"
Routed to Link DP-2 : EXISTING WETLAND

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-yr Rainfall=8.22"

Area (sf)	CN	Description
26,810	32	Woods/grass comb., Good, HSG A
26,810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.3	107	0.0750	1.37		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
13.6	157	Total			

Summary for Subcatchment EX 2.2: EX 2.2

Runoff = 0.07 cfs @ 12.33 hrs, Volume= 0.015 af, Depth= 0.62"
Routed to Link DP-2 : EXISTING WETLAND

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-yr Rainfall=8.22"

Area (sf)	CN	Description
12,253	32	Woods/grass comb., Good, HSG A
12,253		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	44	0.1000	1.58		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
4.9	50	0.2000	0.17		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
5.4	94	Total			

Summary for Subcatchment EX 3.1: EX 3.1

Runoff = 0.06 cfs @ 12.32 hrs, Volume= 0.012 af, Depth= 0.62"
Routed to Link DP-3 : EXISTING STORM SYSTEM

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-yr Rainfall=8.22"

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Type III 24-hr 100-yr Rainfall=8.22"

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Area (sf)	CN	Description
10,198	32	Woods/grass comb., Good, HSG A
10,198		100.00% Pervious Area

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

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Multi-Event Tables

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Events for Link DP-1: EXISTING STORM SYSTEM

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-yr	0.00	0.00	0.00
10-yr	0.08	0.08	0.00
100-yr	2.72	2.72	0.00

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Events for Link DP-2: EXISTING WETLAND

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-yr	0.00	0.00	0.00
10-yr	0.00	0.00	0.00
100-yr	0.21	0.21	0.00

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Events for Link DP-3: EXISTING STORM SYSTEM

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-yr	0.00	0.00	0.00
10-yr	0.00	0.00	0.00
100-yr	0.06	0.06	0.00

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Events for Subcatchment EX 1.1: EX 1.1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.02	0.013	0.04
100-yr	8.22	0.84	0.189	0.62

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Events for Subcatchment EX 1.2: EX 1.2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.05	0.032	0.14
100-yr	8.22	1.31	0.217	0.97

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Events for Subcatchment EX 1.3: EX 1.3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.01	0.009	0.04
100-yr	8.22	0.62	0.137	0.62

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Events for Subcatchment EX 2.1: EX 2.1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.00	0.002	0.04
100-yr	8.22	0.14	0.032	0.62

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Events for Subcatchment EX 2.2: EX 2.2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.00	0.001	0.04
100-yr	8.22	0.07	0.015	0.62

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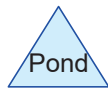
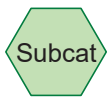
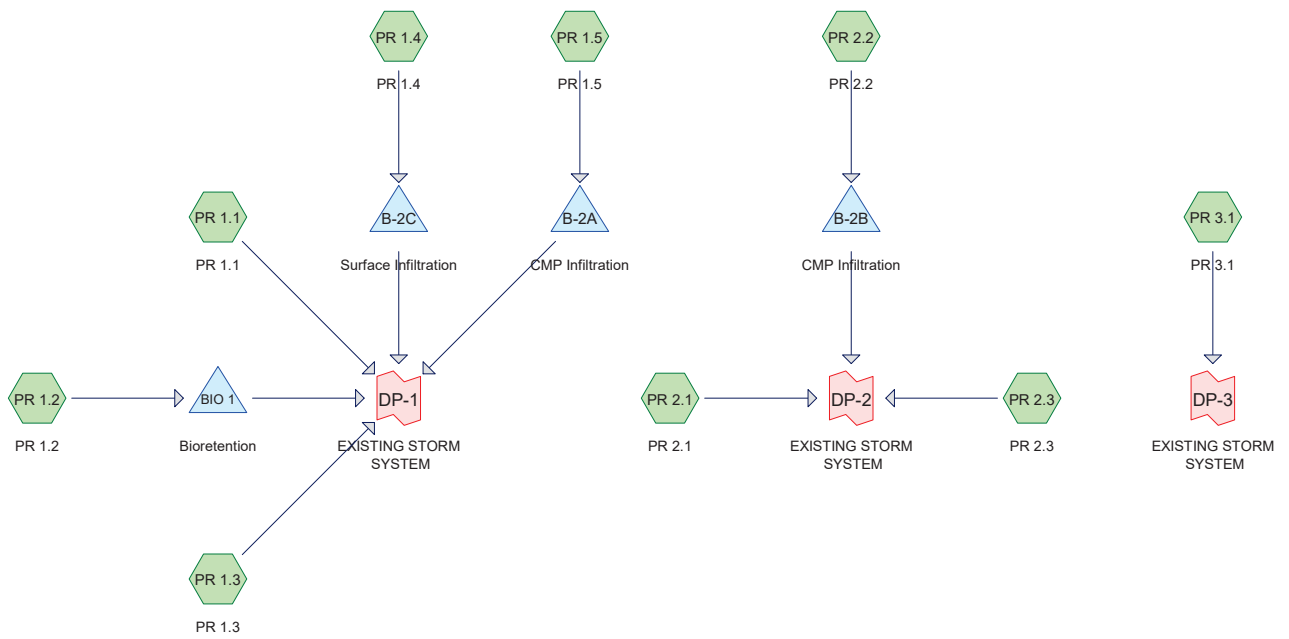
Multi-Event Tables

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Events for Subcatchment EX 3.1: EX 3.1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.00	0.001	0.04
100-yr	8.22	0.06	0.012	0.62



Routing Diagram for Proposed Hydro
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Type III 24-hr 2-yr Rainfall=3.34"

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Summary for Pond B-2A: CMP Infiltration

Inflow Area = 3.076 ac, 76.76% Impervious, Inflow Depth = 1.80" for 2-yr event
 Inflow = 6.59 cfs @ 12.08 hrs, Volume= 0.461 af
 Outflow = 0.61 cfs @ 11.77 hrs, Volume= 0.462 af, Atten= 91%, Lag= 0.0 min
 Discarded = 0.61 cfs @ 11.77 hrs, Volume= 0.462 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 227.78' @ 13.06 hrs Surf.Area= 10,920 sf Storage= 7,534 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 104.3 min (931.5 - 827.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	226.50'	12,571 cf	84.00'W x 130.00'L x 5.00'H Field A 54,600 cf Overall - 23,172 cf Embedded = 31,428 cf x 40.0% Voids
#2A	227.00'	23,172 cf	CMP Round 48 x 84 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L 84 Chambers in 14 Rows 82.00' Header x 12.57 sf x 2 = 2,060.9 cf Inside
		35,743 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	226.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	229.05'	12.0" Round Culvert L= 168.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 229.05' / 228.21' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	229.10'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	229.15'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Device 2	231.18'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.61 cfs @ 11.77 hrs HW=226.55' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.61 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=226.50' TW=0.00' (Dynamic Tailwater)
 ↑ **2=Culvert** (Controls 0.00 cfs)
 ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
 ↑ **4=Orifice/Grate** (Controls 0.00 cfs)
 ↑ **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type III 24-hr 2-yr Rainfall=3.34"

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Summary for Pond B-2B: CMP Infiltration

Inflow Area = 2.111 ac, 71.48% Impervious, Inflow Depth = 1.58" for 2-yr event
Inflow = 4.04 cfs @ 12.08 hrs, Volume= 0.278 af
Outflow = 0.44 cfs @ 11.82 hrs, Volume= 0.278 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.44 cfs @ 11.82 hrs, Volume= 0.278 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 230.07' @ 12.93 hrs Surf.Area= 7,800 sf Storage= 4,189 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 78.0 min (914.5 - 836.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	229.00'	8,985 cf	60.00'W x 130.00'L x 5.00'H Field A 39,000 cf Overall - 16,537 cf Embedded = 22,463 cf x 40.0% Voids
#2A	229.50'	16,537 cf	CMP Round 48 x 60 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L 60 Chambers in 10 Rows 58.00' Header x 12.57 sf x 2 = 1,457.7 cf Inside
			25,522 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	232.00'	12.0" Round Culvert L= 53.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.74' S= 0.0049 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	232.46'	2.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	233.95'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.44 cfs @ 11.82 hrs HW=229.05' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=229.00' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

↑ **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond B-2C: Surface Infiltration

Proposed Hydro

Prepared by Symmes, Maini & McKee

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Type III 24-hr 2-yr Rainfall=3.34"

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Inflow Area = 1.680 ac, 64.43% Impervious, Inflow Depth = 1.31" for 2-yr event
 Inflow = 2.62 cfs @ 12.08 hrs, Volume= 0.184 af
 Outflow = 0.18 cfs @ 14.07 hrs, Volume= 0.184 af, Atten= 93%, Lag= 119.7 min
 Discarded = 0.18 cfs @ 14.07 hrs, Volume= 0.184 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 230.81' @ 14.07 hrs Surf.Area= 3,279 sf Storage= 3,545 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 214.7 min (1,063.7 - 849.0)

Volume	Invert	Avail.Storage	Storage Description
#1	229.50'	22,472 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.50	2,181	0	0
230.00	2,559	1,185	1,185
232.00	4,339	6,898	8,083
234.00	6,594	10,933	19,016
234.50	7,229	3,456	22,472

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	223.93'	12.0" Round Culvert L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 223.93' / 221.53' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	231.50'	1.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	232.26'	4.0" Horiz. Orifice/Grate X 2.00 C= 0.600
#5	Device 2	233.50'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#6	Primary	233.50'	10.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.18 cfs @ 14.07 hrs HW=230.81' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=229.50' TW=0.00' (Dynamic Tailwater)
 ↑2=Culvert (Passes 0.00 cfs of 7.25 cfs potential flow)
 ↑3=Orifice/Grate (Controls 0.00 cfs)
 ↑4=Orifice/Grate (Controls 0.00 cfs)
 ↑5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
 ↑6=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Type III 24-hr 2-yr Rainfall=3.34"

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Summary for Pond BIO 1: Bioretention

Inflow Area = 0.283 ac, 32.30% Impervious, Inflow Depth = 0.54" for 2-yr event
 Inflow = 0.13 cfs @ 12.10 hrs, Volume= 0.013 af
 Outflow = 0.02 cfs @ 13.85 hrs, Volume= 0.013 af, Atten= 87%, Lag= 105.1 min
 Primary = 0.02 cfs @ 13.85 hrs, Volume= 0.013 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 216.18' @ 13.85 hrs Surf.Area= 966 sf Storage= 178 cf
 Flood Elev= 393.00' Surf.Area= 1,932 sf Storage= 1,879 cf

Plug-Flow detention time= 135.5 min calculated for 0.013 af (100% of inflow)
 Center-of-Mass det. time= 133.5 min (1,037.1 - 903.6)

Volume	Invert	Avail.Storage	Storage Description
#1	215.67'	783 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 2,251 cf Overall - 15 cf Embedded = 2,236 cf x 35.0% Voids
#2	218.00'	1,082 cf	Custom Stage Data (Prismatic) Listed below
#3	215.67'	15 cf	6.0" Round Pipe Storage Inside #1 L= 76.0' S= 0.0050 '/'
		1,879 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.67	966	0	0
218.00	966	2,251	2,251

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
218.00	184	0	0
219.00	507	346	346
220.00	966	737	1,082

Device	Routing	Invert	Outlet Devices
#1	Primary	215.67'	12.0" Round Culvert L= 28.8' Ke= 0.500 Inlet / Outlet Invert= 215.67' / 215.53' S= 0.0049 '/ Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.79 sf
#2	Device 1	215.67'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	219.35'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Device 1	219.90'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.02 cfs @ 13.85 hrs HW=216.18' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 0.02 cfs of 0.70 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.02 cfs @ 3.29 fps)
- 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
- 4=Orifice/Grate (Controls 0.00 cfs)

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Type III 24-hr 2-yr Rainfall=3.34"

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Summary for Link DP-1: EXISTING STORM SYSTEM

Inflow Area = 7.198 ac, 49.95% Impervious, Inflow Depth > 0.02" for 2-yr event
 Inflow = 0.02 cfs @ 13.85 hrs, Volume= 0.013 af
 Primary = 0.02 cfs @ 13.85 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: EXISTING STORM SYSTEM

Inflow Area = 2.735 ac, 55.17% Impervious, Inflow Depth = 0.00" for 2-yr event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-3: EXISTING STORM SYSTEM

Inflow Area = 0.135 ac, 4.56% Impervious, Inflow Depth = 0.01" for 2-yr event
 Inflow = 0.00 cfs @ 22.65 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 22.65 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment PR 1.1: PR 1.1

Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.34"

Area (sf)	CN	Description
33,045	32	Woods/grass comb., Good, HSG A
40,971	39	>75% Grass cover, Good, HSG A
2,626	98	Paved parking, HSG A
1,624	61	>75% Grass cover, Good, HSG B
78,266	38	Weighted Average
75,640		96.64% Pervious Area
2,626		3.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	83	0.0250	0.79		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	133	Total			

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Type III 24-hr 2-yr Rainfall=3.34"

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Summary for Subcatchment PR 1.2: PR 1.2

Runoff = 0.13 cfs @ 12.10 hrs, Volume= 0.013 af, Depth= 0.54"
Routed to Pond BIO 1 : Bioretention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.34"

Area (sf)	CN	Description
6,231	39	>75% Grass cover, Good, HSG A
3,989	98	Paved parking, HSG A
2,128	61	>75% Grass cover, Good, HSG B
12,348	62	Weighted Average
8,359		67.70% Pervious Area
3,989		32.30% Impervious Area

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

Summary for Subcatchment PR 1.3: PR 1.3

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-1 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.34"

Area (sf)	CN	Description
4,469	32	Woods/grass comb., Good, HSG A
11,311	39	>75% Grass cover, Good, HSG A
15,780	37	Weighted Average
15,780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	29	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PR 1.4: PR 1.4

Runoff = 2.62 cfs @ 12.08 hrs, Volume= 0.184 af, Depth= 1.31"
Routed to Pond B-2C : Surface Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.34"

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Type III 24-hr 2-yr Rainfall=3.34"

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Area (sf)	CN	Description
26,022	39	>75% Grass cover, Good, HSG A
36,641	98	Paved parking, HSG A
10,500	98	Roofs, HSG A
73,163	77	Weighted Average
26,022		35.57% Pervious Area
47,141		64.43% Impervious Area

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

Summary for Subcatchment PR 1.5: PR 1.5

Runoff = 6.59 cfs @ 12.08 hrs, Volume= 0.461 af, Depth= 1.80"
 Routed to Pond B-2A : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.34"

Area (sf)	CN	Description
31,133	39	>75% Grass cover, Good, HSG A
* 78,841	98	Paved parking, HSG A
24,000	98	Roofs, HSG A
133,974	84	Weighted Average
31,133		23.24% Pervious Area
102,841		76.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.3	45	0.0300	2.60		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.2	46	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.6	141	Total			

Summary for Subcatchment PR 2.1: PR 2.1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Link DP-2 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.34"

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Type III 24-hr 2-yr Rainfall=3.34"

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Area (sf)	CN	Description
13,487	32	Woods/grass comb., Good, HSG A
3,605	39	>75% Grass cover, Good, HSG A
17,092	33	Weighted Average
17,092		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	62	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
9.2	112	Total			

Summary for Subcatchment PR 2.2: PR 2.2

Runoff = 4.04 cfs @ 12.08 hrs, Volume= 0.278 af, Depth= 1.58"
 Routed to Pond B-2B : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.34"

Area (sf)	CN	Description
21,062	98	Roofs, HSG A
44,664	98	Paved parking, HSG A
26,225	39	>75% Grass cover, Good, HSG A
91,951	81	Weighted Average
26,225		28.52% Pervious Area
65,726		71.48% Impervious Area

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

Summary for Subcatchment PR 2.3: PR 2.3

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Routed to Link DP-2 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.34"

Area (sf)	CN	Description
10,100	32	Woods/grass comb., Good, HSG A
10,100		100.00% Pervious Area

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Type III 24-hr 2-yr Rainfall=3.34"

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

Summary for Subcatchment PR 3.1: PR 3.1

Runoff = 0.00 cfs @ 22.65 hrs, Volume= 0.000 af, Depth= 0.01"
 Routed to Link DP-3 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-yr Rainfall=3.34"

Area (sf)	CN	Description
1,338	32	Woods/grass comb., Good, HSG A
268	98	Paved parking, HSG A
4,265	39	>75% Grass cover, Good, HSG A
5,871	40	Weighted Average
5,603		95.44% Pervious Area
268		4.56% Impervious Area

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

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Type III 24-hr 10-yr Rainfall=5.23"

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Summary for Pond B-2A: CMP Infiltration

Inflow Area = 3.076 ac, 76.76% Impervious, Inflow Depth = 3.48" for 10-yr event
 Inflow = 12.63 cfs @ 12.08 hrs, Volume= 0.892 af
 Outflow = 0.61 cfs @ 14.70 hrs, Volume= 0.892 af, Atten= 95%, Lag= 156.9 min
 Discarded = 0.61 cfs @ 11.39 hrs, Volume= 0.892 af
 Primary = 0.00 cfs @ 14.70 hrs, Volume= 0.000 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 229.13' @ 14.70 hrs Surf.Area= 10,920 sf Storage= 19,012 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 293.7 min (1,102.1 - 808.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	226.50'	12,571 cf	84.00'W x 130.00'L x 5.00'H Field A 54,600 cf Overall - 23,172 cf Embedded = 31,428 cf x 40.0% Voids
#2A	227.00'	23,172 cf	CMP Round 48 x 84 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L 84 Chambers in 14 Rows 82.00' Header x 12.57 sf x 2 = 2,060.9 cf Inside
		35,743 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	226.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	229.05'	12.0" Round Culvert L= 168.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 229.05' / 228.21' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	229.10'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	229.15'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Device 2	231.18'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.61 cfs @ 11.39 hrs HW=226.55' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.61 cfs)

Primary OutFlow Max=0.00 cfs @ 14.70 hrs HW=229.13' TW=0.00' (Dynamic Tailwater)
 ↑2=Culvert (Passes 0.00 cfs of 0.02 cfs potential flow)
 ↑3=Orifice/Grate (Orifice Controls 0.00 cfs @ 0.59 fps)
 ↑4=Orifice/Grate (Controls 0.00 cfs)
 ↑5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

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Type III 24-hr 10-yr Rainfall=5.23"

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Summary for Pond B-2B: CMP Infiltration

Inflow Area = 2.111 ac, 71.48% Impervious, Inflow Depth = 3.19" for 10-yr event
Inflow = 8.17 cfs @ 12.07 hrs, Volume= 0.561 af
Outflow = 0.44 cfs @ 11.55 hrs, Volume= 0.561 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.44 cfs @ 11.55 hrs, Volume= 0.561 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 231.29' @ 14.37 hrs Surf.Area= 7,800 sf Storage= 11,460 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 250.0 min (1,066.3 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	229.00'	8,985 cf	60.00'W x 130.00'L x 5.00'H Field A 39,000 cf Overall - 16,537 cf Embedded = 22,463 cf x 40.0% Voids
#2A	229.50'	16,537 cf	CMP Round 48 x 60 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L 60 Chambers in 10 Rows 58.00' Header x 12.57 sf x 2 = 1,457.7 cf Inside
		25,522 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	232.00'	12.0" Round Culvert L= 53.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.74' S= 0.0049 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	232.46'	2.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	233.95'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.44 cfs @ 11.55 hrs HW=229.05' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=229.00' TW=0.00' (Dynamic Tailwater)

↑**2=Culvert** (Controls 0.00 cfs)

↑**3=Orifice/Grate** (Controls 0.00 cfs)

↑**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond B-2C: Surface Infiltration

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Type III 24-hr 10-yr Rainfall=5.23"

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Inflow Area = 1.680 ac, 64.43% Impervious, Inflow Depth = 2.82" for 10-yr event
 Inflow = 5.75 cfs @ 12.08 hrs, Volume= 0.394 af
 Outflow = 0.28 cfs @ 14.93 hrs, Volume= 0.394 af, Atten= 95%, Lag= 171.1 min
 Discarded = 0.26 cfs @ 14.93 hrs, Volume= 0.380 af
 Primary = 0.02 cfs @ 14.93 hrs, Volume= 0.014 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 232.26' @ 14.93 hrs Surf.Area= 4,627 sf Storage= 9,228 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 394.3 min (1,221.1 - 826.7)

Volume	Invert	Avail.Storage	Storage Description
#1	229.50'	22,472 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.50	2,181	0	0
230.00	2,559	1,185	1,185
232.00	4,339	6,898	8,083
234.00	6,594	10,933	19,016
234.50	7,229	3,456	22,472

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	223.93'	12.0" Round Culvert L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 223.93' / 221.53' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	231.50'	1.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	232.26'	4.0" Horiz. Orifice/Grate X 2.00 C= 0.600
#5	Device 2	233.50'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#6	Primary	233.50'	10.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.26 cfs @ 14.93 hrs HW=232.26' (Free Discharge)
 ↖ 1=Exfiltration (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.02 cfs @ 14.93 hrs HW=232.26' TW=0.00' (Dynamic Tailwater)
 ↖ 2=Culvert (Passes 0.02 cfs of 8.56 cfs potential flow)
 ↖ 3=Orifice/Grate (Orifice Controls 0.02 cfs @ 4.19 fps)
 ↖ 4=Orifice/Grate (Controls 0.00 cfs)
 ↖ 5=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
 ↖ 6=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Proposed Hydro

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Type III 24-hr 10-yr Rainfall=5.23"

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Summary for Pond BIO 1: Bioretention

Inflow Area = 0.283 ac, 32.30% Impervious, Inflow Depth = 1.58" for 10-yr event
 Inflow = 0.51 cfs @ 12.08 hrs, Volume= 0.037 af
 Outflow = 0.04 cfs @ 14.33 hrs, Volume= 0.037 af, Atten= 92%, Lag= 134.6 min
 Primary = 0.04 cfs @ 14.33 hrs, Volume= 0.037 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 217.85' @ 14.33 hrs Surf.Area= 966 sf Storage= 747 cf
 Flood Elev= 393.00' Surf.Area= 1,932 sf Storage= 1,879 cf

Plug-Flow detention time= 258.0 min calculated for 0.037 af (100% of inflow)
 Center-of-Mass det. time= 257.0 min (1,122.3 - 865.4)

Volume	Invert	Avail.Storage	Storage Description
#1	215.67'	783 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 2,251 cf Overall - 15 cf Embedded = 2,236 cf x 35.0% Voids
#2	218.00'	1,082 cf	Custom Stage Data (Prismatic) Listed below
#3	215.67'	15 cf	6.0" Round Pipe Storage Inside #1 L= 76.0' S= 0.0050 '/'
		1,879 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.67	966	0	0
218.00	966	2,251	2,251

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
218.00	184	0	0
219.00	507	346	346
220.00	966	737	1,082

Device	Routing	Invert	Outlet Devices
#1	Primary	215.67'	12.0" Round Culvert L= 28.8' Ke= 0.500 Inlet / Outlet Invert= 215.67' / 215.53' S= 0.0049 '/ Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.79 sf
#2	Device 1	215.67'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	219.35'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Device 1	219.90'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.04 cfs @ 14.33 hrs HW=217.85' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 0.04 cfs of 4.67 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.04 cfs @ 7.04 fps)
- 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
- 4=Orifice/Grate (Controls 0.00 cfs)

Proposed Hydro

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Type III 24-hr 10-yr Rainfall=5.23"

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Summary for Link DP-1: EXISTING STORM SYSTEM

Inflow Area = 7.198 ac, 49.95% Impervious, Inflow Depth > 0.15" for 10-yr event
 Inflow = 0.12 cfs @ 13.70 hrs, Volume= 0.089 af
 Primary = 0.12 cfs @ 13.70 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: EXISTING STORM SYSTEM

Inflow Area = 2.735 ac, 55.17% Impervious, Inflow Depth = 0.01" for 10-yr event
 Inflow = 0.00 cfs @ 15.65 hrs, Volume= 0.003 af
 Primary = 0.00 cfs @ 15.65 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-3: EXISTING STORM SYSTEM

Inflow Area = 0.135 ac, 4.56% Impervious, Inflow Depth = 0.29" for 10-yr event
 Inflow = 0.01 cfs @ 12.39 hrs, Volume= 0.003 af
 Primary = 0.01 cfs @ 12.39 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment PR 1.1: PR 1.1

Runoff = 0.06 cfs @ 12.61 hrs, Volume= 0.032 af, Depth= 0.21"
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.23"

Area (sf)	CN	Description
33,045	32	Woods/grass comb., Good, HSG A
40,971	39	>75% Grass cover, Good, HSG A
2,626	98	Paved parking, HSG A
1,624	61	>75% Grass cover, Good, HSG B
78,266	38	Weighted Average
75,640		96.64% Pervious Area
2,626		3.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	83	0.0250	0.79		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	133	Total			

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Type III 24-hr 10-yr Rainfall=5.23"

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Summary for Subcatchment PR 1.2: PR 1.2

Runoff = 0.51 cfs @ 12.08 hrs, Volume= 0.037 af, Depth= 1.58"
Routed to Pond BIO 1 : Bioretention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.23"

Area (sf)	CN	Description
6,231	39	>75% Grass cover, Good, HSG A
3,989	98	Paved parking, HSG A
2,128	61	>75% Grass cover, Good, HSG B
12,348	62	Weighted Average
8,359		67.70% Pervious Area
3,989		32.30% Impervious Area

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

Summary for Subcatchment PR 1.3: PR 1.3

Runoff = 0.01 cfs @ 13.70 hrs, Volume= 0.005 af, Depth= 0.18"
Routed to Link DP-1 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.23"

Area (sf)	CN	Description
4,469	32	Woods/grass comb., Good, HSG A
11,311	39	>75% Grass cover, Good, HSG A
15,780	37	Weighted Average
15,780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	29	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PR 1.4: PR 1.4

Runoff = 5.75 cfs @ 12.08 hrs, Volume= 0.394 af, Depth= 2.82"
Routed to Pond B-2C : Surface Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.23"

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Type III 24-hr 10-yr Rainfall=5.23"

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Area (sf)	CN	Description
26,022	39	>75% Grass cover, Good, HSG A
36,641	98	Paved parking, HSG A
10,500	98	Roofs, HSG A
73,163	77	Weighted Average
26,022		35.57% Pervious Area
47,141		64.43% Impervious Area

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

Summary for Subcatchment PR 1.5: PR 1.5

Runoff = 12.63 cfs @ 12.08 hrs, Volume= 0.892 af, Depth= 3.48"
 Routed to Pond B-2A : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.23"

Area (sf)	CN	Description
31,133	39	>75% Grass cover, Good, HSG A
* 78,841	98	Paved parking, HSG A
24,000	98	Roofs, HSG A
133,974	84	Weighted Average
31,133		23.24% Pervious Area
102,841		76.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.3	45	0.0300	2.60		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.2	46	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.6	141	Total			

Summary for Subcatchment PR 2.1: PR 2.1

Runoff = 0.00 cfs @ 15.53 hrs, Volume= 0.002 af, Depth= 0.06"
 Routed to Link DP-2 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.23"

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Type III 24-hr 10-yr Rainfall=5.23"

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Area (sf)	CN	Description
13,487	32	Woods/grass comb., Good, HSG A
3,605	39	>75% Grass cover, Good, HSG A
17,092	33	Weighted Average
17,092		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	62	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
9.2	112	Total			

Summary for Subcatchment PR 2.2: PR 2.2

Runoff = 8.17 cfs @ 12.07 hrs, Volume= 0.561 af, Depth= 3.19"
 Routed to Pond B-2B : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.23"

Area (sf)	CN	Description
21,062	98	Roofs, HSG A
44,664	98	Paved parking, HSG A
26,225	39	>75% Grass cover, Good, HSG A
91,951	81	Weighted Average
26,225		28.52% Pervious Area
65,726		71.48% Impervious Area

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

Summary for Subcatchment PR 2.3: PR 2.3

Runoff = 0.00 cfs @ 16.87 hrs, Volume= 0.001 af, Depth= 0.04"
 Routed to Link DP-2 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.23"

Area (sf)	CN	Description
10,100	32	Woods/grass comb., Good, HSG A
10,100		100.00% Pervious Area

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Type III 24-hr 10-yr Rainfall=5.23"

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

Summary for Subcatchment PR 3.1: PR 3.1

Runoff = 0.01 cfs @ 12.39 hrs, Volume= 0.003 af, Depth= 0.29"
Routed to Link DP-3 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.23"

Area (sf)	CN	Description
1,338	32	Woods/grass comb., Good, HSG A
268	98	Paved parking, HSG A
4,265	39	>75% Grass cover, Good, HSG A
5,871	40	Weighted Average
5,603		95.44% Pervious Area
268		4.56% Impervious Area

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

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Pond B-2A: CMP Infiltration

Inflow Area = 3.076 ac, 76.76% Impervious, Inflow Depth = 6.31" for 100-yr event
 Inflow = 22.31 cfs @ 12.08 hrs, Volume= 1.616 af
 Outflow = 1.80 cfs @ 13.07 hrs, Volume= 1.617 af, Atten= 92%, Lag= 59.2 min
 Discarded = 0.61 cfs @ 10.18 hrs, Volume= 1.389 af
 Primary = 1.19 cfs @ 13.07 hrs, Volume= 0.228 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 231.49' @ 13.07 hrs Surf.Area= 10,920 sf Storage= 35,715 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 452.6 min (1,244.4 - 791.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	226.50'	12,571 cf	84.00'W x 130.00'L x 5.00'H Field A 54,600 cf Overall - 23,172 cf Embedded = 31,428 cf x 40.0% Voids
#2A	227.00'	23,172 cf	CMP Round 48 x 84 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L 84 Chambers in 14 Rows 82.00' Header x 12.57 sf x 2 = 2,060.9 cf Inside
		35,743 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	226.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	229.05'	12.0" Round Culvert L= 168.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 229.05' / 228.21' S= 0.0050 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	229.10'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	229.15'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Device 2	231.18'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.61 cfs @ 10.18 hrs HW=226.55' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.61 cfs)

Primary OutFlow Max=1.19 cfs @ 13.07 hrs HW=231.49' TW=0.00' (Dynamic Tailwater)
 ↑ **2=Culvert** (Passes 1.19 cfs of 3.66 cfs potential flow)
 ↑ **3=Orifice/Grate** (Orifice Controls 0.04 cfs @ 7.38 fps)
 ↑ **4=Orifice/Grate** (Orifice Controls 0.04 cfs @ 7.31 fps)
 ↑ **5=Sharp-Crested Rectangular Weir** (Weir Controls 1.11 cfs @ 1.83 fps)

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Pond B-2B: CMP Infiltration

Inflow Area = 2.111 ac, 71.48% Impervious, Inflow Depth = 5.95" for 100-yr event
Inflow = 14.95 cfs @ 12.07 hrs, Volume= 1.047 af
Outflow = 0.60 cfs @ 15.15 hrs, Volume= 1.047 af, Atten= 96%, Lag= 184.4 min
Discarded = 0.44 cfs @ 10.52 hrs, Volume= 0.968 af
Primary = 0.16 cfs @ 15.15 hrs, Volume= 0.079 af
Routed to Link DP-2 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 233.98' @ 15.15 hrs Surf.Area= 7,800 sf Storage= 25,465 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 488.5 min (1,287.1 - 798.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	229.00'	8,985 cf	60.00'W x 130.00'L x 5.00'H Field A 39,000 cf Overall - 16,537 cf Embedded = 22,463 cf x 40.0% Voids
#2A	229.50'	16,537 cf	CMP Round 48 x 60 Inside #1 Effective Size= 48.0"W x 48.0"H => 12.57 sf x 20.00'L = 251.3 cf Overall Size= 48.0"W x 48.0"H x 20.00'L 60 Chambers in 10 Rows 58.00' Header x 12.57 sf x 2 = 1,457.7 cf Inside
			25,522 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	232.00'	12.0" Round Culvert L= 53.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 232.00' / 231.74' S= 0.0049 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf
#3	Device 2	232.46'	2.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	233.95'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)

Discarded OutFlow Max=0.44 cfs @ 10.52 hrs HW=229.05' (Free Discharge)

↑ **1=Exfiltration** (Exfiltration Controls 0.44 cfs)

Primary OutFlow Max=0.16 cfs @ 15.15 hrs HW=233.98' TW=0.00' (Dynamic Tailwater)

↑ **2=Culvert** (Passes 0.16 cfs of 3.95 cfs potential flow)

↑ **3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 5.77 fps)

↑ **4=Sharp-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.58 fps)

Summary for Pond B-2C: Surface Infiltration

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Type III 24-hr 100-yr Rainfall=8.22"

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Inflow Area = 1.680 ac, 64.43% Impervious, Inflow Depth = 5.48" for 100-yr event
 Inflow = 11.08 cfs @ 12.07 hrs, Volume= 0.767 af
 Outflow = 1.31 cfs @ 12.70 hrs, Volume= 0.767 af, Atten= 88%, Lag= 37.6 min
 Discarded = 0.34 cfs @ 12.70 hrs, Volume= 0.471 af
 Primary = 0.97 cfs @ 12.70 hrs, Volume= 0.296 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 233.49' @ 12.70 hrs Surf.Area= 6,022 sf Storage= 15,815 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 284.8 min (1,092.5 - 807.7)

Volume	Invert	Avail.Storage	Storage Description
#1	229.50'	22,472 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
229.50	2,181	0	0
230.00	2,559	1,185	1,185
232.00	4,339	6,898	8,083
234.00	6,594	10,933	19,016
234.50	7,229	3,456	22,472

Device	Routing	Invert	Outlet Devices
#1	Discarded	229.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	223.93'	12.0" Round Culvert L= 120.0' Ke= 0.500 Inlet / Outlet Invert= 223.93' / 221.53' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	231.50'	1.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	232.26'	4.0" Horiz. Orifice/Grate X 2.00 C= 0.600
#5	Device 2	233.50'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#6	Primary	233.50'	10.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=0.34 cfs @ 12.70 hrs HW=233.49' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 0.34 cfs)

Primary OutFlow Max=0.97 cfs @ 12.70 hrs HW=233.49' TW=0.00' (Dynamic Tailwater)
 ↳ **2=Culvert** (Passes 0.97 cfs of 9.09 cfs potential flow)
 ↳ **3=Orifice/Grate** (Orifice Controls 0.04 cfs @ 6.80 fps)
 ↳ **4=Orifice/Grate** (Orifice Controls 0.93 cfs @ 5.35 fps)
 ↳ **5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
 ↳ **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Pond BIO 1: Bioretention

Inflow Area = 0.283 ac, 32.30% Impervious, Inflow Depth = 3.73" for 100-yr event
 Inflow = 1.28 cfs @ 12.08 hrs, Volume= 0.088 af
 Outflow = 0.42 cfs @ 12.40 hrs, Volume= 0.088 af, Atten= 67%, Lag= 19.3 min
 Primary = 0.42 cfs @ 12.40 hrs, Volume= 0.088 af
 Routed to Link DP-1 : EXISTING STORM SYSTEM

Routing by Dyn-Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Peak Elev= 219.50' @ 12.40 hrs Surf.Area= 1,702 sf Storage= 1,511 cf
 Flood Elev= 393.00' Surf.Area= 1,932 sf Storage= 1,879 cf

Plug-Flow detention time= 282.3 min calculated for 0.088 af (100% of inflow)
 Center-of-Mass det. time= 281.0 min (1,120.4 - 839.5)

Volume	Invert	Avail.Storage	Storage Description
#1	215.67'	783 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 2,251 cf Overall - 15 cf Embedded = 2,236 cf x 35.0% Voids
#2	218.00'	1,082 cf	Custom Stage Data (Prismatic) Listed below
#3	215.67'	15 cf	6.0" Round Pipe Storage Inside #1 L= 76.0' S= 0.0050 '/'
		1,879 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
215.67	966	0	0
218.00	966	2,251	2,251

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
218.00	184	0	0
219.00	507	346	346
220.00	966	737	1,082

Device	Routing	Invert	Outlet Devices
#1	Primary	215.67'	12.0" Round Culvert L= 28.8' Ke= 0.500 Inlet / Outlet Invert= 215.67' / 215.53' S= 0.0049 '/ Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.79 sf
#2	Device 1	215.67'	1.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 1	219.35'	2.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Device 1	219.90'	24.0" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.42 cfs @ 12.40 hrs HW=219.50' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 0.42 cfs of 6.90 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.05 cfs @ 9.37 fps)
- 3=Sharp-Crested Rectangular Weir (Weir Controls 0.37 cfs @ 1.26 fps)
- 4=Orifice/Grate (Controls 0.00 cfs)

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Link DP-1: EXISTING STORM SYSTEM

Inflow Area = 7.198 ac, 49.95% Impervious, Inflow Depth > 1.36" for 100-yr event
Inflow = 2.71 cfs @ 13.00 hrs, Volume= 0.816 af
Primary = 2.71 cfs @ 13.00 hrs, Volume= 0.816 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-2: EXISTING STORM SYSTEM

Inflow Area = 2.735 ac, 55.17% Impervious, Inflow Depth = 0.50" for 100-yr event
Inflow = 0.21 cfs @ 12.44 hrs, Volume= 0.114 af
Primary = 0.21 cfs @ 12.44 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

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

Summary for Link DP-3: EXISTING STORM SYSTEM

Inflow Area = 0.135 ac, 4.56% Impervious, Inflow Depth = 1.35" for 100-yr event
Inflow = 0.16 cfs @ 12.10 hrs, Volume= 0.015 af
Primary = 0.16 cfs @ 12.10 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment PR 1.1: PR 1.1

Runoff = 1.20 cfs @ 12.27 hrs, Volume= 0.173 af, Depth= 1.16"
Routed to Link DP-1 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.22"

Area (sf)	CN	Description
33,045	32	Woods/grass comb., Good, HSG A
40,971	39	>75% Grass cover, Good, HSG A
2,626	98	Paved parking, HSG A
1,624	61	>75% Grass cover, Good, HSG B
78,266	38	Weighted Average
75,640		96.64% Pervious Area
2,626		3.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
1.7	83	0.0250	0.79		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
14.0	133	Total			

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Type III 24-hr 100-yr Rainfall=8.22"

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Summary for Subcatchment PR 1.2: PR 1.2

Runoff = 1.28 cfs @ 12.08 hrs, Volume= 0.088 af, Depth= 3.73"
Routed to Pond BIO 1 : Bioretention

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.22"

Area (sf)	CN	Description
6,231	39	>75% Grass cover, Good, HSG A
3,989	98	Paved parking, HSG A
2,128	61	>75% Grass cover, Good, HSG B
12,348	62	Weighted Average
8,359		67.70% Pervious Area
3,989		32.30% Impervious Area

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

Summary for Subcatchment PR 1.3: PR 1.3

Runoff = 0.24 cfs @ 12.16 hrs, Volume= 0.032 af, Depth= 1.06"
Routed to Link DP-1 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.22"

Area (sf)	CN	Description
4,469	32	Woods/grass comb., Good, HSG A
11,311	39	>75% Grass cover, Good, HSG A
15,780	37	Weighted Average
15,780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	29	0.0200	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"

Summary for Subcatchment PR 1.4: PR 1.4

Runoff = 11.08 cfs @ 12.07 hrs, Volume= 0.767 af, Depth= 5.48"
Routed to Pond B-2C : Surface Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.22"

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Type III 24-hr 100-yr Rainfall=8.22"

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Area (sf)	CN	Description
26,022	39	>75% Grass cover, Good, HSG A
36,641	98	Paved parking, HSG A
10,500	98	Roofs, HSG A
73,163	77	Weighted Average
26,022		35.57% Pervious Area
47,141		64.43% Impervious Area

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

Summary for Subcatchment PR 1.5: PR 1.5

Runoff = 22.31 cfs @ 12.08 hrs, Volume= 1.616 af, Depth= 6.31"
 Routed to Pond B-2A : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-yr Rainfall=8.22"

Area (sf)	CN	Description
31,133	39	>75% Grass cover, Good, HSG A
* 78,841	98	Paved parking, HSG A
24,000	98	Roofs, HSG A
133,974	84	Weighted Average
31,133		23.24% Pervious Area
102,841		76.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0250	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.3	45	0.0300	2.60		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
0.2	46	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.6	141	Total			

Summary for Subcatchment PR 2.1: PR 2.1

Runoff = 0.12 cfs @ 12.36 hrs, Volume= 0.023 af, Depth= 0.71"
 Routed to Link DP-2 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-yr Rainfall=8.22"

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Type III 24-hr 100-yr Rainfall=8.22"

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Area (sf)	CN	Description
13,487	32	Woods/grass comb., Good, HSG A
3,605	39	>75% Grass cover, Good, HSG A
17,092	33	Weighted Average
17,092		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0500	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.20"
0.7	62	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
9.2	112	Total			

Summary for Subcatchment PR 2.2: PR 2.2

Runoff = 14.95 cfs @ 12.07 hrs, Volume= 1.047 af, Depth= 5.95"
 Routed to Pond B-2B : CMP Infiltration

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-yr Rainfall=8.22"

Area (sf)	CN	Description
21,062	98	Roofs, HSG A
44,664	98	Paved parking, HSG A
26,225	39	>75% Grass cover, Good, HSG A
91,951	81	Weighted Average
26,225		28.52% Pervious Area
65,726		71.48% Impervious Area

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

Summary for Subcatchment PR 2.3: PR 2.3

Runoff = 0.06 cfs @ 12.32 hrs, Volume= 0.012 af, Depth= 0.62"
 Routed to Link DP-2 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-yr Rainfall=8.22"

Area (sf)	CN	Description
10,100	32	Woods/grass comb., Good, HSG A
10,100		100.00% Pervious Area

Proposed Hydro

Type III 24-hr 100-yr Rainfall=8.22"

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

Summary for Subcatchment PR 3.1: PR 3.1

Runoff = 0.16 cfs @ 12.10 hrs, Volume= 0.015 af, Depth= 1.35"
Routed to Link DP-3 : EXISTING STORM SYSTEM

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.22"

Area (sf)	CN	Description
1,338	32	Woods/grass comb., Good, HSG A
268	98	Paved parking, HSG A
4,265	39	>75% Grass cover, Good, HSG A
5,871	40	Weighted Average
5,603		95.44% Pervious Area
268		4.56% Impervious Area

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

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Events for Pond B-2A: CMP Infiltration

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-yr	6.59	0.61	0.61	0.00	227.78	7,534
10-yr	12.63	0.61	0.61	0.00	229.13	19,012
100-yr	22.31	1.80	0.61	1.19	231.49	35,715

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Events for Pond B-2B: CMP Infiltration

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-yr	4.04	0.44	0.44	0.00	230.07	4,189
10-yr	8.17	0.44	0.44	0.00	231.29	11,460
100-yr	14.95	0.60	0.44	0.16	233.98	25,465

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Events for Pond B-2C: Surface Infiltration

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-yr	2.62	0.18	0.18	0.00	230.81	3,545
10-yr	5.75	0.28	0.26	0.02	232.26	9,228
100-yr	11.08	1.31	0.34	0.97	233.49	15,815

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Events for Pond BIO 1: Bioretention

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2-yr	0.13	0.02	216.18	178
10-yr	0.51	0.04	217.85	747
100-yr	1.28	0.42	219.50	1,511

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Events for Link DP-1: EXISTING STORM SYSTEM

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-yr	0.02	0.02	0.00
10-yr	0.12	0.12	0.00
100-yr	2.71	2.71	0.00

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Events for Link DP-2: EXISTING STORM SYSTEM

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-yr	0.00	0.00	0.00
10-yr	0.00	0.00	0.00
100-yr	0.21	0.21	0.00

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Events for Link DP-3: EXISTING STORM SYSTEM

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2-yr	0.00	0.00	0.00
10-yr	0.01	0.01	0.00
100-yr	0.16	0.16	0.00

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Events for Subcatchment PR 1.1: PR 1.1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.06	0.032	0.21
100-yr	8.22	1.20	0.173	1.16

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Events for Subcatchment PR 1.2: PR 1.2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.13	0.013	0.54
10-yr	5.23	0.51	0.037	1.58
100-yr	8.22	1.28	0.088	3.73

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Events for Subcatchment PR 1.3: PR 1.3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.01	0.005	0.18
100-yr	8.22	0.24	0.032	1.06

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Events for Subcatchment PR 1.4: PR 1.4

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	2.62	0.184	1.31
10-yr	5.23	5.75	0.394	2.82
100-yr	8.22	11.08	0.767	5.48

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Events for Subcatchment PR 1.5: PR 1.5

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	6.59	0.461	1.80
10-yr	5.23	12.63	0.892	3.48
100-yr	8.22	22.31	1.616	6.31

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Events for Subcatchment PR 2.1: PR 2.1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.00	0.002	0.06
100-yr	8.22	0.12	0.023	0.71

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Events for Subcatchment PR 2.2: PR 2.2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	4.04	0.278	1.58
10-yr	5.23	8.17	0.561	3.19
100-yr	8.22	14.95	1.047	5.95

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Events for Subcatchment PR 2.3: PR 2.3

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.00
10-yr	5.23	0.00	0.001	0.04
100-yr	8.22	0.06	0.012	0.62

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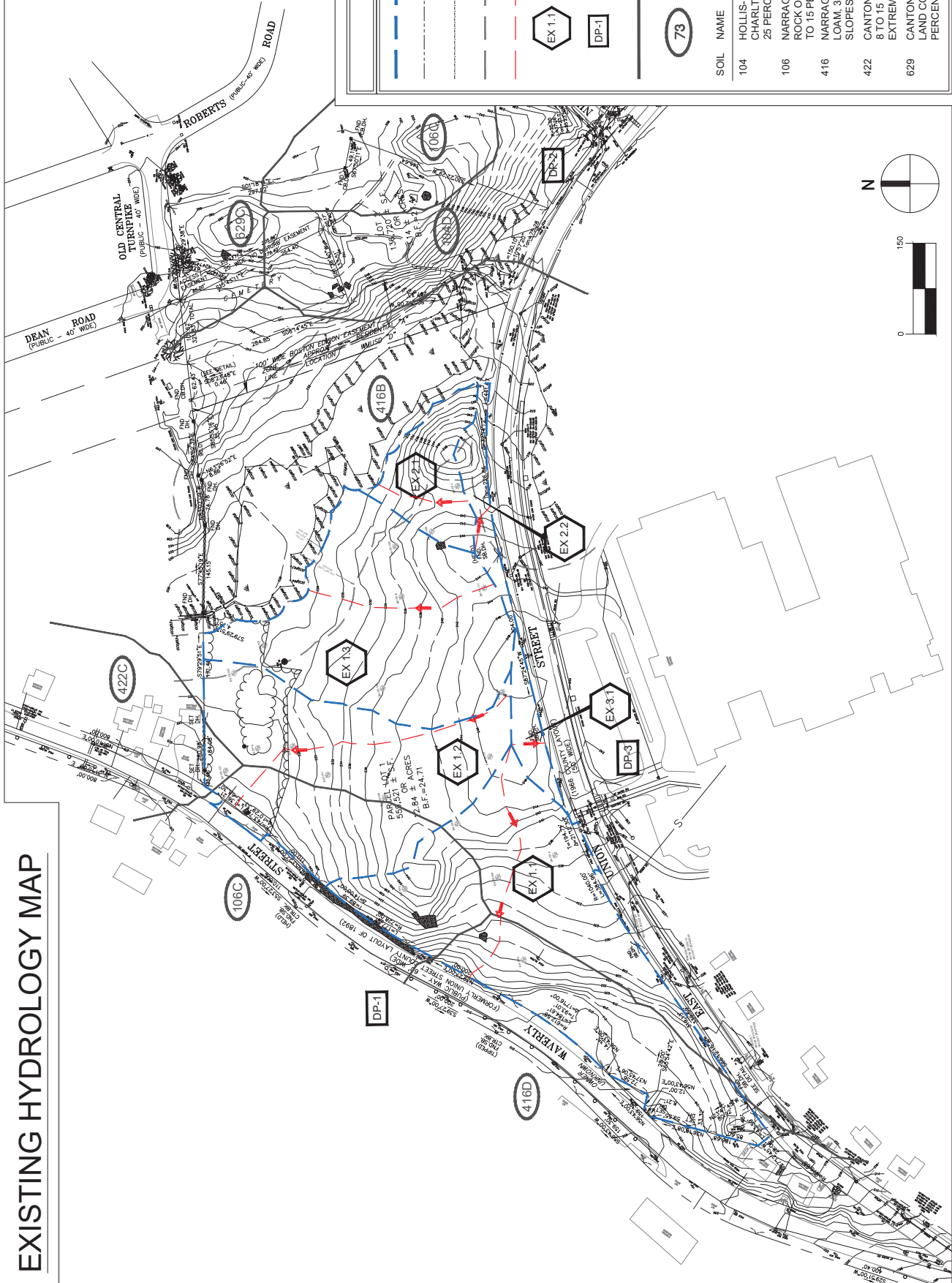
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Events for Subcatchment PR 3.1: PR 3.1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-yr	3.34	0.00	0.000	0.01
10-yr	5.23	0.01	0.003	0.29
100-yr	8.22	0.16	0.015	1.35

EXISTING HYDROLOGY MAP

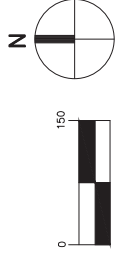
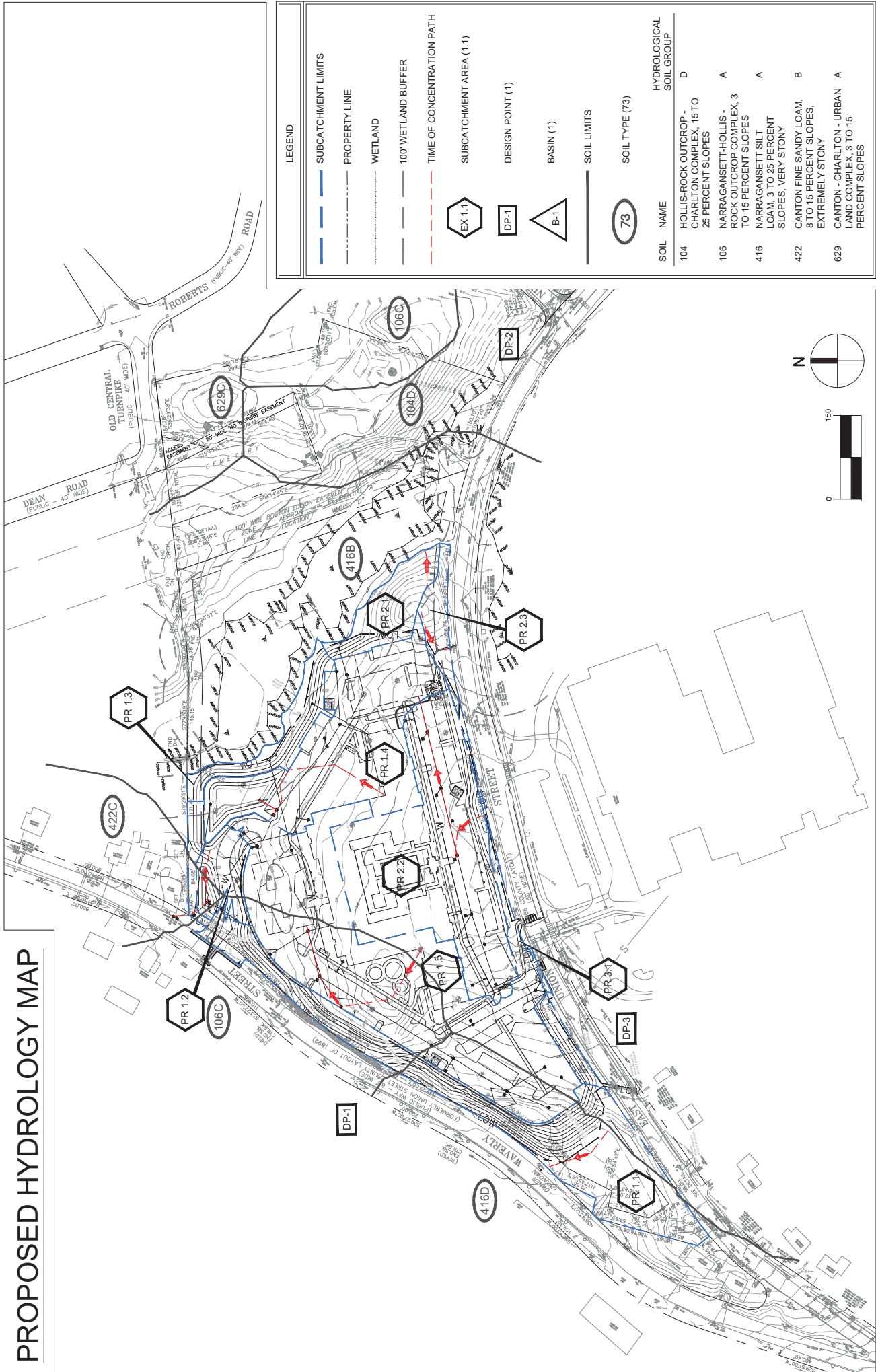


LEGEND

- SUBCATCHMENT LIMITS
- PROPERTY LINE
- WETLAND
- 100' WETLAND BUFFER
- TIME OF CONCENTRATION PATH
- EX 1.1
- DP-1
- SOIL LIMITS
- 73
- SOIL TYPE (73)

SOIL NAME	HYDROLOGICAL SOIL GROUP
104 HOLLIS-ROCK OUTCROP - CHARLTON COMPLEX, 15 TO 25 PERCENT SLOPES	D
106 NARRAGANSETT-HOLLIS - ROCK OUTCROP COMPLEX, 3 TO 15 PERCENT SLOPES	A
416 NARRAGANSETT SILT LOAM, 3 TO 25 PERCENT SLOPES, VERY STONY	A
422 CANTON FINE SANDY LOAM, 8 TO 15 PERCENT SLOPES, EXTREMELY STONY	B
629 CANTON - CHARLTON - URBAN LAND COMPLEX, 3 TO 15 PERCENT SLOPES	A

PROPOSED HYDROLOGY MAP



1000 MASSACHUSETTS AVENUE
 CAMBRIDGE, MASSACHUSETTS 02138
 T: 617.547.5400

61 Waverly St, Ashland MA
 Residences at Ashland
 SMMA Job No. 24142
 Last Updated: 6/17/2025
 Calc by: KIC
 Check by: WWP

Peak Discharge Rate Summary

Design Point	2-year		10-year		100-year	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
DP-1*	0.00	0.02	0.08	0.12	2.72	2.71
DP-2	0.00	0.00	0.00	0.00	0.21	0.21
DP-3**	0.00	0.00	0.00	0.01	0.06	0.16

*For DP-1, the post-development peak discharge rates for the 2-year and 10-yr 24 hour storms increased from the pre-development rates by 0.02 cfs and 0.04 cfs, respectively. As the increases are equal to 0.0 cfs, the difference is considered negligible and therefore is in compliance with the Massachusetts Stormwater Manual Standard 2.

**For DP-3, the post-development peak discharge rate for the 10-yr 24 hour storm increased from the pre-development rate by 0.01 cfs. As the increase is equal to 0.0 cfs, the difference is considered negligible and therefore is in compliance with the Massachusetts Stormwater Manual Standard 2. For the 100-year 24-hour storm, the peak discharge rate increased by 0.10 cfs and will not increase the chance of off-site flooding.

Runoff Volumes Summary [ac-ft]

Design Point	2-year (3.34")		10-year (5.23")		100-year (8.22")	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
DP-1	0	0.013	0.055	0.089	0.543	0.816
DP-2	0	0	0.003	0.003	0.047	0.114
DP-3	0	0	0.001	0.003	0.012	0.015
Total**	0	0.013	0.059	0.095	0.602	0.945

61 Waverly St, Ashland MA

Residences at Ashland

SMMA Job No. 24142
 Date: 6/17/2025
 Calc by: KIC
 Check by: WWP

Hydrologic	
Soil Group	Target Depth Factor (in)
A	0.60
B	0.35
C	0.25
D	0.10

Required Recharge Volume

Note: Required recharge volume is calculated utilizing DEP's "static method"

$R_v = F \cdot \text{imp.area}$

	Contributing Impervious Area		Target Depth Factor (F)*	Required Volume (Rv)	Adjusted Required Volume (Rv)
	<i>sf</i>	<i>acre</i>			
Prop. Roof	HSG A	66,440	1.53	3,322	3,428
Prop. Surface Impervious Area	HSG A	156,152	3.58	7,808	8,057
Total Proposed Impervious	HSG A	222,592	5.11	11,130	11,485
Existing Impervious	HSG A	1,626	0.04	81	84
Total Required Recharge Volume	HSG A	220,966	5.07	11,048	11,401

*recharge volume required for Hydrologic Group A Soils per Mass Stormwater Manual

Recharge Volume Adjustment

Proposed New Impervious Area Within the limit of Work	5.11
Proposed Impervious Area Within the limit of Work Directed to Recharge System	4.95
Proposed Impervious Area Within the limit of Work Not Directed to Recharge System	0.16
Percent Impervious Area Directed to Recharge System	96.9%
* Ratio of New Impervious Area to Impervious Area Directed to Recharge	1.03

Provided Recharge Volume

	Surface Area <i>sf</i>	Recharge Provided <i>cf</i>	Notes
Subsurface Basin (B-2A)	10,920	28,392	below outlet
Subsurface Basin (B-2B)	7,800	26,988	below outlet
Surface Basin (B-2C)	2,181	5,994	below overflow
TOTAL		61,374	Combined, BMPs receive runoff from 4.95 acres impervious area or 97% of the total impervious area

Drawdown Time

	Recharge Volume <i>cf</i>	K (Rawls Rate) <i>in/hr</i>	Bottom Area <i>sf</i>	Time* <i>hr</i>
Subsurface Basin (B-2A)	28,392	2.41	10,920	12.9
Subsurface Basin (B-2B)	26,988	2.41	7,800	17.2
Surface Basin (B-2C)	5,994	2.41	2,181	13.7

*Time = Recharge Volume / K * Bottom Area

Total Maximum Daily Load (TMDL) Calculations

Part I: Nutrient of Concern: Phosphorus (P)

Residences at Ashland

SMMA Job No. 24142

Last Updated: 06/17/2025

Calc by: KIC

	value from MA MS4 document
	value from site conditions
	input value

Table 1 - Annual Composite Phosphorus Load Export Rates

Land Cover	Composite PLERs* (lb/ac/yr)
High Density Residential (Impervious)	1.04
Forest	0.12
Open Space	0.26

*Table 1-1, 2016 MA MS4 General Permit, Appendix F Attachment 1

Table 2 - Baseline Phosphorus Load

	Area (ac)	P Load Export (lb/yr)	Target Reduction (%)	Min. P Reduction Req. (lb/yr)
High Density Residential	0.04	0.04		
Forest	9.11	1.09		
Open Space	0.92	0.24		
Total	10.07	1.37	40%	0.55

Note: The Town of Ashland Stormwater Management Regulations §343-8.1.6 requires 40% reduction in P Load

Table 3 - Untreated Phosphorus Load by Area

	Proposed Area (ac)	P Load Export Rate* (lb/ac/yr)	Untreated Project Phosphorus Load (lb/yr)
Industrial (Impervious)	5.11	2.32	11.86
Forest (Pervious)	1.43	0.13	0.19
Lawn (HSG A)	3.52	0.03	0.11
Total	10.07		12.15

*Table 1-2, 2016 MA MS4 General Permit, Appendix F Attachment 1

Table 4 - Untreated Phosphorus Load Increase Summary

Baseline P Load (lb/yr)	Untreated Project Phosphorus Load (lb/yr)	Phosphorus Load Increase (lb/yr)
1.37	12.15	10.78

Table 5 - Phosphorus Loading to Structural Stormwater BMPs

	Impervious Area (ac)	Forest Area (ac)	HSG A Lawn Area (ac)	P Load to BMP (lb/yr)
Bioretention Basin	0.09	0.00	0.19	0.22
Surface Basin (B-2C)	1.08	0.00	0.60	2.53
Subsurface System (B-2A)	2.36	0.00	0.71	5.50
Subsurface System (B-2B)	1.51	0.00	0.60	3.52
Total	4.95	0.00	1.91	11.76

Table 6A - Phosphorus Load Reductions per Structural Stormwater BMP

	Provided Storage Volume* (cf)	Storm Capacity (in)**	P Load Removal Rate***	P Load Reduction (lb/yr)
Bioretention Basin	887	2.7	63%	0.14
Surface Basin (B-2C)	24,492	6.2	100%	2.53
Subsurface System (B-2A)	29,494	3.4	100%	5.50
Subsurface System (B-2B)	21,848	4.0	100%	3.52
Total				11.68

* volume of storage below lowest outlet

**based on each BMPs contributing impervious area and proposed storage

***values per 2016 MS4 General Permit Appendix F Attachment 3 Tables 3-11, 3-18 & 3-20 for IR=2.41 in/hr

Table 7 - Baseline P Load Summary

Baseline P Load (lb/yr)	Target P Load Reduction (lb/yr)	Target P Load Export (lb/yr)
1.37	0.55	0.82

Table 8 - P Load Export Proposed Conditions

Untreated Project Phosphorus Load (lb/yr)	Structural P Load Reduction (lb/yr)	Proposed P Load Export (lb/yr)	Decrease in P Load Export from Baseline	Target P Load Export from Baseline	Target met?
12.15	11.68	0.46	66%	40%	YES

Appendix 8: Total Maximum Daily Load (TMDL) Calculations

Part II: Nutrient of Concern: Nitrogen (N)

Residences at Ashland

SMMA Job No. 24142

Last Updated: 06/17/2025

Calc by: KIC

	value from MA MS4 document
	value from site conditions
	input value

Table 1 - Annual Nitrogen Load Export Rates

Land Cover	N Export Rate (lb/ac/yr)
High Density Residential (Impervious)	14.1
Forest	0.5
Open Space	0.3

*values per Table 2-2, MA MS4 General Permit, Appendix F Attachment 2

Table 2 - Baseline Nitrogen Load

	Area (ac)	N Load Export (lb/yr)	Target Reduction (%)	Min. N Reduction Req. (lb/yr)
High Density Residential	0.04	0.53		
Forest	9.11	4.55		
Open Space	0.92	0.28		
Total	10.07	5.36	30%	1.61

Note: Wellesley Stormwater Regulations require 35% reduction in N Load

Table 3 - Untreated Project Nitrogen Load by Area

	Proposed Area (ac)	N Load Export Rate	N Load Export (lb/yr)
High Density Residential (Impervious)	5.11	14.10	72.05
Forest (Pervious)	1.43	0.50	0.72
Lawn (HSG A)	3.52	0.30	1.06
Total	10.07		73.82

Table 4 - Untreated Nitrogen Load Increase Summary

Baseline N Load (lb/yr)	Untreated N Load Export (lb/yr)	Nitrogen Load Increase
5.36	73.82	68.47

Table 5 - Nitrogen Load Reductions for Structural Stormwater BMPs

	Impervious Area (ac)	Forest (ac)	HSG A Pervious (ac)	N Load to BMP (lb/yr)
Bioretention Basin	0.09	0.00	0.19	1.35
Surface Basin (B-2C)	1.08	0.00	0.60	15.44
Subsurface System (B-	2.36	0.00	0.71	33.50
Subsurface System (B-	1.51	0.00	0.60	21.46
Total	4.95	0.00	1.91	71.75

Table 6A - Nitrogen Load Reductions for Structural Stormwater BMPs

	Provided Storage Volume* (cf)	Storm Capacity (in)**	N Load Removal Rate*** (%)	N Load Reduction (lb/yr)
Bioretention Basin	887	2.7	40%	0.54
Surface Basin (B-2C)	24,492	6.2	100%	15.44
Subsurface System (B-	29,494	3.4	100%	33.50
Subsurface System (B-	21,848	4.0	100%	21.46
Total				70.94

* volume of storage below lowest outlet

**based on each BMPs contributing impervious area and proposed storage

***values per 2016 MS4 General Permit Appendix F Attachment 3 Tables 3-11, 3-18 & 3-20 for IR=2.41 in/hr

Table 7 - Baseline N Load Summary

Baseline N Load (lb/yr)	Target N Load Reduction	Target N Load Export (lb/yr)
5.36	1.61	3.75

Table 8 - N Load Export Proposed Conditions

Untreated N Load Export (lb/yr)	Structural N Load Reduction (lb/yr)	Proposed N Load Export (lb/yr)	Decrease in P Load Export from Baseline	Target P Load Export from Baseline	Target met?
73.82	70.94	2.89	46%	30%	YES

INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Subcatchment PR 1.2

BMP ¹	C TSS Removal Rate ¹	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Proprietary Treatment Practice	0.80	1.00	0.80	0.20
Bioretention Area	0.90	0.20	0.18	0.02
	0.00	0.02	0.00	0.02
	0.00	0.02	0.00	0.02
	0.00	0.02	0.00	0.02

Total TSS Removal = 98%

Project: Residences at Ashland
Prepared By: KIC
Date: 6/17/2025

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Subcatchment PR 1.4

BMP ¹	C TSS Removal Rate ¹	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Proprietary Treatment Practice	0.80	1.00	0.80	0.20
Infiltration Basin	0.80	0.20	0.16	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04

Total TSS Removal = 96%

Project: Residences at Ashland
 Prepared By: KIC
 Date: 6/17/2025

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Subcatchment PR 1.5

BMP ¹	B TSS Removal Rate ¹	C Starting TSS Load*	D Amount Removed (C*D)	E Remaining Load (D-E)
Proprietary Treatment Practice	0.80	1.00	0.80	0.20
Infiltration Basin	0.80	0.20	0.16	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04

Total TSS Removal = 96%

Project: Residences at Ashland
Prepared By: KIC
Date: 6/17/2025

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS: INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Subcatchment PR 2.2

BMP ¹	B TSS Removal Rate ¹	C Starting TSS Load*	D Amount Removed (C*D)	E Remaining Load (D-E)
Proprietary Treatment Practice	0.80	1.00	0.80	0.20
Infiltration Basin	0.80	0.20	0.16	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04
	0.00	0.04	0.00	0.04

Total TSS Removal = 96%

Project: Residences at Ashland
 Prepared By: KIC
 Date: 6/17/2025

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

1000 MASSACHUSETTS AVENUE
 CAMBRIDGE, MASSACHUSETTS 02138
 T: 617.547.5400

61 Waverly St, Ashland MA
 Residences at Ashland
 SMMA Job No. 24142
 Date: 6/17/2025
 Calc by: KIC
 Check by: WWVP

WEIGHTED TSS REMOVAL RATE

Average TSS Removal Rate (%) = $(A_1 (\text{sq ft}) * \text{TSS}_1 (\%) + A_2 (\text{sq ft}) * \text{TSS}_2 (\%) + \dots + A (\text{sq ft}) * \text{TSS} (\%)) / (A_1 + A_2 + \dots + A)$

	Contributing Impervious A (sq ft)	TSS Removal Efficiency		Effective TSS A (sq ft)
		TSS (%)	TSS (%)	
Subcatchment PR 1-1	2,626	0%	0%	-
Subcatchment PR 1-2	3,989	98%	98%	3,909.6
Subcatchment PR 1-4	47,141	96%	96%	45,255.8
Subcatchment PR 1-5	102,841	96%	96%	98,727.3
Subcatchment PR 2-2	65,726	96%	96%	63,097.3
Subcatchment PR 3-1	268	0%	0%	-
TOTAL	222,593			210,989.9

Average TSS Removal Rate: 94.8%
 Minimum TSS Removal Rate: 80.0%
 Target met? **YES**

1000 MASSACHUSETTS AVENUE
 CAMBRIDGE, MASSACHUSETTS 02138
 T: 617.547.5400

61 Waverly St, Ashland MA

Residences at Ashland

SMMA Job No. 24142

Date: 10/17/2025

Calc by: KIC

Check by: WWP

REQUIRED WATER QUALITY VOLUME

Site is located within an area of rapid infiltration rate (greater than 2.4 inches per hour), therefore 1.0" times the impervious area is required for water quality volume per MA Stormwater Standard 4.

$WQV(\text{cu ft}) = A (\text{sq ft}) * P(\text{in})$ $P=1.0"$

WATER QUALITY VOLUME

		Subsurface Infiltration Basin B-2A	Subsurface Infiltration Basin B-2B	Surface Infiltration Basin B-2C	Bioretention Area
Contributing Impervious Area	A (sq ft)	102,840.90	65,726.00	47,141.00	3,989.00
Rainfall Depth *	P (in)	1	1	1	1
Water Quality Volume	WQV (cu ft)	8,570.10	5,477.20	3,928.40	332.4
Proposed Water Quality Volume	P WQV (cu ft)	35,743.00	25,522.00	22,472.00	1,879.00

4.03 Operation and Maintenance Plan

Operation and Maintenance Plan

The Residences at Ashland

61 Waverly Street
Ashland, MA 01721

10/29/2025

SMMA
1000 Massachusetts Ave.
Cambridge, MA 02138

Operation and Maintenance Plan

This Operation and Maintenance (O&M) Plan has been developed in accordance with the Massachusetts DEP Stormwater Management Guidelines Standard No. 9 to ensure that the proposed stormwater management system functions as designed.

Owner and Responsible Party

The Applicant/Owner, The Gutierrez Company, shall be the party responsible for adherence to the DEP Stormwater Management Policy after completion of construction and until a Certificate of Compliance (CoC) is issued by the Town of Ashland Conservation Commission. The Applicant/Owner shall designate a Site Supervisor who shall assume responsibility for this post construction maintenance plan, after a CoC has been issued. The Applicant/Owner shall be responsible for financing maintenance activities and both anticipated and emergency repairs of the system.

If the property owner changes, it shall be the responsibility of Applicant/Owner to notify the future owner of the stormwater management system and its components as well as the requirements for operation and maintenance.

The Town of Ashland Zoning Board of Appeals (ZBA) and Conservation Commission shall be allowed to enter the property at reasonable times and in a reasonable manner for the purposes of inspection of the systems.

Stormwater Management Maintenance

The following site maintenance activities are required to maintain the optimal pollutant attenuation by the drainage system. A maintenance schedule follows in this plan.

Area Drains, Catch Basins, and Manholes

Proper maintenance includes inspection of all grates, sumps, and outlets. Any debris or obstructions should be removed. Structural damage should be recorded and reported. The amount of sediment in each catch basin should be recorded. The catch basin sumps shall be cleaned when they are half full of sediment or debris (approximately two feet below outlet pipe.)

Water Quality Units

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument.

The water quality system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be

compared to the as-built drawing for the unit to determine whether the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning of the systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Polluted water or sediments removed from the CDS is to be disposed of in accordance with all applicable local, state and federal laws and regulations including M.G.L.c. 21C and 310 CMR 30.00.

Surface Infiltration Basin

Infiltration basins are prone to clogging and failure, so it is imperative to implement aggressive maintenance plans and schedules. Perform inspections and preventive maintenance at least twice a year, and after every time drainage discharges through the high outlet orifice. Pretreatment BMPs should be inspected in accordance with the minimal requirements specified for those practices and after every major storm event.

Once the basin is in use, inspect it after every major storm for the first few months to ensure it is stabilized and functioning properly and if necessary, take corrective action. A major storm event is defined as a storm that is equal to or greater than the 2-year, 24-hour storm (3.3 inches in a 24-hour period). Note how long water remains standing in the basin after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging (such as upland sediment erosion, excessive compaction of soils, or low spots).

Thereafter, inspect the infiltration basin at least twice per year. Important items to check during the inspection include:

- Signs of differential settlement,
- Cracking,
- Erosion,
- Leakage in the embankments
- Tree growth on the embankments
- Condition of riprap,
- Sediment accumulation and
- The health of the turf.

At least twice a year, mow the buffer area, side slopes, and basin bottom. Remove grass clippings and accumulated organic matter to prevent an impervious organic mat from forming. Remove trash and debris

at the same time. Use deep tilling to break up clogged surfaces, and revegetate immediately. Remove sediment from the basin as necessary, but wait until the floor of the basin is thoroughly dry. Use light equipment to remove the top layer so as to not compact the underlying soil. Deeply till the remaining soil, and revegetate as soon as possible. Inspect and clean pretreatment devices associated with basins at least twice a year, and ideally every other month.

Subsurface Infiltration Basin

The inlet and outlet of each system should be inspected and cleared of any debris that might clog the system. The system should be checked to ensure functionality after installation. The area above and immediately adjacent to the system should be checked for depressions. The area above and adjacent to the system should also be inspected to ensure that no unauthorized modifications have been made.

Bioretention Areas

Premature failure of bioretention areas is a significant issue caused by lack of regular maintenance. Bioretention areas require careful attention while plants are being established and seasonal landscaping maintenance thereafter.

Inspect pretreatment devices and bioretention cells regularly for sediment build-up, structural damage, and standing water.

Inspect soil and repair eroded areas monthly. Re-mulch void areas as needed. Remove litter and debris monthly. Treat diseased vegetation as needed. Remove and replace dead vegetation twice per year (spring and fall).

Proper selection of plant species and support during establishment of vegetation should minimize—if not eliminate—the need for fertilizers and pesticides. Remove invasive species as needed to prevent these species from spreading into the bioretention area. Replace mulch every two years, in the early spring. Upon failure, excavate bioretention area, scarify bottom and sides, replace filter fabric and soil, replant, and mulch.

Because the soil medium filters contaminants from runoff, the cation exchange capacity of the soil media will eventually be exhausted. When the cation exchange capacity of the soil media decreases, change the soil media to prevent contaminants from migrating to the groundwater, or from being discharged via an underdrain outlet.

Other Site Maintenance

Pavement and Grass Areas

The pavement areas should be swept to remove solids and reduce the amount of suspended solids in the runoff. All accumulated trash and litter throughout the site should be collected and discarded.

Dumping of landscape debris, including leaves, grass clippings and brush, within wetland areas shall be prohibited.

Snow Removal

Maintenance activities during the winter months are primarily limited to snow removal activities and removal of debris and trash throughout the site.

Snow removal operations will adhere to the *Massachusetts Department of Environmental Protection – Bureau of Resource Protection Guidelines (dated March 8, 2001)*. Snow will be stockpiled as far away from wetland areas as possible and removed as necessary under larger snow events. Stockpiling snow in this manner will allow meltwater to enter the drainage system and thereby receive pretreatment prior to discharging to receiving waters. Snow and ice that has accumulated around catch basin grates will be removed.

DEP prohibits snow disposal in stormwater basins including the surface basin onsite.

Winter Salt and Sand Use

For concrete walkways and plaza areas, no binary chloride compounds shall be applied, i.e. sodium chloride, calcium chloride or magnesium chloride, for a minimum of 6 months after concrete installation is complete. This allows the concrete to cure to its optimal strength. For the first year, an aggressive snow removal process through mechanical means or hand shoveling followed by the use of sand or fine gravel mixtures optimal for the life of the sidewalks and plaza systems.

Maintenance Schedule

Required Action	Frequency
Catch Basins and Manholes	
Inspect for depth of sediment, obstructions, structural damage, or other malfunction	Quarterly in the first year; at least twice per year after
Clean sumps of accumulated sediment	When structures are 1/2 full of sediment/debris (approximately two feet below outlet pipe) once per year minimum
Surface Infiltration Basins	
Preventative maintenance	Twice per year
Inspect to ensure proper functioning	After every major storm during first 3 months of operation and twice a year thereafter and when there are discharges through the high outlet orifice
Mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris, remove grass clipping and accumulated organic matter	Twice per year
Inspect and clean pretreatment devices	Every other month recommended and at least twice per year and after every major storm event.
Subsurface Infiltration Basins	
Inspect inlets and outlet and remove any debris	Quarterly in first year; at least twice per year after
Inspect system for functionality	After first major rainfall following installation

Check for depressions in areas above and surrounding the system	Once per year
Confirm that no authorized modifications have been performed to the site around (including over) the system	Once per year
Inspect interior of system	Once per year
Bioretention Areas	
Inspect & remove trash enclosure	Once per week
Prune and remove/replace dead vegetation	As needed; once per year in the fall
Replace entire media & all vegetation	Twice per year in spring/early summer
Pavement and Grass Areas	
Sweep pavement areas	At least twice per year: after final snow melt and after final leaf fall and as necessary in summer months
Remove accumulated litter, debris, and discarded materials throughout the site	Once per week
Water Quality Units	
Inspect for depth of sediment, obstructions, structural damage, and other malfunction	Twice per year in spring and fall
Remove sediment and pollutants	When level of sediment in structure's sump reaches 75% of capacity or when appreciable level of hydrocarbons and debris has accumulated; at a minimum of once per year

Reporting and Documentation

The Site Supervisor for the Applicant/Owner shall be responsible for maintaining an accurate Site Maintenance Log. The Site Maintenance Log shall be located on site and made available to the Town of Ashland Conservation Commission upon request.

The Site Maintenance Log shall:

- Document the completion of planned maintenance tasks
- Identify the person responsible for the completion of tasks
- Identify any outstanding problem, malfunction, or inconsistency identified during the course of routine maintenance

The Site Supervisor shall be responsible for ensuring that the scheduled tasks are appropriately completed as described in this plan and the Site Maintenance Log accurately represents activities carried out as described in this plan.

Site Maintenance Log

A Site Maintenance Log shall be completed as described above and shall, at a minimum, include the following items:

- Completed Inspection Checklist
- Date of activity performed
- Specific maintenance task
- Structural components maintained, as identified on the O&M Plan
- Staff person or contractor performing activity on behalf of the Applicant/Owner
- Supervisor verification of maintenance activity
- Recommended additional maintenance task
- Means to document identified areas of concern, erosion, or system discrepancies requiring attention

Public Safety Features

On-site public safety features include the following:

- Heavy-duty covers and grates on all manholes and catch basins designed to withstand H2O loading
- Maintain or reduce peak stormwater runoff rates from pre-development to post-development
- Creation and implementation of an O&M Plan to ensure the ability of the stormwater management system to continue to operate as designed

Inspection Checklist

Date of Inspection _____

Checklist Completed By _____

Reviewed by Supervisor _____

Required Action	Frequency	Comments
Catch Basins and Manholes		
Inspect for depth of sediment, obstructions, structural damage, or other malfunction	Quarterly in the first year; at least twice per year after	
Clean sumps of accumulated sediment	When structures are ½ full of sediment/debris (approximately two feet below outlet pipe) once per year minimum	
Surface Infiltration Basins		
Preventative maintenance	Twice per year	
Inspect to ensure proper functioning	After every major storm during first 3 months of operation and twice a year thereafter and when there are discharges through the high outlet orifice	
Mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris, remove grass clipping and accumulated organic matter	Twice per year	
Inspect and clean pretreatment devices	Every other month recommended and at least twice per year and after every major storm event.	
Subsurface Infiltration Basins		
Inspect inlets and outlet and remove any debris	Quarterly in first year; at least twice per year after	
Inspect system for functionality	After first major rainfall following installation	

Check for depressions in areas above and surrounding the system	Once per year	
Confirm that no authorized modifications have been performed to the site around (including over) the system	Once per year	
Inspect interior of system	Once per year	
Bioretention Areas		
Inspect & remove trash enclosure	Once per week	
Prune and remove/replace dead vegetation	As needed; once per year in the fall	
Replace entire media & all vegetation	Twice per year in spring/early summer	
Pavement and Grass Areas		
Sweep pavement areas	At least twice per year: after final snow melt and after final leaf fall and as necessary in summer months	
Remove accumulated litter, debris, and discarded materials throughout the site	Once per week	
Water Quality Units		
Inspect for depth of sediment, obstructions, structural damage, and other malfunction	Twice per year in spring and fall	
Remove sediment and pollutants	When level of sediment in structure's sump reaches 75% of capacity or when appreciable level of hydrocarbons and debris has accumulated; at a minimum of once per year	

4.04 Wetland Border Report (prepared by Goddard Consulting)

Wetland Border Report

Site Locus: 61 Waverly St, Ashland MA 01721

Prepared for: Gutierrez Company (the “Applicant”)

Prepared by: Goddard Consulting LLC, 291 Main St, Suite 8, Northborough MA 01532

Date: 11/21/2024, Revised 10/24/25

INTRODUCTION

On November 20th, 2024, wetland resources were delineated for the applicant on land located at 61 Waverly St, Ashland MA (refer to enclosed locus maps). The wetland borders were flagged using the criteria in the most recent edition of MA Wetland Protection Act (WPA) and Regulations 310 CMR 10.00 et al. Hydric soil indicators, vegetation changes, hydrological indicators, and topography were all considered for delineation purposes. On October 24, 2025, Goddard conducted a site visit to ensure the flags remained present and visible. No changes to the wetland line were noted during this visit.

The titles of attached documents are as follows:

- DEP Bordering Vegetated Wetland Determination Form, 11/21/2024
- Orthophoto of Locus Site, Goddard Consulting LLC., 11/19/2024
- Sketch of Wetland Delineation, Goddard Consulting LLC., 11/19/2024
- Soils Map on Locus Site, Goddard Consulting LLC., 11/19/2024
- NRCS Soil Map – Worcester County, Massachusetts, accessed 11/21/2024
- FEMA Map of Locus Site, Goddard Consulting LLC., 11/19/2024
- USGS of Locus Site, Goddard Consulting LLC, 11/19/2024

SUMMARY OF FINDINGS

A Bordering Vegetated Wetland (BVW) was delineated in the eastern portion of the site with wetland flag series GCA1-GCA95. An intermittent stream located in the northeast of the site, flows south into a pipe and connects with the BVW. Bank of the intermittent stream was flagged with series GCS1-GCS11. A BVW to the south of the site was delineated with flag series GCC1-GCC20. The sampling point for the BVW determination took place near flag GCA81.

Vegetation downgradient of the BVW is dominant in red maple/*Acer rubrum* (FAC), highbush blueberry/*Vaccinium corymbosum* (FACW), sweet pepperbush/*Clethra alnifolia* (FAC), and cinnamon fern/*Osmundastrum cinnamomeum* (FACW). Vegetation upgradient of the BVW consists of white oak/*Quercus alba* (FACU), red oak/*Quercus rubra* (FACU), white pine/*Pinus strobus* (FACU), bracken fern/*Pteridium aquilinum* (FACU), hay-scented fern/*Dennstaedtia punctilobula* (UPL).

Soils identified on the property include silt loam. In the upland soil sample, an A layer with the consistency of silt loam colored 10YR2/1 was found from 0-6”. From 6-12”, a B layer with the consistency of fine sandy loam colored 10YR3/3 was found. A restrictive rock layer was present at a depth of 12+”. In the wetland soil sample, an O layer consistency of muck colored 10YR2/1 was found from 0-10”. A restrictive rock layer was found at a depth of 10+”. More detailed information about soils is included in the attached NRCS Soil Map and the DEP Bordering Vegetated Wetland Determination Forms.

According to the MassGIS data layers for the Natural Heritage & Endangered Species Program (NHESP), the locus site is not located within Estimated and/or Priority Habitat of Rare Wildlife or an Area of Critical Environmental Concern (ACEC). The site is not located in an Outstanding Resource Waters Area (ORW). The site does not fall

within the jurisdictional FEMA Flood Zone. There are no mapped certified pools on-site. There are two “potential” vernal pools mapped in the eastern portion of the site, but they have not been confirmed to be actual habitat.

The MA Wetlands Protection Act and the Town of Ashland take jurisdiction over Bordering Vegetated Wetlands (BVW) and bank of intermittent stream. The delineated BVW and bank have a jurisdictional 100-foot Buffer Zone that casts onto the locus site. Any work within these resource areas including the 100-foot Buffer Zones requires a Request for Determination (RDA) or Notice of Intent (NOI) to be filed with the Ashland Conservation Commission.

DESCRIPTION OF REGULATED INLAND RESOURCE AREA

The table below provides the regulatory jurisdiction, flag numbers/colors, and wetland types and locations for the resource areas delineated.

Resource Area	Regulatory Jurisdiction	Flag Numbers and Color	Wetland Types and Locations
Bordering Vegetated Wetland (BVW)	BVW & 100-foot Buffer Zone	GCA1-GCA95 (Blue flags)	The boundary of BVW located at the east of the site.
Bordering Vegetated Wetland (BVW)	BVW & 100-foot Buffer Zone	GCC1-GCC20 (Blue flags)	The boundary of BVW located south of the site.
Bank of Intermittent Stream	Bank & 100-foot Buffer Zone	GCS1-GCS11	Bank of intermittent stream located in the north of the site.

Sincerely,
Goddard Consulting, LLC



Tom Schutz, WPIT, WSA
Wetland Scientist

BORDERING VEGETATED WETLAND DETERMINATION FORM

Project/Site: 61 Waverly Street City/Town: Ashland Sampling Date: 11/20/24
 Applicant/Owner: Israel Lopez, Gutierrez Company Sampling Point or Zone: GCA81
 Investigator(s): Tom Schutz, WPIT Latitude/Longitude: 42.26380, -71.44571
 Soil Map Unit Name: Narragansett silt loam NWI or DEP Classification: PFO1E

UPGRADIENT

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks)
 Are Vegetation , Soil , or Hydrology significantly disturbed? (If yes, explain in Remarks)
 Are Vegetation , Soil , or Hydrology naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc

Wetland vegetation criterion met?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soils criterion met?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetlands hydrology present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks, Photo Details, Flagging, etc.:					

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Depth (in)
Water Table Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Depth (in)
Saturation Present (including capillary fringe)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Depth (in)
Wetland Hydrology Indicators			
Reliable Indicators of Wetlands Hydrology	Indicators that can be Reliable with Proper Interpretation	Indicators of the Influence of Water	
<input type="checkbox"/> Water-stained leaves	<input type="checkbox"/> Hydrological records	<input type="checkbox"/> Direct observation of inundation	
<input type="checkbox"/> Evidence of aquatic fauna	<input type="checkbox"/> Free water in a soil test hole	<input type="checkbox"/> Drainage patterns	
<input type="checkbox"/> Iron deposits	<input type="checkbox"/> Saturated soil	<input type="checkbox"/> Drift lines	
<input type="checkbox"/> Algal mats or crusts	<input type="checkbox"/> Water marks	<input type="checkbox"/> Scoured areas	
<input type="checkbox"/> Oxidized rhizospheres/pore linings	<input type="checkbox"/> Moss trim lines	<input type="checkbox"/> Sediment deposits	
<input type="checkbox"/> Thin muck surfaces	<input type="checkbox"/> Presence of reduced iron	<input type="checkbox"/> Surface soil cracks	
<input type="checkbox"/> Plants with air-filled tissue (aerenchyma)	<input type="checkbox"/> Woody plants with adventitious roots	<input type="checkbox"/> Sparsely vegetated concave surface	
<input type="checkbox"/> Plants with polymorphic leaves	<input type="checkbox"/> Trees with shallow root systems	<input type="checkbox"/> Microtopographic relief	
<input type="checkbox"/> Plants with floating leaves	<input type="checkbox"/> Woody plants with enlarged lenticels	<input type="checkbox"/> Geographic position (depression, toe of slope, fringing lowland)	
<input type="checkbox"/> Hydrogen sulfide odor			
Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):			

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

	Common Name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indicator? (yes/no)	% Dominant
1	Northern White Oak	Quercus alba	FACU	20.5%	X		66.1%
2	Red Oak	Quercus rubra	FACU	10.5%	X		33.9%
3							
4							
5							
6							
7							
8							
9							

31.0% =Total Cover

Shrub/Sapling Stratum Plot size 15'

	Common Name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indicator? (yes/no)	% Dominant
1	White Pine	Pinus strobus	FACU	10.5%	X		33.3%
2	Highbush Blueberry	Vaccinium corymbosum	FACW	10.5%	X	X	33.3%
3	Red Oak	Quercus rubra	FACU	10.5%	X		33.3%
4							
5							
6							
7							
8							
9							

31.5% =Total Cover

Herb Stratum Plot size 5'

	Common Name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indicator? (yes/no)	% Dominant
1	Northern Bracken Fern	Pteridium aquilinum	FACU	10.5%	X		50.0%
2	Hay Scented Fern	Dennstaedtia punctilobula	UPL	10.5%	X		50.0%
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

21.0% =Total Cover

VEGETATION – continued.

Woody Vine Stratum							
		Plot size <u>30'</u>					
	Common Name	Scientific name	Indicator Status	Absolute % Cover	Dominant? (yes/no)	Wetland Indicator? (yes/no)	% Dominant
1							
2							
3							
4							
				0.0%	=Total Cover		

Rapid Test:	Do all dominant species have an indicator status of OBL or FACW?		Yes		No	X
Dominance Test:	Number of dominant species	Number of dominant species that are wetland indicator plants	Do wetland indicator plants make up $\geq 50\%$ of dominant plant species?			
	7	1	Yes		No	X
Prevalence Index:		Total % Cover (all strata)	Multiply by:	Result		
	OBL species	0%	x1	=	0%	
	FACW species	11%	x2	=	21%	
	FAC species	0%	x3	=	0%	
	FACU species	63%	x4	=	250%	
	UPL species	11%	x5	=	53%	
	Column Totals (A)	84%		(B)	324%	
	Prevalence Index	B/A=	3.87	Is the Prevalence Index ≤ 3.0 ?		
				Yes	No	X
Wetland vegetation criterion met?	Yes	No	X			

Definitions of Vegetation Strata

- Tree: Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height
- Shrub/Sapling: Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall
- Herb: All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall
- Woody vines: All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.00%
6-15 %	10.50%
15-25 %	20.50%
26-50 %	38.00%
51-75 %	63.00%
76-95 %	85.50%
96-100 %	98.00%

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹		
A 0-6"	10YR2/1	100				SL	
B 6-12"	10YR3/3	100				FSL	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)	Indicators for Problematic Hydric Soils
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Dark Surface (S7)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Polyvalue Below Surface (S8)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Thin Dark Surface (S9)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Iron-Manganese Masses (F12)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Mesic Spodic (A17)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Red Parent Material (F21)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Dark Surface (S7)	<input type="checkbox"/> Other (Include Explanation in Remarks)

Restrictive Layer (if observed) Type: Rock Depth (inches): 12"

Remarks

Hydric Soils criterion met? Yes No X

DOWNGRADIENT

Are climatic/hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? (If yes, explain in Remarks)
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If yes, explain in Remarks)

SUMMARY OF FINDINGS – Attach site map and photograph log showing sampling locations, transects, etc

Wetland vegetation criterion met?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soils criterion met?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetlands hydrology present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks, Photo Details, Flagging, etc.:					

HYDROLOGY

Field Observations:			
Surface Water Present?	Yes	No <input checked="" type="checkbox"/>	Depth (in)
Water Table Present?	Yes	No <input checked="" type="checkbox"/>	Depth (in)
Saturation Present (including capillary fringe)?	Yes	No <input checked="" type="checkbox"/>	Depth (in)
Wetland Hydrology Indicators			
Reliable Indicators of Wetlands	Indicators that can be Reliable with	Indicators of the Influence of Water	
<input checked="" type="checkbox"/> Water-stained leaves	<input checked="" type="checkbox"/> Hydrological records	<input type="checkbox"/> Direct observation of inundation	
<input type="checkbox"/> Evidence of aquatic fauna	<input type="checkbox"/> Free water in a soil test hole	<input checked="" type="checkbox"/> Drainage patterns	
<input type="checkbox"/> Iron deposits	<input type="checkbox"/> Saturated soil	<input type="checkbox"/> Drift lines	
<input type="checkbox"/> Algal mats or crusts	<input checked="" type="checkbox"/> Water marks	<input checked="" type="checkbox"/> Scoured areas	
<input type="checkbox"/> Oxidized rhizospheres/pore linings	<input type="checkbox"/> Moss trim lines	<input type="checkbox"/> Sediment deposits	
<input type="checkbox"/> Thin muck surfaces	<input type="checkbox"/> Presence of reduced iron	<input type="checkbox"/> Surface soil cracks	
<input type="checkbox"/> Plants with air-filled tissue (aerenchyma)	<input type="checkbox"/> Woody plants with adventitious roots	<input checked="" type="checkbox"/> Sparsely vegetated concave surface	
<input type="checkbox"/> Plants with polymorphic leaves	<input checked="" type="checkbox"/> Trees with shallow root systems	<input type="checkbox"/> Microtopographic relief	
<input type="checkbox"/> Plants with floating leaves	<input type="checkbox"/> Woody plants with enlarged lenticels	<input checked="" type="checkbox"/> Geographic position (depression, toe of slope, fringing lowland)	
<input type="checkbox"/> Hydrogen sulfide odor			
Remarks (describe recorded data from stream gauge, monitoring well, aerial photos, previous inspections, if available):			

This form is only for BVW delineations. Other wetland resource areas may be present and should be delineated according to the applicable regulatory provisions.

Sampling Point GCA81

VEGETATION – Use both common and scientific names of plants.

Tree Stratum Plot size 30'

	Common Name	Scientific name	Indicator	Absolute %	Dominant?	Wetland Indicator?	% Dominant
1	Red Maple	Acer rubrum	FAC	38.0%	X	X	100.0%
2							
3							
4							
5							
6							
7							
8							
9							

38.0% =Total Cover

Shrub/Sapling Stratum Plot size 15'

	Common Name	Scientific name	Indicator	Absolute %	Dominant?	Wetland Indicator?	% Dominant
1	Red Maple	Acer rubrum	FAC	20.5%	X	X	37.6%
2	Highbush Blueberry	Vaccinium corymbosum	FACW	20.5%	X	X	37.6%
3	Sweet Pepperbush	Clethra alnifolia	FAC	10.5%		X	19.3%
4	White Pine	Pinus strobus	FACU	3.0%			5.5%
5							
6							
7							
8							
9							

54.5% =Total Cover

Herb Stratum Plot size 5'

	Common Name	Scientific name	Indicator	Absolute %	Dominant?	Wetland Indicator?	% Dominant
1	Cinnamon Fern	Osmundastrum cinnamomeum	FACW	20.5%	X	X	100.0%
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

20.5% =Total Cover

VEGETATION – continued.

Woody Vine Stratum							
Plot size <u>30'</u>							
	Common Name	Scientific name	Indicator	Absolute %	Dominant?	Wetland Indicator?	% Dominant
1							
2							
3							
4							
				0.0%	=Total Cover		

Rapid Test:		Do all dominant species have an indicator status of OBL or FACW?		Yes	X	No	
Dominance Test:	Number of dominant species	Number of dominant species that are		Do wetland indicator plants make			
	4	4		Yes	X	No	
Prevalence Index:		Total % Cover	Multiply by:	Result			
	OBL species	0%	x1	=	0%		
	FACW species	41%	x2	=	82%		
	FAC species	69%	x3	=	207%		
	FACU species	3%	x4	=	12%		
	UPL species	0%	x5	=	0%		
	Column Totals (A)	113%		(B)	301%		
Prevalence Index		B/A=	2.66	Is the Prevalence Index ≤ 3.0?			
				Yes	X	No	
Wetland vegetation criterion met?		Yes	X	No			

Definitions of Vegetation Strata

- Tree Woody plants 3 in. (7.62 cm) or more in diameter at breast height (DBH), regardless of height
- Shrub/Sapling Woody plants less than 3 in. (7.62 cm) DBH and greater than or equal to 3.3 ft. (1 m) tall
- Herb All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.3 ft. (1 m) tall
- Woody vines All woody vines greater than 3.3 ft. (1 m) in height

Cover Ranges	
Range	Midpoint
1-5 %	3.00%
6-15 %	10.50%
15-25 %	20.50%
26-50 %	38.00%
51-75 %	63.00%
76-95 %	85.50%
96-100 %	98.00%



SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators)							
Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹		
0-0-10"	10YR2/2	100				Muck	Organic

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains ²Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators (Check all that apply)		Indicators for Problematic Hydric Soils	
<input checked="" type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3)	
<input checked="" type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Polyvalue Below Surface (S8)	<input type="checkbox"/> Dark Surface (S7)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Thin Dark Surface (S9)	<input type="checkbox"/> Polyvalue Below Surface (S8)	
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Thin Dark Surface (S9)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Iron-Manganese Masses (F12)	
<input checked="" type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Mesic Spodic (A17)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Redox Dark Surface (F7)	<input type="checkbox"/> Red Parent Material (F21)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Depleted Dark Surface (F8)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Dark Surface (S7)		<input type="checkbox"/> Other (Include Explanation in Remarks)	
Restrictive Layer (if observed)	Type: Rock	Depth (inches):	10"
Remarks			
Hydric Soils criterion met? Yes X No			

Legend

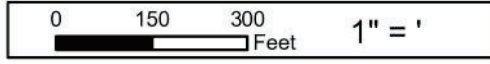
-  Property Boundary
-  Tax Parcels



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Orthophoto of Locus Site

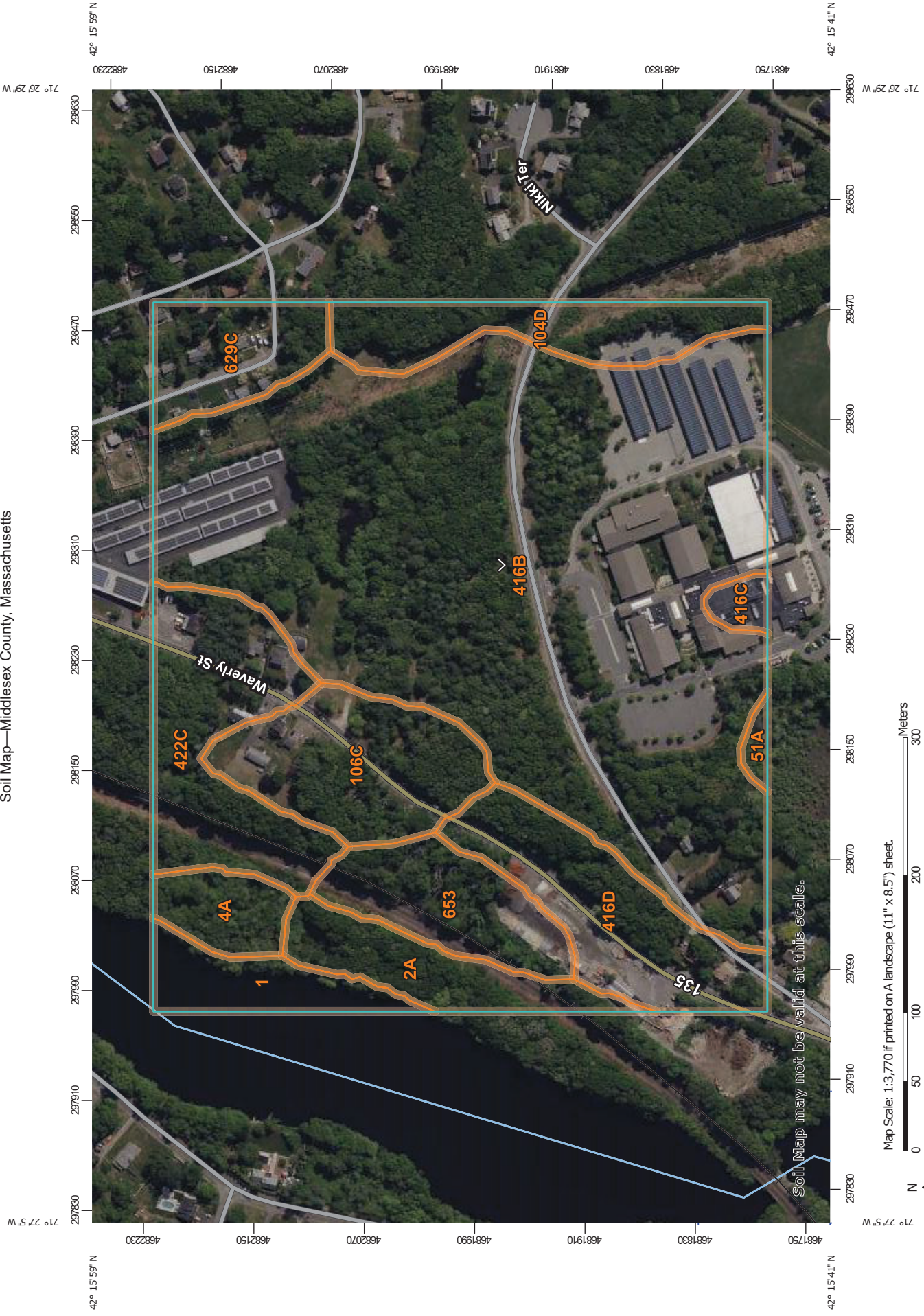


Date: 11/19/2024

61 Waverly Street
Ashland, MA 01721

Parcel ID: 15.0-12

Soil Map—Middlesex County, Massachusetts



Map Scale: 1:3,770 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

- Area of Interest (AOI)
- 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
- Water Features**
 - Streams and Canals
- Transportation**
 - Rails
 - Interstate Highways
 - US Routes
 - Major Roads
 - Local Roads
- Background**
 - Aerial Photography
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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 24, Aug 27, 2024

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




Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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	1.7	3.0%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded	2.2	3.9%
4A	Rippowam fine sandy loam, 0 to 3 percent slopes, frequently flooded	1.3	2.2%
51A	Swansea muck, 0 to 1 percent slopes	0.2	0.4%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	2.9	5.0%
106C	Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes	4.0	6.9%
416B	Narragansett silt loam, 3 to 8 percent slopes, very stony	30.6	53.7%
416C	Narragansett silt loam, 8 to 15 percent slopes, very stony	0.4	0.7%
416D	Narragansett silt loam, 15 to 25 percent slopes, very stony	4.1	7.2%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	4.7	8.2%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	2.2	3.9%
653	Udorthents, sandy	2.7	4.8%
Totals for Area of Interest		56.9	100.0%

Legend

-  Property Boundary
-  Tax Parcels
-  Soils (Outlines)

Canton fine sandy loam,
8 to 15 percent slopes,
extremely stony

Rippowam fine
sandy loam, 0 to
3 percent slopes

Narragansett-Hollis-Rock
outcrop complex, 3 to
15 percent slopes

Udorthents,
sandy

Narragansett-Hollis-Rock
outcrop complex, 3 to
15 percent slopes

Narragansett silt
loam, 3 to 8 percent
slopes, very stony

Narragansett silt
loam, 15 to 25 percent
slopes, very stony

Swansea
muck, 0 to 1
percent slopes

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Soils on Locus Site



0 150 300 Feet 1" = '

Date: 11/19/2024



61 Waverly Street
Ashland, MA 01721

Parcel ID: 15.0-12

Legend

-  Property Boundary
-  Tax Parcels

USA_Flood_Hazard_Reduced

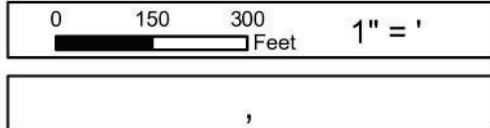
-  0.2% Annual Chance Flood Hazard
-  1% Annual Chance Flood Hazard



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FEMA Flood Zones near the Locus Site



Date: 11/19/2024

61 Waverly Street
Ashland, MA 01721

Parcel ID: 15.0-12

Legend

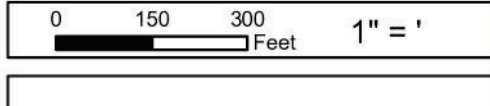
-  Property Boundary
-  Tax Parcels
-  NHESP Potential Vernal Pools



S:\ashland - 014 GIS 0 4.043 - 61 Waverly St\Ortho - 61 Waverly St\Ortho - 61 Waverly St.aprx



Potential Vernal Pools near the Locus Site





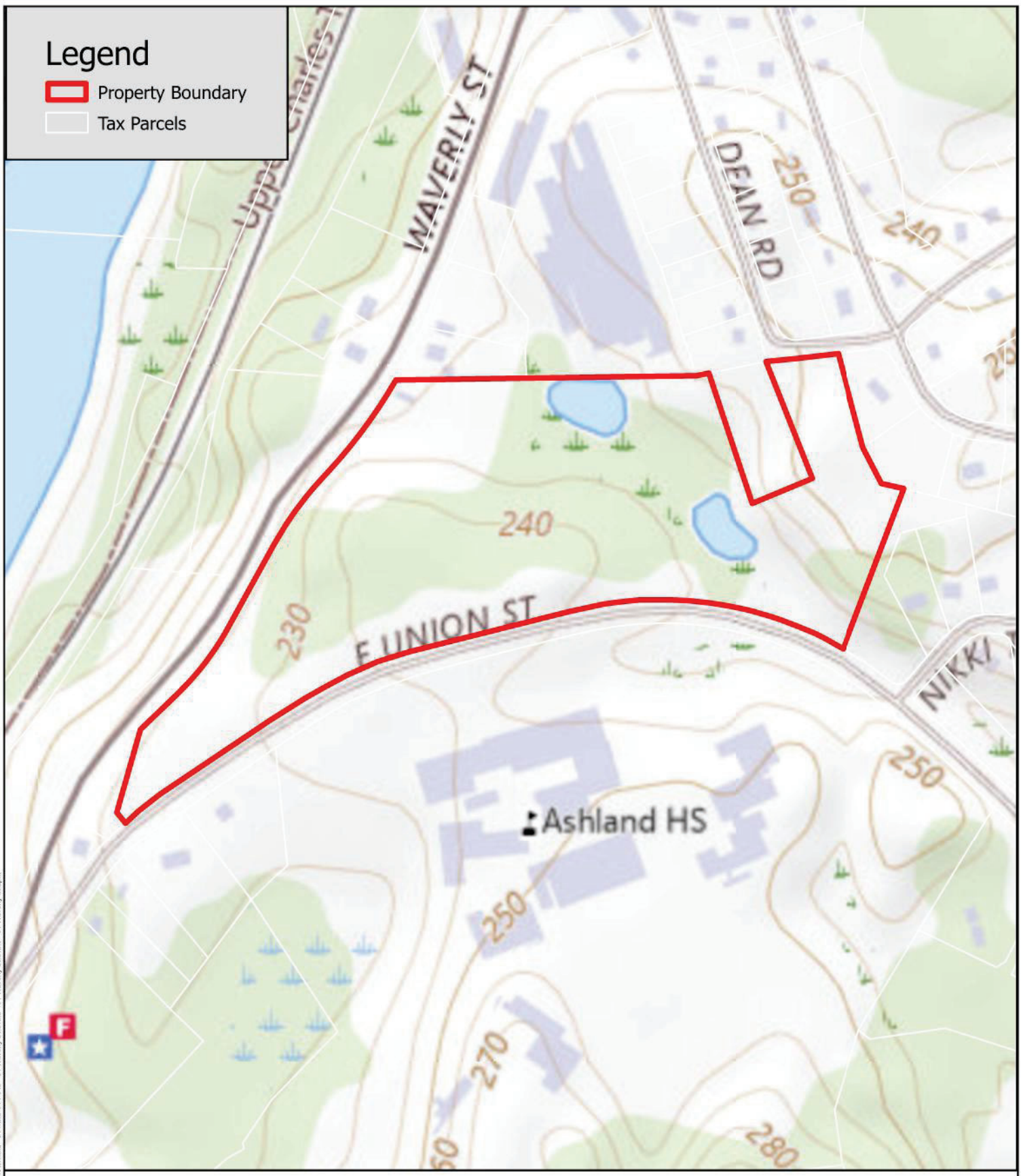
Date: 11/19/2024

61 Waverly Street
Ashland, MA 01721

Parcel ID: 15.0-12

Legend

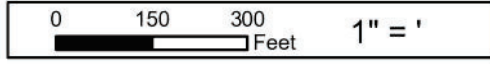
-  Property Boundary
-  Tax Parcels



S:\Ashland - 014.GIS\014.043 - 61 Waverly St\Ortho - 61 Waverly St.aprx



USGS of Locus Site



Date: 11/19/2024

61 Waverly Street
Ashland, MA 01721

Parcel ID: 15.0-12

4.05 Surface Evaluation for Stormwater (prepared by Sanborn Head)

Mr. Israel Lopez
The Gutierrez Company
200 Summit Drive, Suite 400
Burlington, Massachusetts 01803

May 21, 2025
File No. 6470.001

Re: Subsurface Evaluation for Stormwater
61 Waverly Street
Ashland, Massachusetts

Dear Israel:

This data report summarizes the results of recent subsurface explorations completed to support the design of stormwater management systems at the proposed development located at 61 Waverly Street in Ashland, Massachusetts (Site). This report has been prepared by Sanborn, Head & Associates, Inc. (Sanborn Head) on behalf of The Gutierrez Company (TGC, Client). The Site location is shown on Figure 1.

Based on our previous communication, we understand that TGC is pursuing the design and permitting of a multi-family development at the Site. The development will include surface parking, multi-car garages, and stormwater management systems. This data report includes an Exploration Location Plan, subsurface logs of the test pits completed at the Site, the results of geotechnical laboratory testing, and stormwater design considerations. This report is subject to the limitations in Attachment A. Elevations in this report reference the survey file by GLM Engineering Consultants on January 23, 2025 using the National Geodetic Vertical Datum of 1929 (NGVD 1929).

SUBSURFACE EXPLORATION PROGRAMS

December 2024

Between December 19 and 20, 2024, a total of nine (9) test pits, designated SH-TP-1 through SH-TP-9, were excavated at the Site by Form-Up Sitework (Form-Up) of Rindge, New Hampshire under the observation of Sanborn Head. The approximate locations of the test pits are shown on the attached Exploration Location Plan (Figure 2). The test pits were advanced to depths ranging between approximately 3 to 11 feet below ground surface (bgs) and were logged using the Modified Burmister System. Test pit logs are included in Attachment B.

During test pit excavation, soil samples were collected by Sanborn Head from test pits considered for stormwater at depths representative of the natural soils (C-layer below the upper forest mat and subsoil horizons). Three (3) soil samples taken from SH-TP-3, SH-TP-8, and SH-TP-9 were submitted to GeoTesting Express (GeoTesting) of Acton, Massachusetts for grain size analysis and United States Department of Agriculture (USDA) Textural Classification. The laboratory results are included as Attachment C.

May 2025

On May 5 and 6, 2025, eleven (11) additional test pits, designated SH-TP-101 through SH-TP-111, were excavated at the Site by Form-Up under the observation of Sanborn Head. The approximate locations of the test pits are shown on the attached Figure 2. The test pits were advanced to depths ranging between approximately 5.5 to 10 feet bgs. Stormwater test pit logs using the USDA Textural Classification system were prepared by a certified Massachusetts Soil Evaluator (Lauren Guiry, SE #14952) specifically for SH-TP-101 through SH-TP-106. The remaining test pits were logged using the Modified Burmister System. Both sets of test pit logs are included in Attachment B.

During excavation of the stormwater test pits, soil samples were collected by Sanborn Head at depths representative of the natural soils (C-layer below the upper topsoil and subsoil horizons). Soil samples taken from SH-TP-101, SH-TP-103, SH-TP-104, and SH-TP-106 were submitted to GeoTesting for grain size analysis and USDA Textural Classification. The laboratory results are included as Attachment C.

SUMMARY OF SUBSURFACE DATA

December 2024

Within the test pits considered for stormwater purposes (SH-TP-3, SH-TP-8, and SH-TP-9), Sanborn Head generally encountered an approximately 6-inch-thick topsoil horizon, underlain by approximately 2.2 to 2.5 feet of subsoil, underlain by fine to coarse sand with varying amounts of gravel, silt, and cobbles (natural soil, glacial till). Multiple boulders were encountered in each test pit, including boulders larger than 3 feet in diameter.

The USDA Textural Classification for the natural soil was either Loamy Sand or Sandy Loam, with a Hydrologic Soil Group (HSG) of either A or B, respectively. SH-TP-3 and SH-TP-8 were terminated at depths of approximately 4 and 11 feet bgs, respectively, due to probable bedrock. Refusal was not encountered in SH-TP-9; the test pit was terminated at approximately 10.5 feet bgs. In general, bedrock is understood to be higher in the central upland portion of the Site and drop radially towards the Site perimeter.

Neither groundwater nor redoximorphic features were observed in the test pits; however, it should be noted that groundwater levels will vary depending on seasonal variations in temperature, precipitation, and other factors that differ from conditions at the time groundwater observations were made.

May 2025

At stormwater test pit locations SH-TP-101 through SH-TP-106, Sanborn Head encountered a topsoil horizon ranging in thickness from approximately 4 to 32 inches, underlain by a subsoil horizon ranging in thickness from approximately 2 to 23 inches, underlain by Loamy Sand, with varying amounts of gravel and cobbles (natural soil, glacial till) to approximately 5.5 to 9 feet bgs, depending on the location.

The natural soil/C layer materials encountered in each test pit generally consisted of fine to coarse sand, with varying quantities of gravel, cobbles, and silt. The USDA Textural

Classifications for the natural soils submitted to GeoTesting are Loamy Sand, HSG A. The test pits were terminated at depths between approximately 5.5 and 9 feet bgs due to either encountered groundwater, refusal on boulders, or refusal on bedrock, as outlined on the attached logs.

Similar to the December 2024 test pits, groundwater was generally not encountered in the upland portion of the Site, suggesting that where rainfall runoff penetrates the ground it travels to the top of the bedrock surface and generally follows the top of bedrock down toward the perimeter of the Site. Where groundwater and/or redoximorphic features were encountered in the lower elevation test pits, it generally varied between 219.0 and 225.5 as summarized below:

Test Pit Location	Groundwater Observation (Depth - inches / Elevation – feet)	Redoximorphic Features (Depth – inches / Elevation – feet)
SH-TP-101	Not Observed	78 / 217.5
SH-TP-102	Weeping: 18, 90 / 225.5, 219.5 Standing: 96 / 219.0	18 to 60 / 225.5 to 222.0
SH-TP-103	Weeping: 34, 90 / 225.1, 220.5 Standing: 96 / 220.0	34 to 54 / 225.1 to 223.5
SH-TP-104	Not Observed	19 to 21 – see Note 1

1. Redoximorphic features observed in SH-TP-104 not interpreted as ESHGW.

It should be noted that groundwater levels will vary depending on seasonal variations in temperature, precipitation, and other factors that differ from conditions at the time groundwater observations were made.

STORMWATER RECOMMENDATIONS

The visual classification and laboratory test results for the submitted samples are summarized in the table below, including HSG, ESHGW, and USDA Textural Classification. The presumptive Rawl’s Rate infiltration (K) at each test pit location is also provided based on the USDA soil texture in accordance with the Massachusetts Stormwater Handbook.



Test Pit	HSG	USDA Textural Classification	K (in/hr)	ESHW (El., ft)	Test Pit Depth (ft)	Stormwater BMP
SH-TP-3	A	Very Gravelly Loamy Sand	2.41	<220	4.0 Refusal	N/A
SH-TP-8	B	Gravelly Sandy Loam	1.02	<225	11.0 Refusal	Eastern Subsurface (Note 1)
SH-TP-9	A	Very Gravelly, Cobbly Loamy Sand	2.41	<215	10.5 No Refusal	Northern Subsurface (Note 1)
SH-TP-101	A	Gravelly Loamy Sand	2.41	217.50	8.0 Refusal	Bioswale
SH-TP-102	A	Gravelly Loamy Sand	2.41	225.50	8.5 Refusal	Surface Basin
SH-TP-103	A	Gravelly Loamy Sand	2.41	225.17	9.0 No Refusal	
SH-TP-104	A	Cobbly, Gravelly Loamy Sand	2.41	<218	9.0 Refusal	Northern Subsurface
SH-TP-105	A	Cobbly, Gravelly Loamy Sand	2.41	<230.5	5.5 Refusal	Eastern Subsurface
SH-TP-106	A	Cobbly, Gravelly Loamy Sand	2.41	<234.5	7.5 Refusal	

1. SH-TP-8 and SH-TP-9 are within 55 and 35 feet, respectively, of the listed BMP.

In general, we recommended that after exposing the proposed subgrade for the proposed stormwater feature(s), any remaining existing topsoil, subsoil and/or boulders that interfere with stormwater structure installation be removed within the feature’s footprint, and if necessary, replaced with suitably draining material that meets or exceeds the proposed infiltration rates for the respective basin. Due to the potential variability within the natural glacial till soil, we further recommend the removal of isolated pockets of poorly-drained material (Silt Loam), if encountered during future stormwater feature construction.

Care should also be taken to limit disturbance to exposed stormwater system subgrades to avoid over-compaction and/or deposition of silty materials by erosion and surface runoff. In the event exposed subgrades are not maintained, unsuitable subgrades should be identified, cleaned or scraped, and, if necessary, unsuitable materials over-excavated and replaced with suitably draining material that meets or exceeds the proposed infiltration rates for the respective basin.

We trust this data report meets the current needs of the project. If you should have any questions, please call us at (978) 577-1030.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.



Corinne R. Disenhof
Project Manager



Luke Norton, PE
Vice President



LGG/CRD/LDN: lgg

- Encl. Figure 1 – Locus Plan
- Figure 2 – Exploration Location Plan
- Attachment A – Limitations
- Attachment B – Subsurface Exploration Logs
- Attachment C – Laboratory Analytical Results

\\conserv1\shdata\6400s\6470.001\Source Files\May 2025 - Stormwater Subsurface Data Report\
20250521 - Stormwater Data Report_Ashland.docx



Figures



NOTES:
 The base map was taken from the 7.5-minute USGS Topographic Quadrangle Maps mosaic created in June 2001 by MassGIS (Bureau of Geographic Information).



Drawn By: D. Dombrowsky
 Designed By: C. Disen Hof
 Reviewed By: L. Norton
 Project No: 6470.001
 Date: May 2025

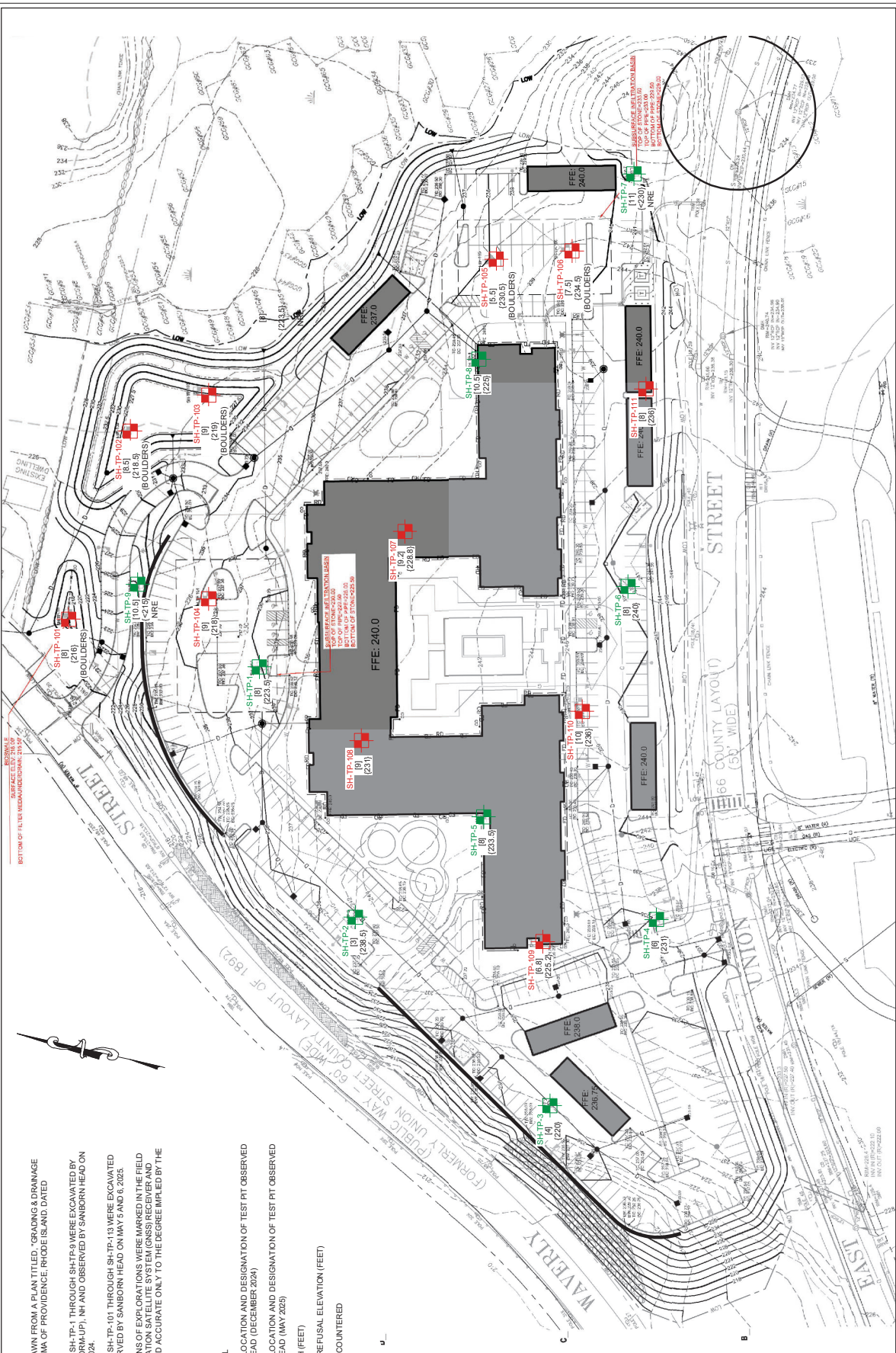


Figure 1

Locus Plan

Stormwater Subsurface Data Report

61 Waverly Street
 Ashland, Massachusetts



- NOTES:**
1. THE BASE MAP WAS DRAWN FROM A PLAN TITLED, "GRADING & DRAINAGE PLAN PREPARED BY SMMVA OF PROVIDENCE, RHODE ISLAND DATED FEBRUARY 10, 2025.
 2. TEST PITS DESIGNATED SH-TP-1 THROUGH SH-TP-9 WERE EXCAVATED BY FORM-UP SITEWORK (FORM-UP), NH AND OBSERVED BY SANBORN HEAD ON DECEMBER 19 AND 20, 2024.
 3. TEST PITS DESIGNATED SH-TP-10 THROUGH SH-TP-13 WERE EXCAVATED BY FORM-UP AND OBSERVED BY SANBORN HEAD ON MAY 15 AND 16, 2025.
 4. APPROXIMATE LOCATIONS OF EXPLORATIONS WERE MARKED IN THE FIELD USING A GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) RECEIVER AND SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

- LEGEND:**
- SH-R-1 APPROXIMATE LOCATION AND DESIGNATION OF TEST PIT OBSERVED BY SANBORN HEAD (DECEMBER 2024)
 - SH-TP-10 APPROXIMATE LOCATION AND DESIGNATION OF TEST PIT OBSERVED BY SANBORN HEAD (MAY 2025)
 - (8) TEST PIT DEPTH (FEET)
 - (223.3) APPROXIMATE REFUSAL ELEVATION (FEET)
 - NRE NO REFUSAL ENCOUNTERED

61 WAVERLY STREET
ASHLAND, MASSACHUSETTS

EXPLORATION LOCATION PLAN

DRAWN BY: D. DOMBROWSKY
DESIGNED BY: C. DISENHOF
REVIEWED BY: L. NORTON
PROJECT MGR: C. DISENHOF
PIC: L. NORTON
DATE: MAY 2025

PROJECT NUMBER: 6470.001
FIGURE NUMBER: 2

NO.	DATE	DESCRIPTION	BY

Attachment A

Limitations

ATTACHMENT A

LIMITATIONS

Explorations

1. The analyses, recommendations, and designs submitted in this report are based in part on the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions may be more or less gradual than indicated. For specific information, refer to the test pit logs.
3. Water level readings have been made in the test pits, if applicable, at the times and under the conditions stated on the exploration logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from those occurring at the time measurements were made.

Review

4. In the event that any changes in the nature, design, or location of the proposed building are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and conclusions of the report modified or verified in writing by Sanborn Head.

Construction

5. It is recommended that this firm be retained to provide soil engineering services during the excavation and earthwork construction phases of the work. This is to observe compliance with the design concepts, specifications, or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

6. This report has been prepared for the exclusive use of The Gutierrez Company for the proposed multi-family development at 61 Waverly Street in Ashland, Massachusetts, in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
7. This data report has been prepared for this project by Sanborn Head for design purposes only and is not sufficient to prepare an accurate bid. Contractors wishing a copy of this report may secure it with the understanding that its scope is limited to design considerations only.

Attachment B

Subsurface Exploration Logs



Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-1

Ground Elevation: 231.5 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 09:00
 Time Finished: 09:30

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water --- Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	TOPSOIL.	0	↑	↑	
0.5		0.5	Light brown, fine to coarse SAND, some Gravel, little Silt, trace Cobbles. Moist.	0.5	↑	↑	
2							
4					M	10A 5B 2C	
6							
8		8	Test pit terminated at 8 feet bgs due to refusal on bedrock or boulders.	8	↓	↓	
10							
12							
14							
16							
18							
20							

TEST.PIT P:\6400S\6470.00\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
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Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-2

Ground Elevation: 241.5 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 10:00
 Time Finished: 10:30

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water --- Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	TOPSOIL.	0	M	↑	
0.5		0.5	Brown, fine to coarse SAND, some Gravel, some Silt, trace Cobbles. Moist. SUBSOIL.	0.5	↑	12A 6B 5C	
2					D		
3		3	Test pit terminated at 3 feet bgs due to refusal on probable bedrock.	3	↓		
4							
6							
8							
10							
12							
14							
16							
18							
20							

TEST PIT P:\6400S\6470.00\1\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
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Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-3

Ground Elevation: 224 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 10:00
 Time Finished: 10:30

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water N/A Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	Brown, fine to coarse SAND, little Silt, trace Gravel, very few Root fragments.	0	↑		
		0.5	Moist. TOPSOIL.	0.5			
			Brown, fine to coarse SAND, some Gravel, some Silt. Moist. SUBSOIL.		M		
2							
		3	Brown, fine to coarse SAND and Gravel, little Silt, little Cobbles. Moist. [VERY GRAVELLY LOAMY SAND].	3	↓		
4		4	Test pit terminated at 4 feet bgs due to refusal on probable bedrock.	4			
6							
8							
10							
12							
14							
16							
18							
20							

TEST PIT P:\6400S\6470.00\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
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Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 12:00
 Time Finished: 12:30

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water N/A Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	Brown, fine to coarse SAND, little Silt, trace Gravel, very few Root fragments.	0	↑	↑	
0.5		0.5	Moist. TOPSOIL.	0.5	↑	↑	
2			Brown, fine to coarse SAND, little Gravel, little Silt, trace Cobbles. Moist. SUBSOIL.		M	10A 2B	
2.5		2.5	Gray, fine to coarse SAND, some Gravel, little Cobbles, little Silt. Moist.	2.5	↑	↑	
4					D	20A 6B 1C	
6		6	Test pit terminated at 6 feet bgs due to refusal on probable bedrock.	6	↓	↓	
8							
10							
12							
14							
16							
18							
20							

TEST.PIT P:\6400S\6470.00\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
--	---	--	-----------------------------	---------------------------

Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 12:30
 Time Finished: 13:00

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water --- Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excav. Effort	Boulder Qty & Class	Remarks
0		0	TOPSOIL.	0			
0.2		0.2	Light brown, fine to coarse SAND, some Gravel, some Silt, trace Cobbles. Moist. SUBSOIL.	0.2	E	10A 4B	
2							
3		3	Gray, fine to coarse SAND, some Gravel, little Cobbles, little Silt. Moist.	3			
4							
6					D	10A 2B 1C	
8		8	Test pit terminated at 8 feet bgs due to refusal on probable bedrock.	8			
10							
12							
14							
16							
18							
20							

TEST.PIT P:\6400S\6470.00\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

Excavation Effort

E	Easy
M	Moderate
D	Difficult

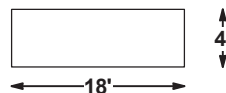
Boulder Size Classification

12" - 24"	A
24" - 36"	B
36" and larger	C

Soil Description

Minor Component Proportions	
trace	0 - 10%
little	10 - 20%
some	20 - 35%
and	35 - 50%

Test Pit Plan



North Arrow



Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 13:00
 Time Finished: 15:00

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water --- Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	TOPSOIL.	0	↑	↑	
0.5		0.5	Light brown, fine to coarse SAND, little Gravel, little Silt, trace Cobbles. Moist. SUBSOIL.	0.5	M	4A 6B 2C	
2		2	Gray, fine to coarse SAND, some Gravel, little Sand, trace Cobbles.	2	↑	↑	
4							
6					D	6A 2B 2C	
8		8	Test pit terminated at 8 feet bgs due to refusal on probable bedrock.	8	↓	↓	
10							
12							
14							
16							
18							
20							

TEST.PIT P:\6400S\6470.00\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
--	---	---	-----------------------------	---------------------------

Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 14:00
 Time Finished: 14:30

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water N/A Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	TOPSOIL.	0			
0.2		0.2	Light brown, fine to coarse SAND, some Gravel, some Silt, trace Cobbles. Moist. SUBSOIL.	0.2	↑	↑	
2					M	3A 2B 1C	
4		4	Gray, fine to coarse SAND, some Gravel, little Silt, little Cobbles. Moist. TILL.	4	↑	↑	
6							
8					M	5A 2B 3C	
10							
11		11	Test pit terminated at 11 feet bgs. No refusal encountered.	11	↓	↓	
12							
14							
16							
18							
20							

TEST.PIT P:\6400S\6470.00\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
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Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-8

Ground Elevation: 236 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 12/14/24
 Time Started: 10:00
 Time Finished: 10:30

Logged By: A. Grochmal
 Checked By: C. Disenhof

Weather: Clear, 40°

Groundwater Readings
 Date 12/14/24 Time --- Depth to Water --- Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 14 ft

Make: Komatsu
 Model: PL
 Bucket Capacity: CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	TOPSOIL.	0	↑		
0.5		0.5	Brown, fine to coarse SAND, some Silt, little Gravel, trace Cobbles. Moist. SUBSOIL.	0.5			
2.7		2.7	Brown, fine to coarse SAND, some Silt, some Gravel, trace Cobbles. Moist. [GRAVELLY SANDY LOAM].	2.7			
11		11	Test pit terminated at 11 feet bgs due to refusal on probable bedrock.	11	↓		

TEST.PIT P:\6400S\6470.00\1\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
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Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-9

Ground Elevation: 225.5 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 12/20/24
 Time Started: 07:00
 Time Finished: 07:45

Logged By: L. Norton
 Checked By: C. Disenhof

Weather: Cloudy, 3°

Groundwater Readings
 Date 12/20/24 Time --- Depth to Water N/A Ref. Pt. --- Depth of Test Pit --- Stab. Time ---

Excavation Equipment

Contractor: Form-Up Construction
 Operator: Kenyon
 Reach: 15 ft


Make: Komatsu
 Model: PL
 Bucket Capacity: 0.5 CY

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	TOPSOIL/FILL.	0	↑	↑	Brush pile observed at the ground surface. The thickened subsoil contained a large boulder, topsoil, and broken rock fragments and is interpreted to be a reworked subsoil.
0.5		0.5	Brown, fine to coarse SAND, some Silt, little Gravel, trace Cobbles. Moist. REWORKED SUBSOIL.	0.5	↑	↑	
2		2.7	Light brown/gray, fine to coarse GRAVEL and Sand, little Cobbles, little Silt. Moist. [VERY GRAVELLY, COBBLY LOAMY SAND].	2.5	E	↑	
5		5		5	↓	1C 2-3A	
10.5		10.5	Test pit terminated at 10.5 feet bgs. No refusal encountered.	10.5	↓	↓	


TEST PIT P:\6400S\6470.00\WORK\LOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 1/30/25

<p>Excavation Effort</p> <p>E Easy M Moderate D Difficult</p>	<p>Boulder Size Classification</p> <p>12" - 24" A 24" - 36" B 36" and larger C</p>	<p>Soil Description</p> <p>Minor Component Proportions</p> <p>trace 0 - 10% little 10 - 20% some 20 - 35% and 35 - 50%</p>	<p>Test Pit Plan</p>	<p>North Arrow</p>
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Deep Observation Hole

Site Name: 61 Waverly Street Site Address: Ashland, MA Project No.: 6470.001 Ground Surface Elev. (ft.): 224		Date: 5/6/2025 Time: 7:25 Weather: Cloudy/Rain, 55F									
Logged by: L. Guiry Soil Evaluator #: SE14952											
Test Pit Number: SH-TP-101											
Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features		Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other	
			Depth	Color		Percent	Gravel				Cobbles
0 - 12	Ap	10YR 3/2	-	-	Sandy Loam	<5	0	Weak Granular	Very Friable	1	
12 - 20	Bw	10YR 4/4	-	-	Gravelly Sandy Loam	20	5	Massive	Friable	2	
20 - 96	C	2.5Y 5/3	78"	10YR 3/4	Gravelly Loamy Sand	20	10	Massive	Friable	2, 3	
-											
Test Pit Termination Depth (in.): 96			Reason for Termination: Refusal on boulders in the east/west sidewalls.								
Groundwater Observations:			In-Situ Testing: No in-situ testing performed.								
Depth to water weeping from pit face (in.): NE			NA		Stabilization Time:		NA		Percolation Test: NA		Depth (in.): NA
Depth to standing water in hole (in.):			78		Basis for ESHGW:		Redoximorphic Features		Permeameter Test: NA		Depth (in.): NA
Depth to estimated seasonal high groundwater [ESHGW] (in.):			78		Basis for ESHGW:		Redoximorphic Features		Falling Head Test: NA		Depth (in.): NA
Additional Notes:			Other Test: NA								
1. Ap-horizon thickness ranges from approximately 6 to 12 inches. 2. Numerous boulders ranging in diameter from 0.5 to 3 ft were observed in the B-horizon/C layer. 3. Redoximorphic features were observed in the southern sidewall of the test pit. 4. NE = Not encountered NA = Not applicable											


Deep Observation Hole

Site Name: 61 Waverly Street Site Address: Ashland, MA Project No.: 6470.001 Ground Surface Elev. (ft.): 227		Date: 5/6/2025 Time: 8:35 Weather: Cloudy/Rain, 55F									
Logged by: L. Guiry Soil Evaluator #: SE14952											
Test Pit Number: SH-TP-102											
Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features		Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other	
			Depth	Color		Percent	Gravel				Cobbles
0 - 10	Ap	10YR 3/2	-	-	Sandy Loam	5	0	Weak Granular	Very Friable	-	
10 - 18	Bw	10YR 4/4	-	-	Gravelly Sandy Loam	15	5	Massive	Friable	-	
18 - 102	C	2.5Y 5/3	18-60"	10YR 3/6 2.5Y 6/2	Gravelly Loamy Sand	25	10	Massive	Friable	-	
-											
Test Pit Termination Depth (in.): 102			Reason for Termination: Groundwater/Refusal on boulders in the western sidewall.								
Groundwater Observations:											
Depth to water weeping from pit face (in.): 18, 90			In-Situ Testing: No in-situ testing performed.								
Depth to standing water in hole (in.): 96			Stabilization Time: 10 min		Percolation Test: NA		Depth (in.): NA		NA		
Depth to estimated seasonal high groundwater [ESHGW] (in.): 18			Basis for ESHGW: Redoximorphic Features		Permeameter Test: NA		Depth (in.): NA		NA		
Additional Notes:			18		Falling Head Test: NA		Depth (in.): NA		NA		
1. NA = Not applicable			Other Test: NA		Depth (in.): NA		NA		NA		


Deep Observation Hole

Site Name: 61 Waverly Street Site Address: Ashland, MA Project No.: 6470.001 Ground Surface Elev. (ft.): 228		Date: 5/6/2025 Time: 9:30 Weather: Cloudy/Rain, 60F									
Logged by: L. Guiry Soil Evaluator #: SE14952											
Test Pit Number: SH-TP-103											
Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features		Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other	
			Depth	Color		Percent	Gravel				Cobbles
0 - 32	Ap	10YR 3/2	-	-	Sandy Loam	5	0	Weak Granular	Very Friable	-	
32 - 34	Bw	10YR 4/4	-	-	Gravelly Sandy Loam	15	<5	Massive	Friable	-	
34 - 108	C	2.5Y 5/3	34-54"	10YR 3/6 2.5Y 6/2	Gravelly Loamy Sand	35	10	Massive	Friable	-	
-											
Test Pit Termination Depth (in.): 108					Reason for Termination: Groundwater.						
Groundwater Observations:											
Depth to water weeping from pit face (in.): 34, 90			In-Situ Testing: No in-situ testing performed.								
Depth to standing water in hole (in.): 96			Stabilization Time: 10 min		Percolation Test: NA		Depth (in.): NA		NA		
Depth to estimated seasonal high groundwater [ESHGW] (in.): 34			Basis for ESHGW: Redoximorphic Features		Permeameter Test: NA		Depth (in.): NA		NA		
Additional Notes:			34		Falling Head Test: NA		Depth (in.): NA		NA		
1. NA = Not applicable			Other Test: NA		Depth (in.): NA		NA		NA		


Deep Observation Hole

Site Name: 61 Waverly Street Site Address: Ashland, MA Project No.: 6470.001 Ground Surface Elev. (ft.): 227		Date: 5/6/2025 Time: 10:10 Weather: Rain, 60F									
Logged by: L. Guiry Soil Evaluator #: SE14952											
Test Pit Number: SH-TP-104											
Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features		Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other	
			Depth	Color		Percent	Gravel				Cobbles
0 - 12	Ap	10YR 3/2	-	-	Sandy Loam	5	0	Weak Granular	Very Friable	-	
12 - 19	Bw	10YR 4/4	-	-	Gravelly Sandy Loam	20	10	Massive	Friable	-	
19 - 108	C	2.5Y 5/3	19-21"	10YR 3/6	Cobbly, Gravelly Loamy Sand	20	15	Massive	Friable	1	
-											
Test Pit Termination Depth (in.): 108			Reason for Termination: Refusal on boulders.								
Groundwater Observations:											
Depth to water weeping from pit face (in.): NE			Stabilization Time:		Percolation Test:		No in-situ testing performed.		Depth (in.): NA		
Depth to standing water in hole (in.): NA			Basis for ESHGW: <108		Permeameter Test:		Falling Head Test:		Depth (in.): NA		
Depth to estimated seasonal high groundwater [ESHGW] (in.):			Not observed		Other Test:		Depth (in.): NA		Depth (in.): NA		
Additional Notes:											
1. Redoximorphic features observed at the interface of B-horizon and C layer; not interpreted as ESHGW.											
2. NE = Not encountered NA = Not applicable											

Deep Observation Hole

Site Name: 61 Waverly Street Site Address: Ashland, MA Project No.: 6470.001 Ground Surface Elev. (ft.): 236											
Date: 5/6/2025 Time: 12:30 Weather: Rain, 60F											
Logged by: L. Guiry Soil Evaluator #: SE14952											
Test Pit Number:	SH-TP-105										
Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features		Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other	
			Depth	Color	Percent		Gravel	Cobbles			
0 - 4	Ap	10YR 3/2	-	-	-	Sandy Loam	5	0	Weak Granular	Very Friable	-
4 - 18	Bw	10YR 4/6	-	-	-	Gravelly Sandy Loam	15	<5	Massive	Friable	-
18 - 66	C	2.5Y 5/3	-	-	-	Cobbly, Gravelly Loamy Sand	30	15	Massive	Friable	-
-											
Test Pit Termination Depth (in.):			66		Reason for Termination: Refusal on boulders.						
Groundwater Observations:											
Depth to water weeping from pit face (in.):			NE		In-Situ Testing: No in-situ testing performed.						
Depth to standing water in hole (in.):			NA		Stabilization Time:		NA		Percolation Test:		NA
Depth to estimated seasonal high groundwater [ESHGW] (in.):			<66		Basis for ESHGW:		Not observed		Permeameter Test:		NA
Additional Notes:					Other Test:		NA		Falling Head Test:		NA
1. NE = Not encountered									Depth (in.):		NA
NA = Not applicable									Depth (in.):		NA

Deep Observation Hole

Site Name: 61 Waverly Street Site Address: Ashland, MA Project No.: 6470.001 Ground Surface Elev. (ft.): 242		Date: 5/6/2025 Time: 11:30 Weather: Rain, 60F									
Logged by: L. Guiry Soil Evaluator #: SE14952											
Test Pit Number: SH-TP-106											
Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features		Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other	
			Depth	Color		Percent	Gravel				Cobbles
0 - 5	Ap	10YR 3/2	-	-	Sandy Loam	5	0	Weak Granular	Very Friable	-	
5 - 17	Bw	10YR 4/4	-	-	Gravelly Sandy Loam	15	5	Massive	Friable	-	
17 - 90	C	2.5Y 5/3	-	-	Cobbly, Gravelly Loamy Sand	15	15	Massive	Friable	-	
-											
Test Pit Termination Depth (in.): 90			Reason for Termination: Refusal on boulders.								
Groundwater Observations: No in-situ testing performed.											
Depth to water weeping from pit face (in.): NE			Stabilization Time:		Percolation Test:		Depth (in.):		NA		
Depth to standing water in hole (in.): NA			Basis for ESHGW:		Permeameter Test:		Depth (in.):		NA		
Depth to estimated seasonal high groundwater [ESHGW] (in.): <90			Not observed		Falling Head Test:		Depth (in.):		NA		
Additional Notes:					Other Test:		Depth (in.):		NA		
1. NE = Not encountered NA = Not applicable											



Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-107

Ground Elevation: 238 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 05/05/25
 Time Started: 12:00
 Time Finished: 12:30

Logged By: C. Disenhof
 Checked By: L. Norton

Weather: Wet, 55°

Excavation Equipment

Contractor: Form-Up Site Work
 Operator: Ben
 Reach: 13 ft

Make: Volvo
 Model: 160B LC
 Bucket Capacity: 1 CY

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Test Pit	Stab. Time
05/05/25	---			No Groundwater Encountered	

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	FOREST MAT.	0	E		
0.3		0.3	Brown, fine to coarse SAND and Silt, little Gravel, trace Cobbles. Moist. SUBSOIL.	0.3		2A	
1		1		1			
2.5		2.5	Gray, fine to coarse SAND and Gravel, little Cobbles, little Silt. Moist. TILL.	2.5		6A 4B 1C	
5.5		5.5		5.5		4B 1C	
9.2		9.2	PROBABLE BEDROCK	9.2			
9.2		9.2	Test pit terminated at 9.2 feet bgs due to refusal on probable bedrock.	9.2			

TEST PIT: P:\6400S\6470.001\WORKLOGS\6470.001.GPJ 2017 SANBORN HEAD V.1.GLB 2010 SANBORN HEAD V.2.GDT 5/20/25

Excavation Effort

E	Easy
M	Moderate
D	Difficult

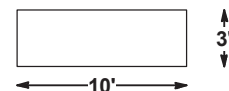
Boulder Size Classification

12" - 24"	A
24" - 36"	B
36" and larger	C

Soil Description
Minor Component Proportions

trace	0 - 10%
little	10 - 20%
some	20 - 35%
and	35 - 50%

Test Pit Plan



North Arrow





Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-108

Ground Elevation: 240 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 05/05/25
 Time Started: 08:15
 Time Finished: 08:30

Logged By: C. Disenhof
 Checked By: L. Norton

Weather: Rain, 55°

Excavation Equipment

Contractor: Form-Up Site Work
 Operator: Ben
 Reach: 13 ft

Make: Volvo
 Model: 160B LC
 Bucket Capacity: 1 CY

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Test Pit	Stab. Time
05/05/25	---				No Groundwater Encountered

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	FOREST MAT.	0	↑	↑	
0.75		0.75	Brown, fine to coarse SAND and Silt, few Roots, trace Gravel. Moist. SUBSOIL.	0.75	E		
2		2.3	Gray, fine to coarse SAND, some Gravel, little Cobbles, little Silt. Moist. TILL.	2.3	↓		
4						4A	
6					M		
8							
9		9	Test pit terminated at 9 feet bgs due to refusal on probable bedrock.	9	↓	↓	
10							
12							
14							
16							
18							
20							

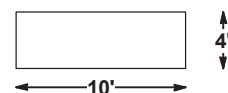
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Excavation Effort
 E Easy
 M Moderate
 D Difficult

Boulder Size Classification
 12" - 24" A
 24" - 36" B
 36" and larger C

Soil Description
Minor Component Proportions
 trace 0 - 10%
 little 10 - 20%
 some 20 - 35%
 and 35 - 50%

Test Pit Plan



North Arrow





Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-109

Ground Elevation: 234 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 05/05/25
 Time Started: 09:20
 Time Finished: 00:00

Logged By: C. Disenhof
 Checked By: L. Norton

Weather: Rain, 55°

Excavation Equipment

Contractor: Form-Up Site Work
 Operator: Ben
 Reach: 13 ft

Make: Volvo
 Model: 160B LC
 Bucket Capacity: 1 CY

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Test Pit	Stab. Time
05/05/25	---				No Groundwater Observed

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	FOREST MAT.	0	↑	↑	Approximately 3-ft diameter boulder at surface.
0.5		0.5	Brown, fine to coarse SAND and Silt, common Roots, trace Gravel, trace Cobbles. Moist. SUBSOIL.	0.5	E	2A 1B	
2		2	Light brown, fine to coarse SAND, some Silt, little Gravel, little Cobbles. Moist. TILL.	2	↓	↓	
6.8		6.8	Test pit terminated at 6.8 feet bgs due to refusal on probable bedrock.	6.8	D	7A 3B	

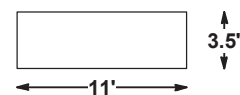
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Excavation Effort
 E Easy
 M Moderate
 D Difficult

Boulder Size Classification
 12" - 24" A
 24" - 36" B
 36" and larger C

Soil Description
Minor Component Proportions
 trace 0 - 10%
 little 10 - 20%
 some 20 - 35%
 and 35 - 50%

Test Pit Plan



North Arrow





Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-110

Ground Elevation: 246 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 05/05/25
 Time Started: 10:15
 Time Finished: 00:00

Logged By: C. Disenhof
 Checked By: L. Norton

Weather: Rain, 55°

Excavation Equipment

Contractor: Form-Up Site Work
 Operator: Ben
 Reach: 13 ft

Make: Volvo
 Model: 160B LC
 Bucket Capacity: 1 CY

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Test Pit	Stab. Time
05/05/25	---				No Groundwater Encountered

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	FOREST MAT.	0	↑	1C	
0.8		0.8	Brown, SILT, some Cobbles, little Sand, trace Gravel. Moist. SUBSOIL.	0.8	E	↑	
2		2.5	Gray, fine to coarse SAND, some Gravel, little Cobbles, little Silt. Moist. TILL.	2.5	↓	1B	
4							
6					M	5A	
8							
10		10	Test pit terminated at 10 feet bgs due to refusal on probable bedrock.	10	↓		
12							
14							
16							
18							
20							

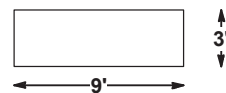
TEST PIT: P:\6400S\6470.001\WORKLOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 5/20/25

Excavation Effort
 E Easy
 M Moderate
 D Difficult

Boulder Size Classification
 12" - 24" A
 24" - 36" B
 36" and larger C

Soil Description
Minor Component Proportions
 trace 0 - 10%
 little 10 - 20%
 some 20 - 35%
 and 35 - 50%

Test Pit Plan



North Arrow





Project: 61 Waverly St
 Location: Ashland, MA
 Project No.: 6470.001

Test Pit No. SH-TP-111

Ground Elevation: 244 ± feet
 Datum: NGVD 1929

Sanborn, Head & Associates, Inc.

Date: 05/05/25
 Time Started: 11:10
 Time Finished: 00:00

Logged By: C. Disenhof
 Checked By: L. Norton

Weather: Overcast, 55°

Excavation Equipment

Contractor: Form-Up Site Work
 Operator: Ben
 Reach: 13 ft

Make: Volvo
 Model: 160B LC
 Bucket Capacity: 1 CY

Groundwater Readings

Date	Time	Depth to Water	Ref. Pt.	Depth of Test Pit	Stab. Time
05/05/25	---				No Groundwater Observed

Depth (ft)	Field Testing Data	Strata Depth (ft)	Geologic Description	Strata Depth (ft)	Excv. Effort	Boulder Qty & Class	Remarks
0		0	FOREST MAT.	0			
0.5		0.5	Brown, fine to coarse SAND and Silt, few Roots, little Gravel, trace Cobbles.	0.5		5A 5B	
2.4		2.4	BOULDERS or BEDROCK	2.4			
4			Gray, fine to coarse SAND, some Gravel, trace Cobbles, little Silt. TILL.		D	10A 5B	Nested boulders from approximately 3 to 8 feet bgs.
8			PROBABLE BEDROCK.				
8			Test pit terminated between 2.4 to 8 feet bgs due to refusal on probable bedrock.				

TEST PIT: P:\6400S\6470.001\WORKLOGS\6470.001.GPJ 2017 SANBORN HEAD V1.GLB 2010 SANBORN HEAD V2.GDT 5/20/25

Excavation Effort

E	Easy
M	Moderate
D	Difficult

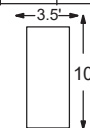
Boulder Size Classification

12" - 24"	A
24" - 36"	B
36" and larger	C

Soil Description
Minor Component Proportions

trace	0 - 10%
little	10 - 20%
some	20 - 35%
and	35 - 50%

Test Pit Plan



North Arrow



Description and Classification of Soil

1. Density or Consistency: The density or consistency of a soil sample is based on the Standard Penetration Test N-value according to the following table:

Density of Granular Soil	SPT N-Value		Consistency of Cohesive Soil
Very Loose	0-4	<2	Very Soft
Loose	5-10	2-4	Soft
Medium Dense	11-30	5-8	Medium Stiff
Dense	31-50	9-15	Stiff
Very Dense	>50	16-30	Very Stiff
		>30	Hard

The Standard Penetration Resistance, or N-value in blows per foot, is the sum of the blows recorded over the second and third 6-inch interval.

A number followed by "/3" indicates the distance that the sampler advanced. For example, "100/4" indicates that 100 blows of a 140-pound hammer falling 30 inches advanced the sampler 4 inches. "WOR/24" indicates the weight of the drilling rods without the hammer caused the sampler to advance 24 inches.

"WOH" indicates the static weight of the 140-pound hammer and the drilling rods attached to the split spoon sampler were sufficient to cause the sampler to advance.

"WOR" indicates the static weight of the drilling rods attached to the split spoon sampler was sufficient to cause the sampler to advance.

2. Color: The color of a soil sample is based on visual observation.

3. Soil Components

- A. Description: The components of a soil sample are described by visually estimating the percentage of each component by weight of the total sample using a Modified Burmister System.

- i. Major Component: The major soil component is written with upper case letters for granular soil (e.g., SAND, GRAVEL) and a combination of upper- and lower-case letters for fine grained soil (e.g., Silty CLAY, Clayey SILT).

- ii. Minor Component: The minor soil components are written with the first letter of each soil type in upper case, and the remaining letters in lower case (e.g., Gravel, Silt). The minor components are identified and prefaced in the description based on the following percentages:

Preface	Percentage
and	35-50
some	20-35
little	10-20
trace	0-10

- iii. Note: The actual percentages of gravel soil may differ from that measured when sampling with a standard split spoon sampler because of the relatively small sampler diameter. Also, it is not possible to identify the presence of boulders and cobbles using a standard split spoon sampler.

B. Definitions

- i. Granular Soil: A granular soil sample is defined by the following particle sizes as referenced to a standard sieve:

Material	Description	Standard Sieve Limit	
		Upper	Lower
Boulders	C-sized	--	36 inch
	B-sized	36 inch	24 inch
	A-sized	24 inch	12 inch
Cobbles	--	12 inch	3 inch
Gravel	coarse	3 inch	3/4 inch
	fine	3/4 inch	No. 4
Sand	coarse	No. 4	No. 10
	medium	No. 10	No. 40
	fine	No. 40	No. 200

- ii. Fine Grained Soil: The degree of plasticity of fine-grained soils is defined as follows:

Material	Degree of Plasticity	Plasticity Index (PI)	Smallest Thread Diameter (in.)
SILT	Non-Plastic	0	None
Clayey SILT	Slight	1 to 5	1/4
SILT & CLAY	Low	5 to 10	1/8
CLAY & SILT	Medium	10 to 20	1/16
Silty CLAY	High	20 to 40	1/32
CLAY	Very High	40+	1/64

- iii. Organic Soil: An organic soil sample is classified by observation of the sample structure as follows:

Material	Description
TOPSOIL	Surficial soils that support plant life and which contain organic matter.
SUBSOIL	Soil underlying the topsoil which may contain roots or plant fibers.
PEAT	Deposits of plant remains in which the original plant fibers or root structure are visible.
ORGANIC SILT	Deposit of plant remains in which the original plant fibers or root structure have decomposed.

- iv. Non-Soil Constituents: Non-soil constituents (artificial or anthropogenic material, organic materials, cobbles and boulders) are described as follows:

The following terminology is used to denote size ranges of non-soil constituents such as man-made objects or fill material:

Descriptive Term	Size Range	Comparative Term
Specks	< No. 200 Sieve	Silt and Clay fines
Particles	No. 200 Sieve to No. 4 Sieve	Sand
Fragments	No. 4 Sieve to 3 in.	Gravel
Pieces	3 in. to 12 in.	Cobbles
Blocks	> 12 in.	Boulders

The following terminology is used to describe the frequency that a non-soil constituent is observed by estimating the percentage of the constituent by weight of the total sample:

Descriptor	Percentage
very few	0-5
few	5-10
common	10-20
frequent	20-35
numerous	35-50

4. Moisture Content: The moisture content of a soil sample is based on the observable presence of water according to the following table:

Dry	Moisture is not apparent, dusty.
Moist	No visible water.
Wet	Visible free water.

5. Other Pertinent Characteristics: Pertinent characteristics observed in a soil sample should be noted according to the following table:

Soil Structure Produced by Deposition of Sediments	
Stratified	Random soil deposits of varying components of color.
Varved	Alternating soil deposits of varying thickness (i.e., clays or silts).
Stratum	Soil deposit > 12 inches thick.
Layer	Soil deposit 3 inches to 12 inches thick.
Seam	Soil deposit 1/8 inch to 3 inches thick.
Parting/Lens	Soil deposit <1/8 inch thick.

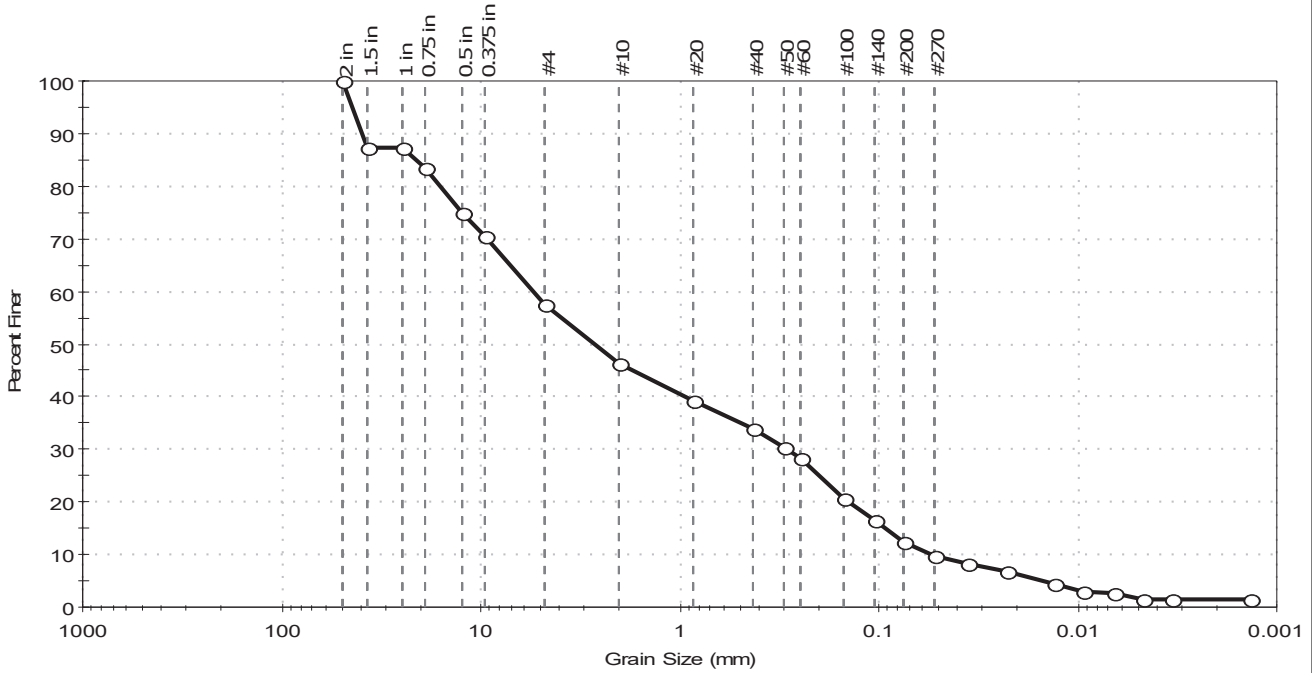
Attachment C

Laboratory Analytical Reports



Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: TP-3
 Sample Type: Bag
 Tested By: ajl
 Sample ID: S-1
 Test Date: 01/08/25
 Checked By: ank
 Depth: 3-4'
 Test Id: 799505
 Test Comment: ---
 Visual Description: Moist, light yellowish brown silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	42.3	45.3	12.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	87		
1 in	25.00	87		
0.75 in	19.00	83		
0.5 in	12.50	75		
0.375 in	9.50	70		
#4	4.75	58		
#10	2.00	46		
#20	0.85	39		
#40	0.42	34		
#50	0.30	30		
#60	0.25	28		
#100	0.15	21		
#140	0.11	16		
#200	0.075	12		
#270	0.053	10		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0362	8		
---	0.0227	7		
---	0.0131	4		
---	0.0094	3		
---	0.0067	3		
---	0.0048	1		
---	0.0034	1		
---	0.0014	1		

Coefficients	
D ₈₅ = 21.3549 mm	D ₃₀ = 0.2900 mm
D ₆₀ = 5.3936 mm	D ₁₅ = 0.0940 mm
D ₅₀ = 2.6572 mm	D ₁₀ = 0.0557 mm
C _u = 96.833	C _c = 0.280

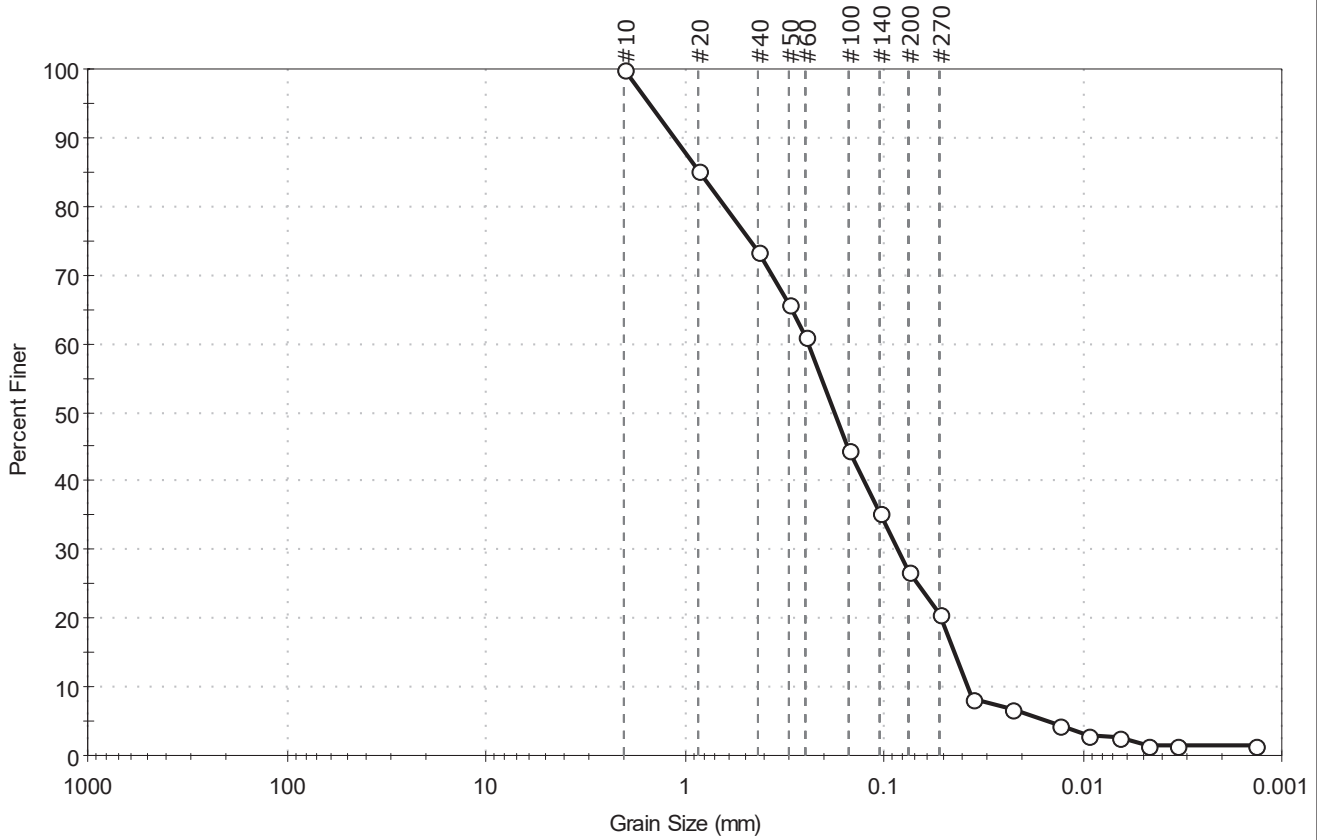
Classification	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description
 Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD
 Dispersion Device : Apparatus A - Mech Mixer
 Dispersion Period : 1 minute
 Est. Specific Gravity : 2.65
 Separation of Sample: #270 Sieve



Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: TP-3
 Sample Type: Bag
 Tested By: ajl
 Sample ID: S-1
 Test Date: 01/08/25
 Checked By: ank
 Depth: 3-4'
 Test Id: 799505
 Test Comment: Only minus No. 10 sieve for USDA classification
 Visual Description: Moist, light yellowish brown silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	73.2	26.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	85		
#40	0.42	73		
#50	0.30	66		
#60	0.25	61		
#100	0.15	44		
#140	0.11	35		
#200	0.075	27		
#270	0.053	21		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0362	8		
---	0.0227	7		
---	0.0131	4		
---	0.0094	3		
---	0.0067	3		
---	0.0048	1		
---	0.0034	1		
---	0.0014	1		

Coefficients

D ₈₅ = 0.8444 mm	D ₃₀ = 0.0853 mm
D ₆₀ = 0.2430 mm	D ₁₅ = 0.0445 mm
D ₅₀ = 0.1784 mm	D ₁₀ = 0.0382 mm
C _u = 6.361	C _c = 0.784

Classification

ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD
 Dispersion Device : Apparatus A - Mech Mixer
 Dispersion Period : 1 minute
 Est. Specific Gravity : 2.65
 Separation of Sample: #270 Sieve

Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	TP-3	Sample Type:	Bag
Sample ID:	S-1	Test Date:	01/10/25
Depth :	3-4'	Test Id:	799508
Test Comment:	---		
Visual Description:	Moist, light yellowish brown silty sand with gravel		
Sample Comment:	---		

USDA Textural Classification

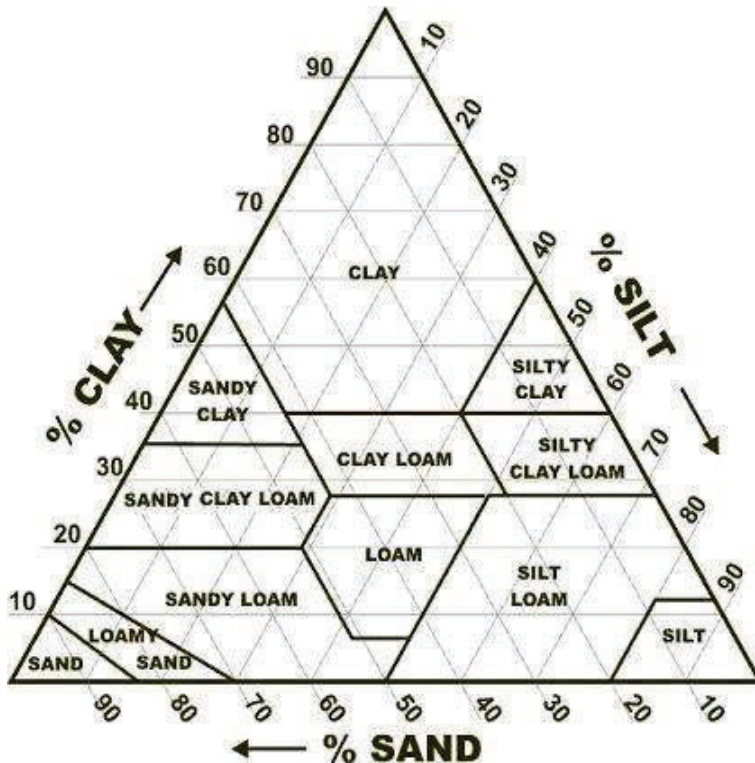
Boring ID	Sample ID	Depth	Sand, %	Silt, %	Clay, %	Classification
TP-3	S-1	3-4'	81	18	1	Loamy Sand

Classifications based only on material passing the #10 sieve

Sand: material passing 2.0 mm and retained on 0.05 mm diameter

Silt: material passing 0.05 mm and retained on 0.002 mm diameter

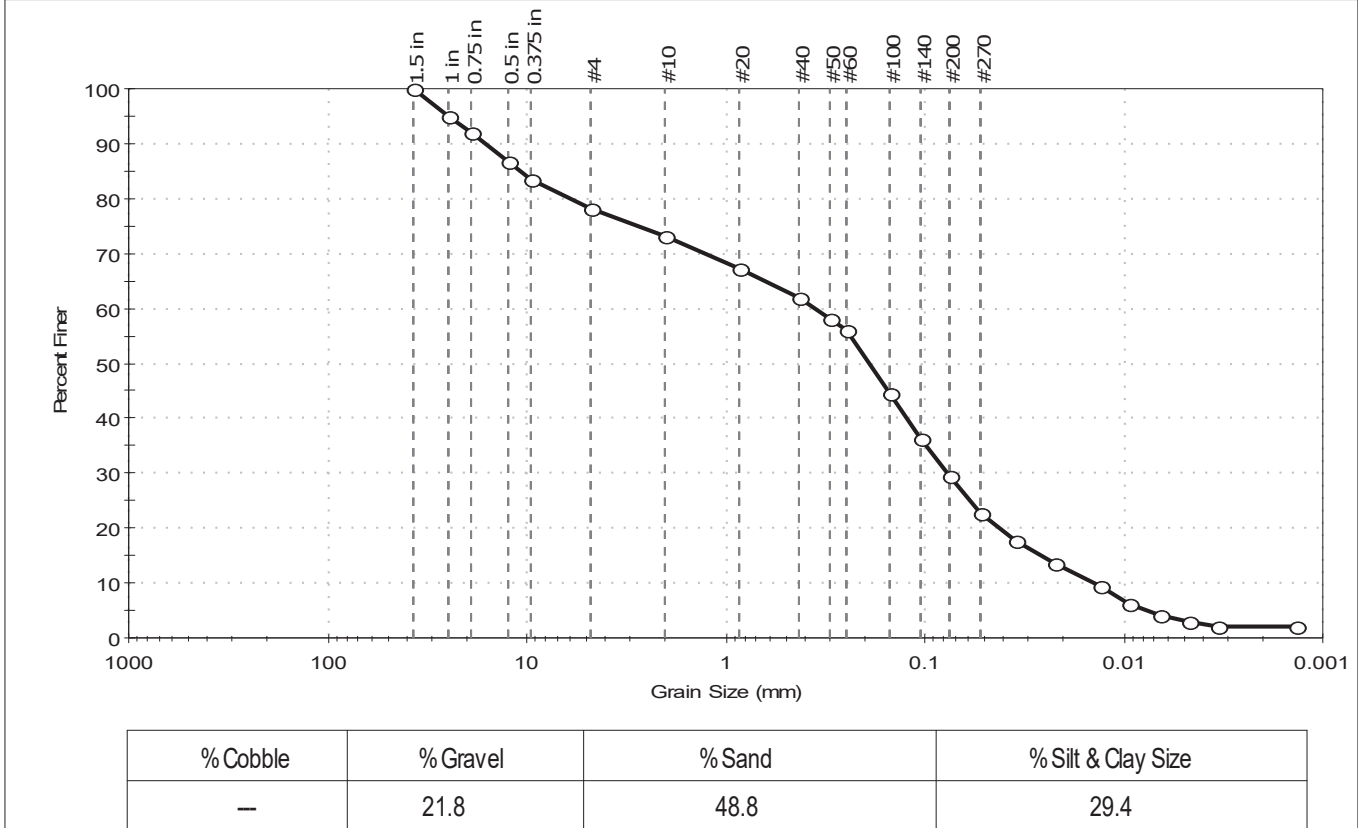
Clay: material passing 0.002 mm diameter





Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: TP-8
 Sample Type: Bag
 Tested By: ajl
 Sample ID: S-2
 Test Date: 01/08/25
 Checked By: ank
 Depth: 9-10.5'
 Test Id: 799506
 Test Comment: ---
 Visual Description: Moist, light yellowish brown silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	95		
0.75 in	19.00	92		
0.5 in	12.50	87		
0.375 in	9.50	84		
#4	4.75	78		
#10	2.00	73		
#20	0.85	67		
#40	0.42	62		
#50	0.30	58		
#60	0.25	56		
#100	0.15	45		
#140	0.11	36		
#200	0.075	29		
#270	0.053	23		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0349	18		
---	0.0222	14		
---	0.0130	9		
---	0.0093	6		
---	0.0067	4		
---	0.0047	3		
---	0.0034	2		
---	0.0014	2		

Coefficients

D ₈₅ = 10.8296 mm	D ₃₀ = 0.0775 mm
D ₆₀ = 0.3562 mm	D ₁₅ = 0.0261 mm
D ₅₀ = 0.1906 mm	D ₁₀ = 0.0142 mm
C _u = 25.085	C _c = 1.187

Classification

<u>ASTM</u>	N/A
<u>AASHTO</u>	Silty Gravel and Sand (A-2-4 (0))

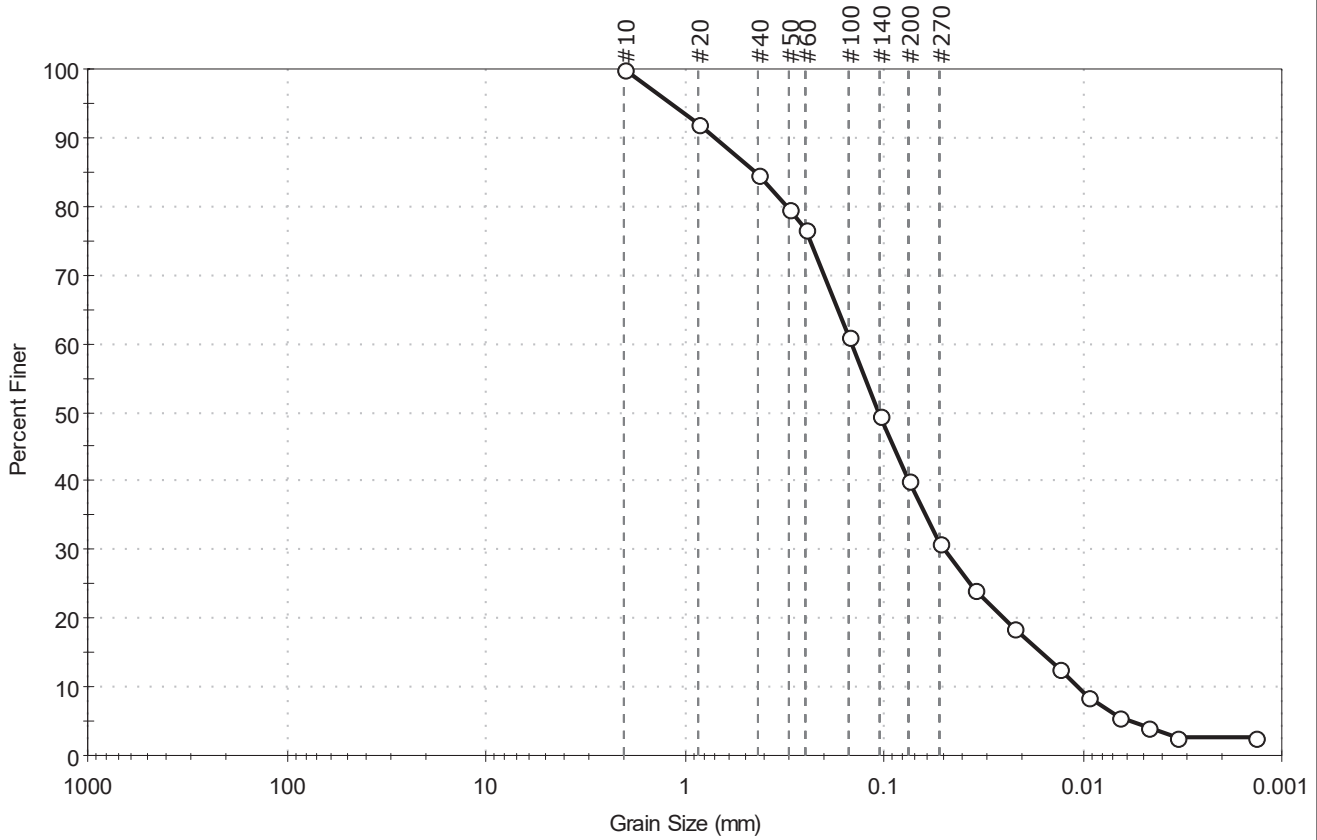
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD
 Dispersion Device : Apparatus A - Mech Mixer
 Dispersion Period : 1 minute
 Est. Specific Gravity : 2.65
 Separation of Sample: #270 Sieve



Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: TP-8
 Sample Type: Bag
 Tested By: ajl
 Sample ID: S-2
 Test Date: 01/08/25
 Checked By: ank
 Depth: 9-10.5'
 Test Id: 799506
 Test Comment: Only minus No. 10 sieve for USDA classification
 Visual Description: Moist, light yellowish brown silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	59.8	40.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	92		
#40	0.42	85		
#50	0.30	80		
#60	0.25	77		
#100	0.15	61		
#140	0.11	50		
#200	0.075	40		
#270	0.053	31		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0349	24		
---	0.0222	18		
---	0.0130	13		
---	0.0093	8		
---	0.0067	6		
---	0.0047	4		
---	0.0034	3		
---	0.0014	3		

Coefficients

D ₈₅ = 0.4436 mm	D ₃₀ = 0.0500 mm
D ₆₀ = 0.1451 mm	D ₁₅ = 0.0160 mm
D ₅₀ = 0.1073 mm	D ₁₀ = 0.0105 mm
C _u = 13.819	C _c = 1.641

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

Est. Specific Gravity : 2.65

Separation of Sample: #270 Sieve

Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	TP-8	Sample Type:	Bag
Sample ID:	S-2	Test Date:	01/10/25
Depth :	9-10.5'	Test Id:	799509
Test Comment:	---		
Visual Description:	Moist, light yellowish brown silty sand with gravel		
Sample Comment:	---		

USDA Textural Classification

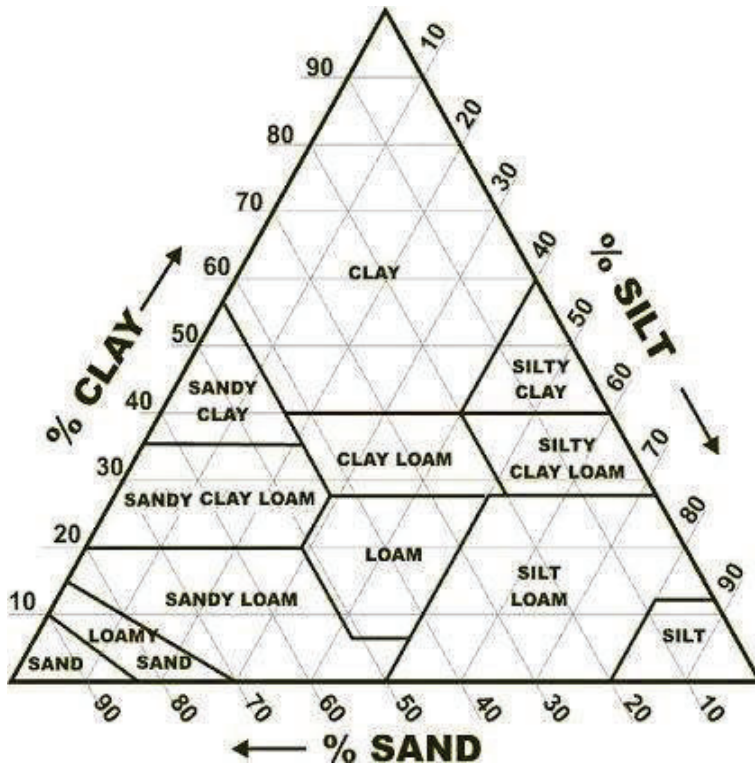
Boring ID	Sample ID	Depth	Sand, %	Silt, %	Clay, %	Classification
TP-8	S-2	9-10.5'	71	27	2	Sandy Loam

Classifications based only on material passing the #10 sieve

Sand: material passing 2.0 mm and retained on 0.05 mm diameter

Silt: material passing 0.05 mm and retained on 0.002 mm diameter

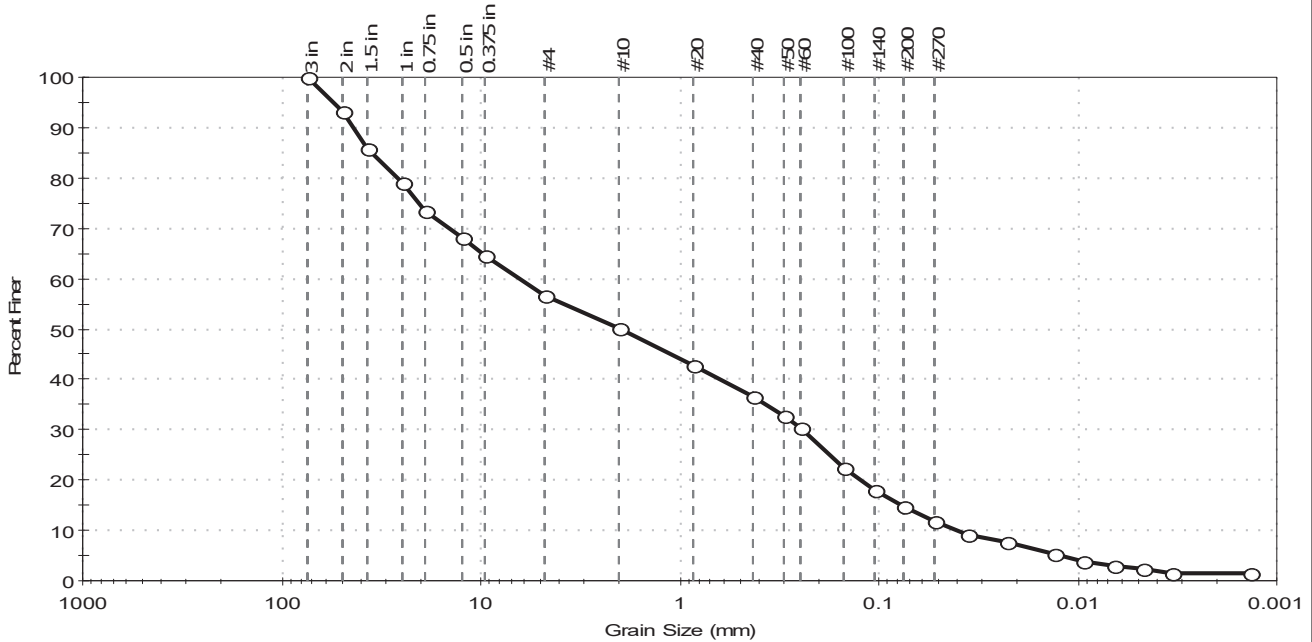
Clay: material passing 0.002 mm diameter





Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: TP-9
 Sample Type: Bag
 Tested By: ajl
 Sample ID: C-1
 Test Date: 01/08/25
 Checked By: ank
 Depth: 3-10'
 Test Id: 799504
 Test Comment: ---
 Visual Description: Moist, light yellowish brown silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	43.3	41.9	14.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3 in	75.00	100		
2 in	50.00	93		
1.5 in	37.50	86		
1 in	25.00	79		
0.75 in	19.00	73		
0.5 in	12.50	68		
0.375 in	9.50	65		
#4	4.75	57		
#10	2.00	50		
#20	0.85	43		
#40	0.42	37		
#50	0.30	33		
#60	0.25	30		
#100	0.15	23		
#140	0.11	18		
#200	0.075	15		
#270	0.053	12		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0362	9		
---	0.0226	8		
---	0.0132	5		
---	0.0094	4		
---	0.0067	3		
---	0.0047	2		
---	0.0034	1		
---	0.0014	1		

Coefficients	
D ₈₅ = 35.8392 mm	D ₃₀ = 0.2429 mm
D ₆₀ = 6.3222 mm	D ₁₅ = 0.0763 mm
D ₅₀ = 1.9620 mm	D ₁₀ = 0.0402 mm
C _u = 157.269	C _c = 0.232

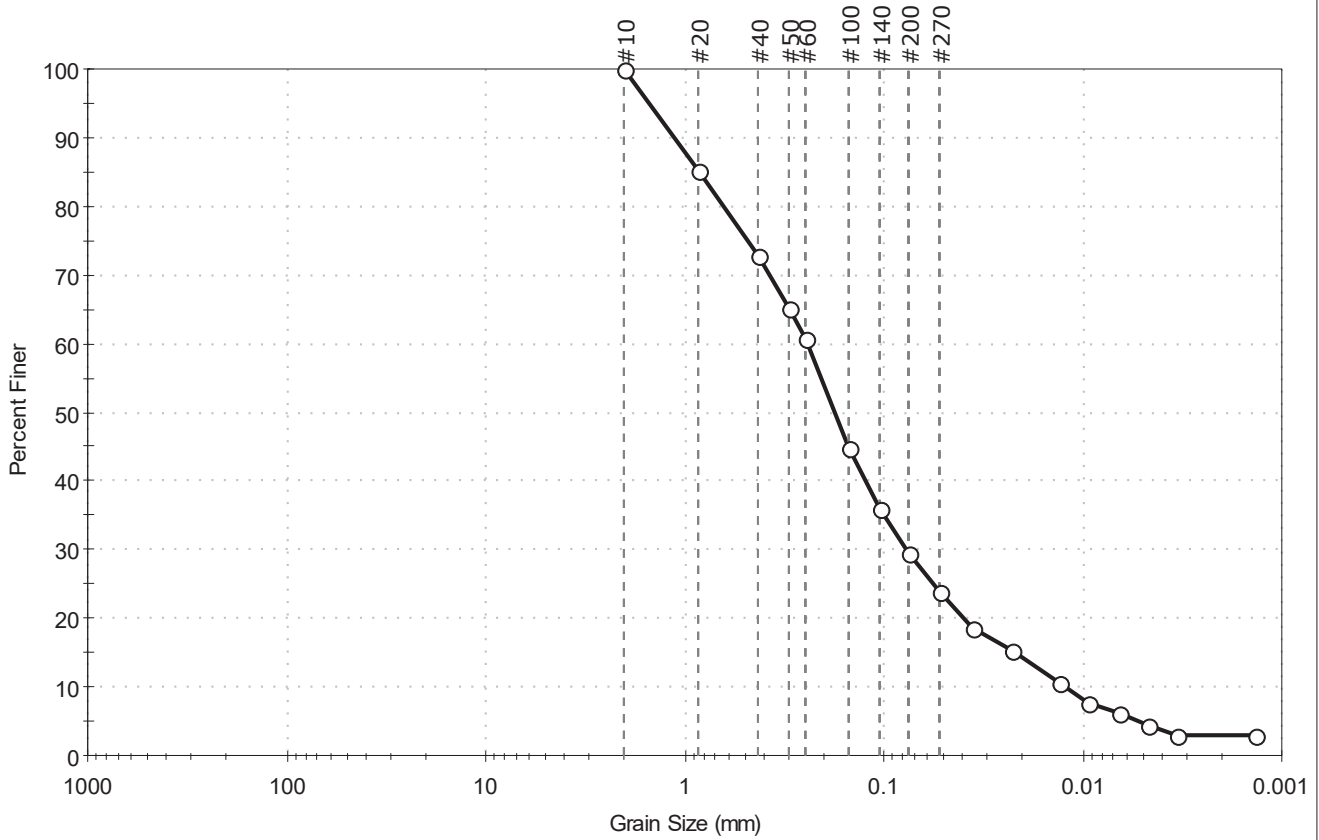
Classification	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description	
Sand/Gravel Particle Shape : ANGULAR	
Sand/Gravel Hardness : HARD	
Dispersion Device : Apparatus A - Mech Mixer	
Dispersion Period : 1 minute	
Est. Specific Gravity : 2.65	
Separation of Sample: #270 Sieve	



Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: TP-9
 Sample Type: Bag
 Tested By: ajl
 Sample ID: C-1
 Test Date: 01/08/25
 Checked By: ank
 Depth: 3-10'
 Test Id: 799504
 Test Comment: Only minus No. 10 sieve for USDA classification
 Visual Description: Moist, light yellowish brown silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	70.4	29.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	85		
#40	0.42	73		
#50	0.30	65		
#60	0.25	61		
#100	0.15	45		
#140	0.11	36		
#200	0.075	30		
#270	0.053	24		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0362	19		
---	0.0226	15		
---	0.0132	11		
---	0.0094	8		
---	0.0067	6		
---	0.0047	5		
---	0.0034	3		
---	0.0014	3		

Coefficients	
D ₈₅ = 0.8438 mm	D ₃₀ = 0.0767 mm
D ₆₀ = 0.2445 mm	D ₁₅ = 0.0215 mm
D ₅₀ = 0.1769 mm	D ₁₀ = 0.0121 mm
C _u = 20.207	C _c = 1.989

Classification	
ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #270 Sieve

Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	TP-9	Sample Type:	Bag
Sample ID:	C-1	Test Date:	01/10/25
Depth :	3-10'	Test Id:	799507
Test Comment:	---		
Visual Description:	Moist, light yellowish brown silty sand with gravel		
Sample Comment:	---		

USDA Textural Classification

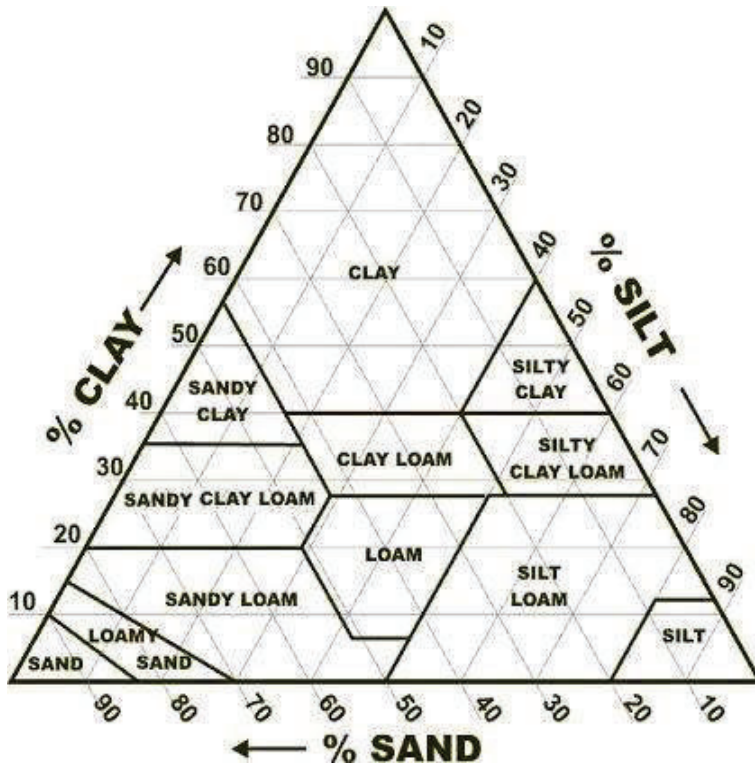
Boring ID	Sample ID	Depth	Sand, %	Silt, %	Clay, %	Classification
TP-9	C-1	3-10'	78	21	1	Loamy Sand

Classifications based only on material passing the #10 sieve

Sand: material passing 2.0 mm and retained on 0.05 mm diameter

Silt: material passing 0.05 mm and retained on 0.002 mm diameter

Clay: material passing 0.002 mm diameter



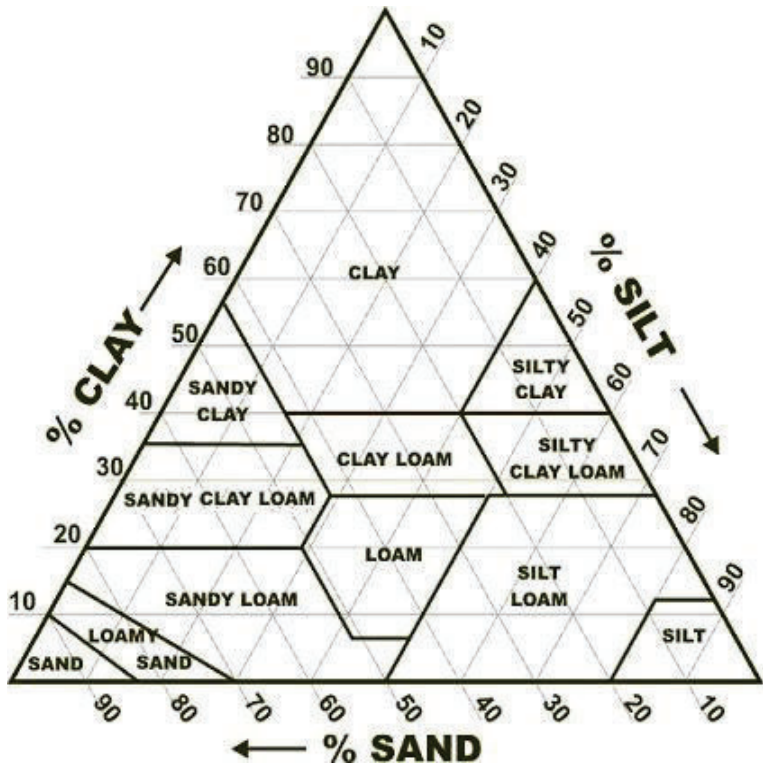
Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	SH-TP-101	Sample Type:	Bag
Sample ID:	C	Test Date:	05/19/25
Depth :	20-96"	Test Id:	815705
Test Comment:	---		
Visual Description:	Moist, light brownish gray silty sand with gravel		
Sample Comment:	---		

USDA Textural Classification

Boring ID	Sample ID	Depth	Sand, %	Silt, %	Clay, %	Classification
SH-TP-101	C	20-96"	73	27	0	Loamy Sand

Classifications based only on material passing the #10 sieve

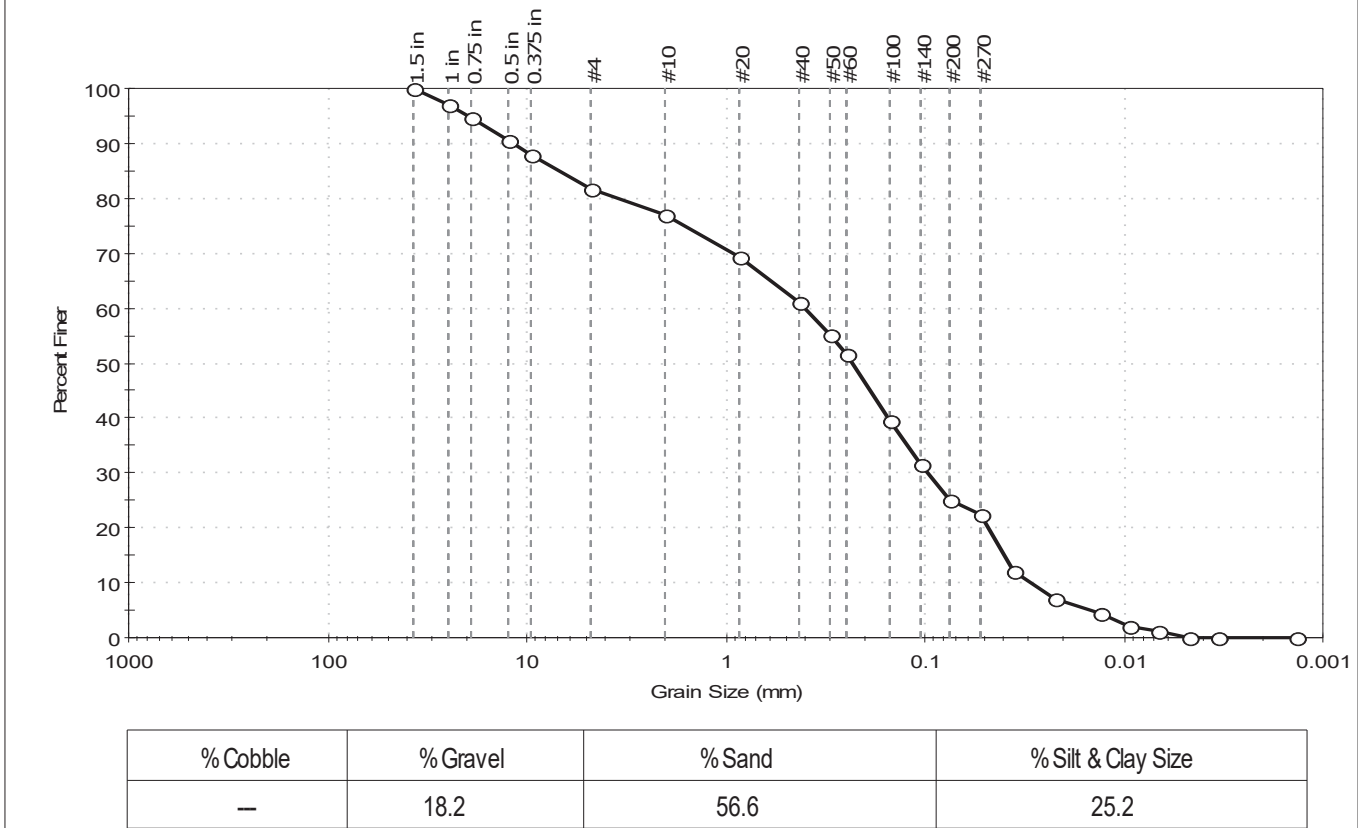
- Sand: material passing 2.0 mm and retained on 0.05 mm diameter
- Silt: material passing 0.05 mm and retained on 0.002 mm diameter
- Clay: material passing 0.002 mm diameter





Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: SH-TP-101
 Sample Type: Bag
 Tested By: ajl
 Sample ID: C
 Test Date: 05/16/25
 Checked By: ank
 Depth: 20-96"
 Test Id: 815700
 Test Comment: ---
 Visual Description: Moist, light brownish gray silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	97		
0.75 in	19.00	95		
0.5 in	12.50	91		
0.375 in	9.50	88		
#4	4.75	82		
#10	2.00	77		
#20	0.85	69		
#40	0.42	61		
#50	0.30	55		
#60	0.25	52		
#100	0.15	39		
#140	0.11	32		
#200	0.075	25		
#270	0.053	22		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0355	12		
---	0.0225	7		
---	0.0132	4		
---	0.0094	2		
---	0.0067	1		
---	0.0047	0		
---	0.0034	0		
---	0.0014	0		

Coefficients

D ₈₅ = 6.7778 mm	D ₃₀ = 0.0968 mm
D ₆₀ = 0.4005 mm	D ₁₅ = 0.0397 mm
D ₅₀ = 0.2328 mm	D ₁₀ = 0.0291 mm
C _u = 13.763	C _c = 0.804

Classification

<u>ASTM</u>	N/A
<u>AASHTO</u>	Silty Gravel and Sand (A-2-4 (0))

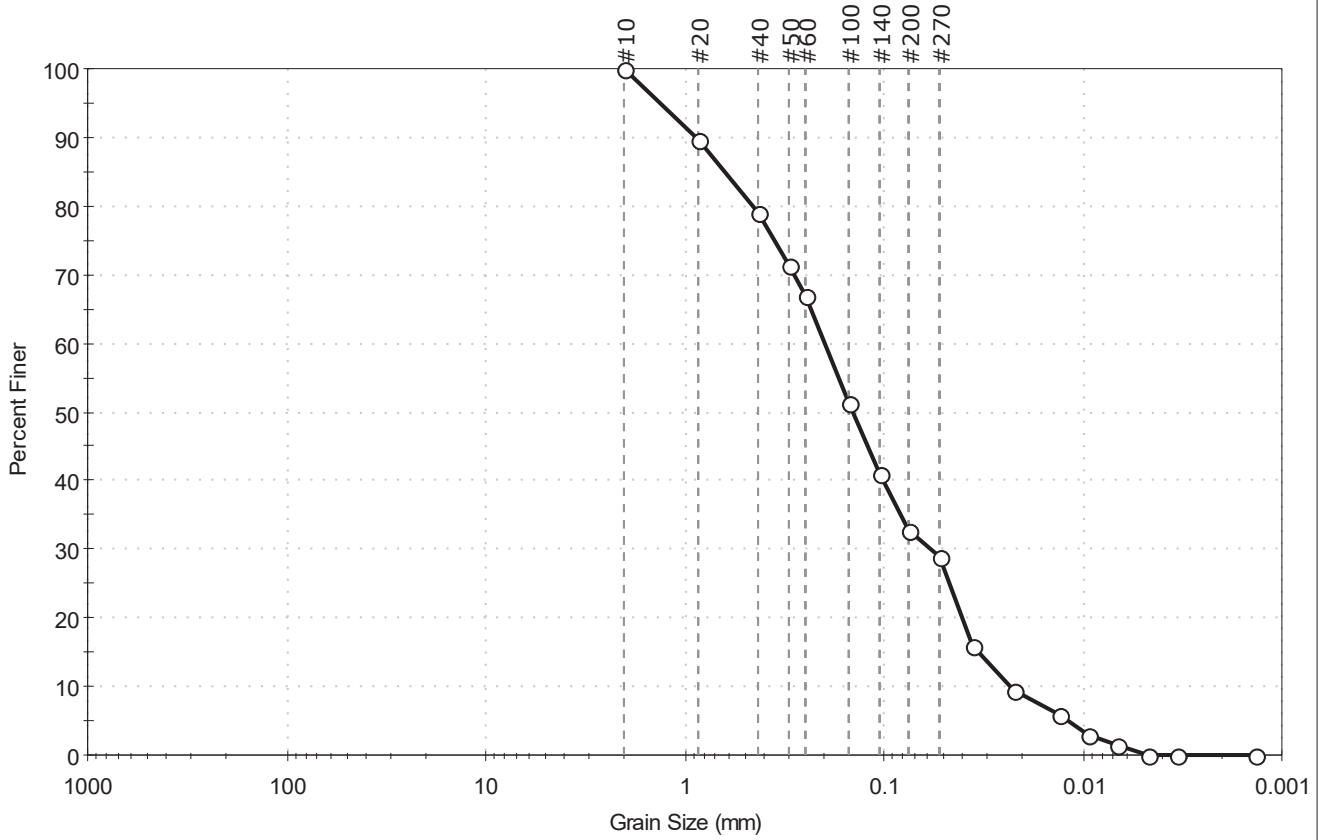
Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD
 Dispersion Device : Apparatus A - Mech Mixer
 Dispersion Period : 1 minute
 Est. Specific Gravity : 2.65
 Separation of Sample: #200 Sieve



Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	SH-TP-101	Sample Type:	Bag
Sample ID:	C	Test Date:	05/16/25
Depth:	20-96"	Test Id:	815700
Test Comment:	Only minus No. 10 sieve for USDA classification		
Visual Description:	Moist, light brownish gray silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	67.3	32.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	90		
#40	0.42	79		
#50	0.30	72		
#60	0.25	67		
#100	0.15	51		
#140	0.11	41		
#200	0.075	33		
#270	0.053	29		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0355	16		
---	0.0225	9		
---	0.0132	6		
---	0.0094	3		
---	0.0067	1		
---	0.0047	0		
---	0.0034	0		
---	0.0014	0		

<u>Coefficients</u>	
D ₈₅ = 0.6233 mm	D ₃₀ = 0.0581 mm
D ₆₀ = 0.1992 mm	D ₁₅ = 0.0330 mm
D ₅₀ = 0.1439 mm	D ₁₀ = 0.0233 mm
C _u = 8.549	C _c = 0.727

<u>Classification</u>	
ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	SH-TP-103	Sample Type:	Bag
Sample ID:	C	Test Date:	05/19/25
Depth :	34-108"	Test Id:	815706
Test Comment:	---		
Visual Description:	Moist, light olive brown silty sand with gravel		
Sample Comment:	---		

USDA Textural Classification

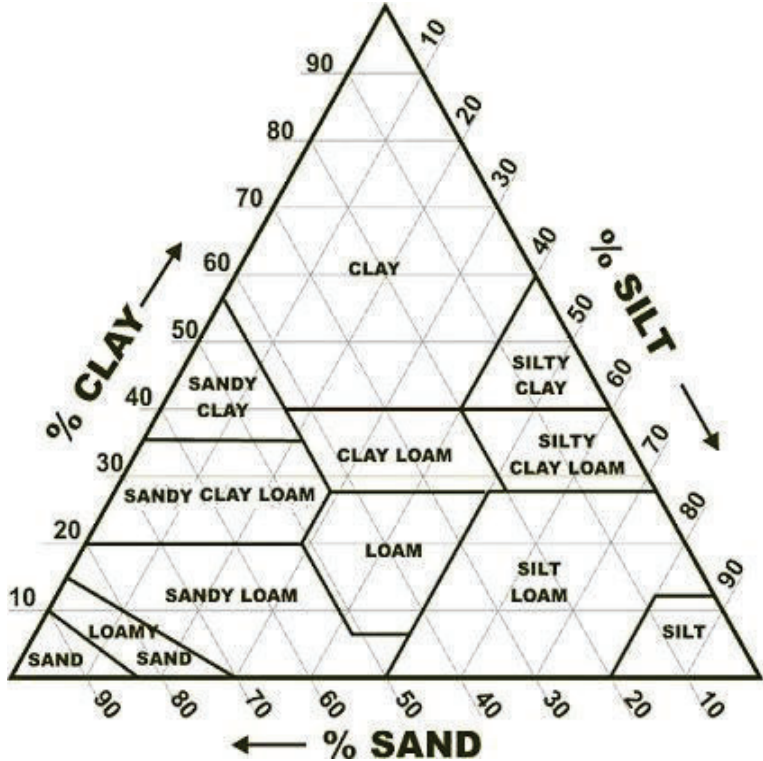
Boring ID	Sample ID	Depth	Sand, %	Silt, %	Clay, %	Classification
SH-TP-103	C	34-108"	78	21	1	Loamy Sand

Classifications based only on material passing the #10 sieve

Sand: material passing 2.0 mm and retained on 0.05 mm diameter

Silt: material passing 0.05 mm and retained on 0.002 mm diameter

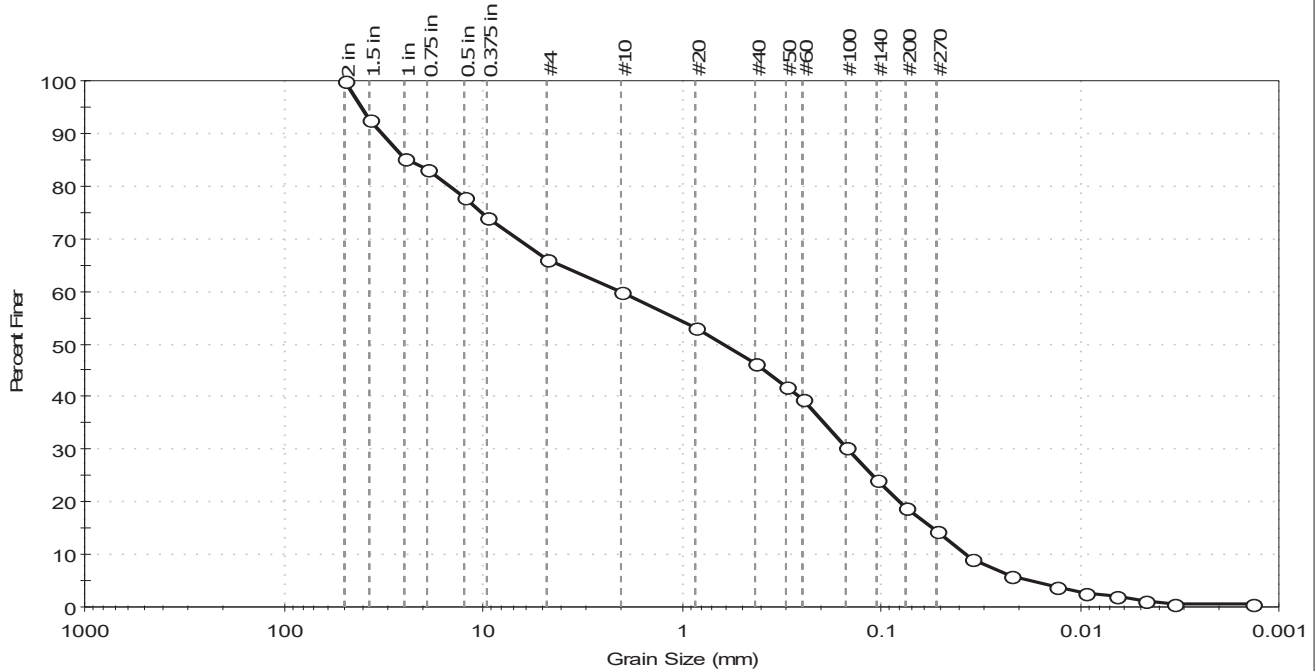
Clay: material passing 0.002 mm diameter





Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: SH-TP-103
 Sample Type: Bag
 Tested By: ajl
 Sample ID: C
 Test Date: 05/16/25
 Checked By: ank
 Depth: 34-108"
 Test Id: 815701
 Test Comment: ---
 Visual Description: Moist, light olive brown silty sand with gravel
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	33.9	47.3	18.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	93		
1 in	25.00	85		
0.75 in	19.00	83		
0.5 in	12.50	78		
0.375 in	9.50	74		
#4	4.75	66		
#10	2.00	60		
#20	0.85	53		
#40	0.42	46		
#50	0.30	42		
#60	0.25	39		
#100	0.15	30		
#140	0.11	24		
#200	0.075	19		
#270	0.053	15		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0348	9		
---	0.0224	6		
---	0.0131	4		
---	0.0094	3		
---	0.0066	2		
---	0.0047	1		
---	0.0034	1		
---	0.0014	1		

Coefficients	
D ₈₅ = 24.1682 mm	D ₃₀ = 0.1476 mm
D ₆₀ = 2.0199 mm	D ₁₅ = 0.0549 mm
D ₅₀ = 0.6192 mm	D ₁₀ = 0.0371 mm
C _u = 54.445	C _c = 0.291

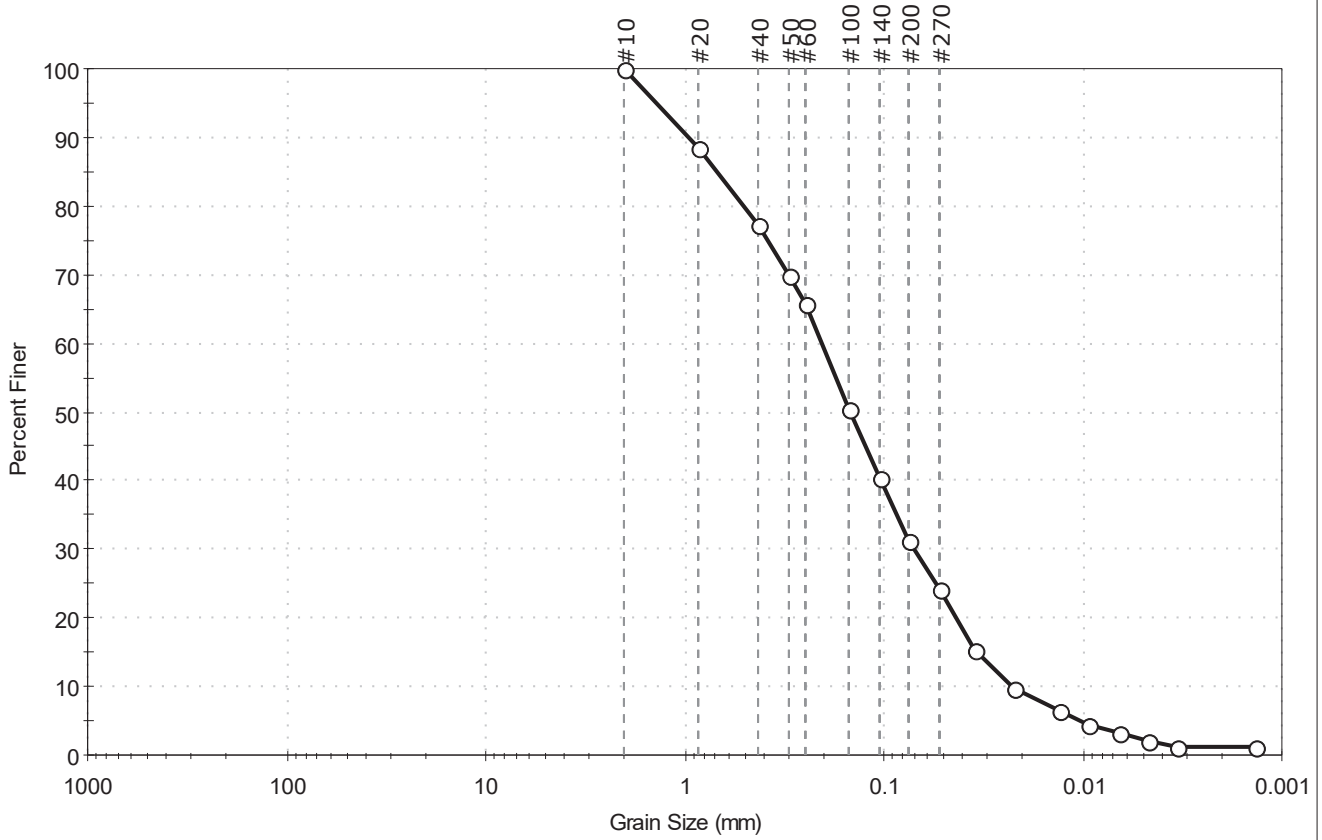
Classification	
ASTM	N/A
AASHTO	Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve



Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	SH-TP-103	Sample Type:	Bag
Sample ID:	C	Test Date:	05/16/25
Depth:	34-108"	Test Id:	815701
Test Comment:	Only minus No. 10 sieve for USDA classification		
Visual Description:	Moist, light olive brown silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	68.6	31.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	89		
#40	0.42	77		
#50	0.30	70		
#60	0.25	66		
#100	0.15	51		
#140	0.11	40		
#200	0.075	31		
#270	0.053	24		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0348	15		
---	0.0224	10		
---	0.0131	7		
---	0.0094	4		
---	0.0066	3		
---	0.0047	2		
---	0.0034	1		
---	0.0014	1		

<u>Coefficients</u>	
D ₈₅ = 0.6821 mm	D ₃₀ = 0.0701 mm
D ₆₀ = 0.2060 mm	D ₁₅ = 0.0340 mm
D ₅₀ = 0.1474 mm	D ₁₀ = 0.0227 mm
C _u = 9.075	C _c = 1.051

<u>Classification</u>	
ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u>
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

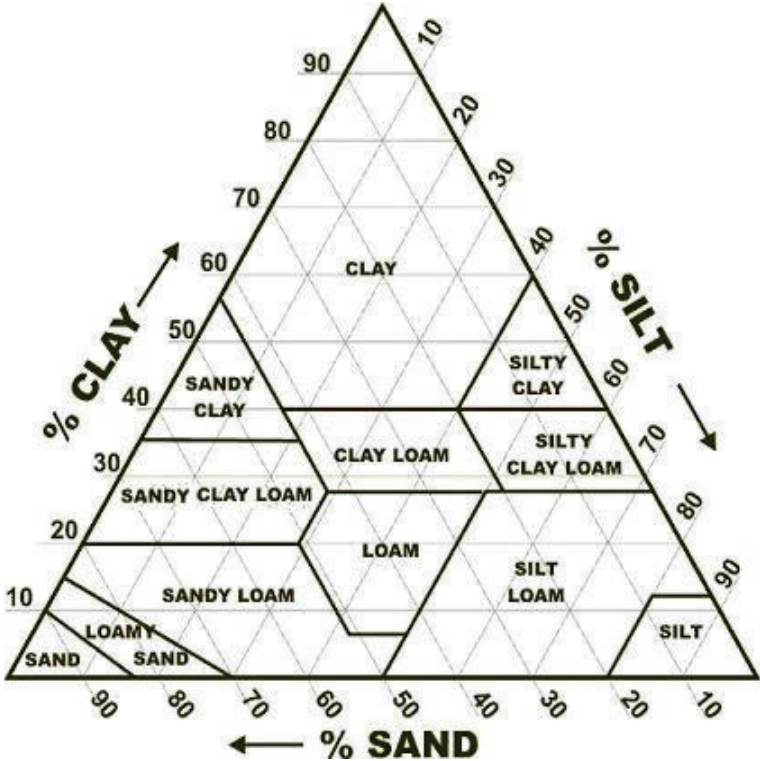
Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	SH-TP-104	Sample Type:	Bag
Sample ID:	C	Test Date:	05/19/25
Depth :	19-108"	Test Id:	815707
Test Comment:	---		
Visual Description:	Moist, light yellowish brown silty sand with gravel		
Sample Comment:	---		

USDA Textural Classification

Boring ID	Sample ID	Depth	Sand, %	Silt, %	Clay, %	Classification
SH-TP-104	C	19-108"	80	20	0	Loamy Sand

Classifications based only on material passing the #10 sieve

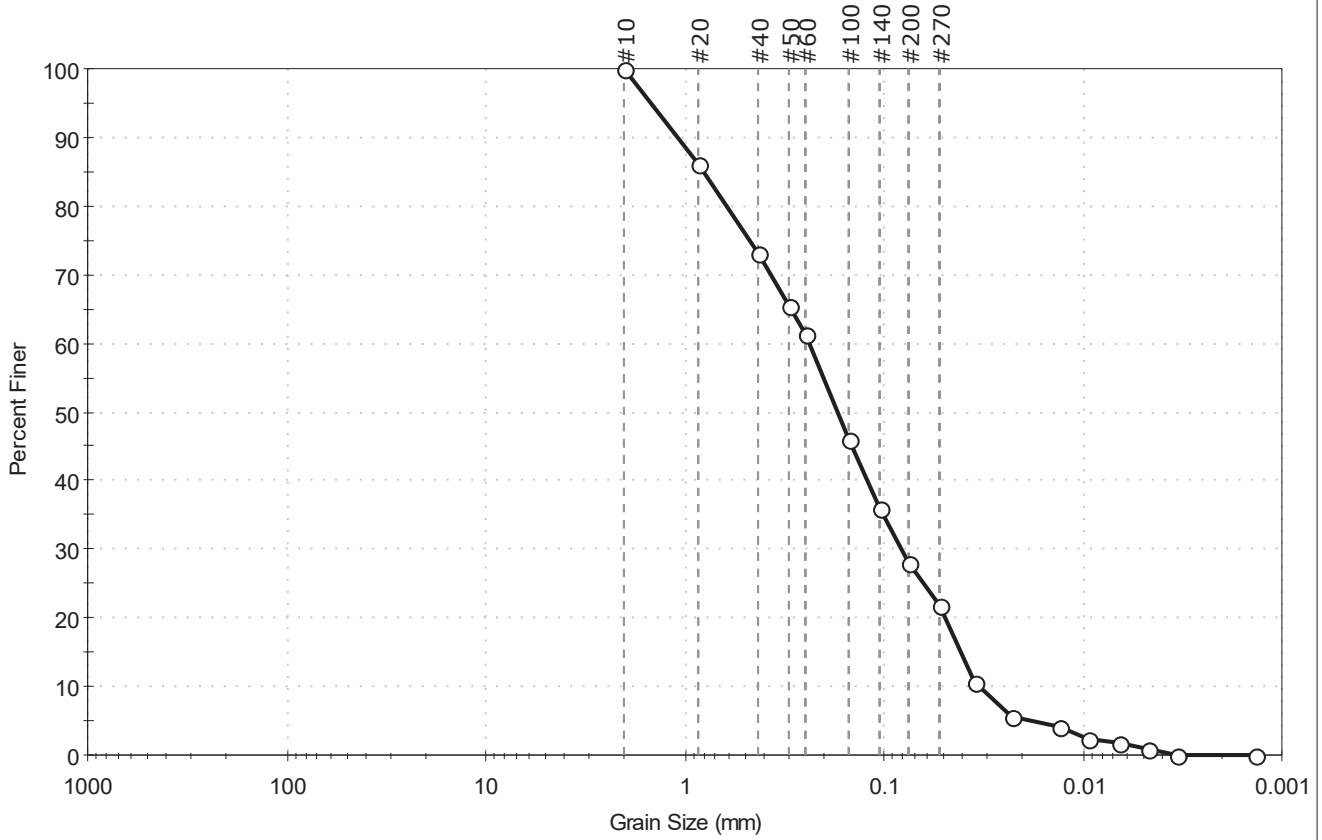
- Sand: material passing 2.0 mm and retained on 0.05 mm diameter
- Silt: material passing 0.05 mm and retained on 0.002 mm diameter
- Clay: material passing 0.002 mm diameter





Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	SH-TP-104	Sample Type:	Bag
Sample ID:	C	Test Date:	05/16/25
Depth:	19-108"	Test Id:	815702
Test Comment:	Only minus No. 10 sieve for USDA classification		
Visual Description:	Moist, light yellowish brown silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	72.1	27.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	86		
#40	0.42	73		
#50	0.30	65		
#60	0.25	61		
#100	0.15	46		
#140	0.11	36		
#200	0.075	28		
#270	0.053	22		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0351	11		
---	0.0227	6		
---	0.0131	4		
---	0.0094	2		
---	0.0067	2		
---	0.0047	1		
---	0.0034	0		
---	0.0014	0		

Coefficients	
D ₈₅ = 0.7974 mm	D ₃₀ = 0.0819 mm
D ₆₀ = 0.2393 mm	D ₁₅ = 0.0412 mm
D ₅₀ = 0.1710 mm	D ₁₀ = 0.0332 mm
C _u = 7.208	C _c = 0.844

Classification	
ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

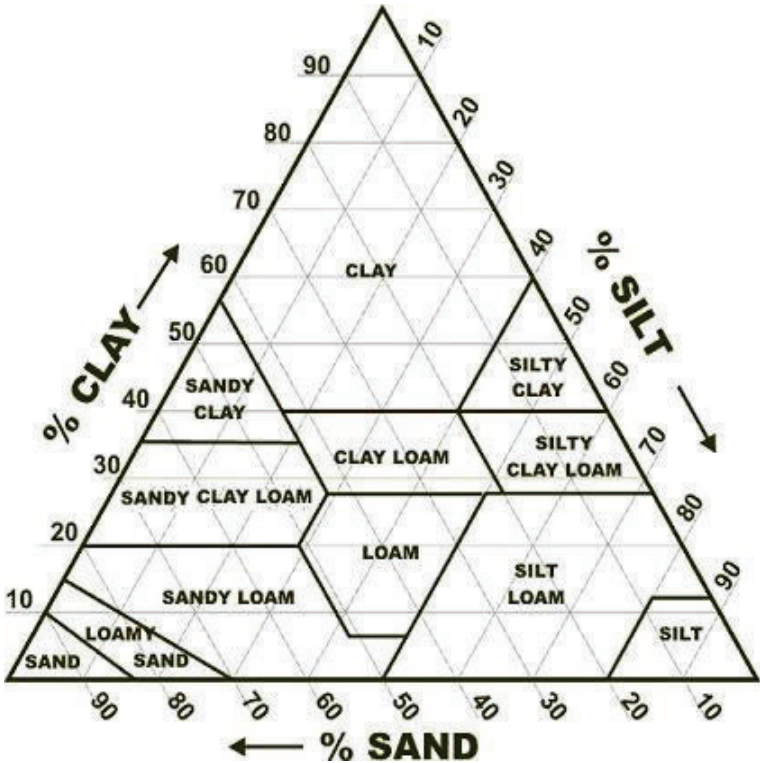
Client:	Sanborn, Head & Associates, Inc.		
Project:	61 Waverly St		
Location:	Ashland, MA	Project No:	GTX-320345
Boring ID:	SH-TP-106	Sample Type:	Bag
Sample ID:	C	Test Date:	05/19/25
Depth :	17-90"	Test Id:	815708
Test Comment:	---		
Visual Description:	Moist, light brownish gray silty sand		
Sample Comment:	---		

USDA Textural Classification

Boring ID	Sample ID	Depth	Sand, %	Silt, %	Clay, %	Classification
SH-TP-106	C	17-90"	79	21	0	Loamy Sand

Classifications based only on material passing the #10 sieve

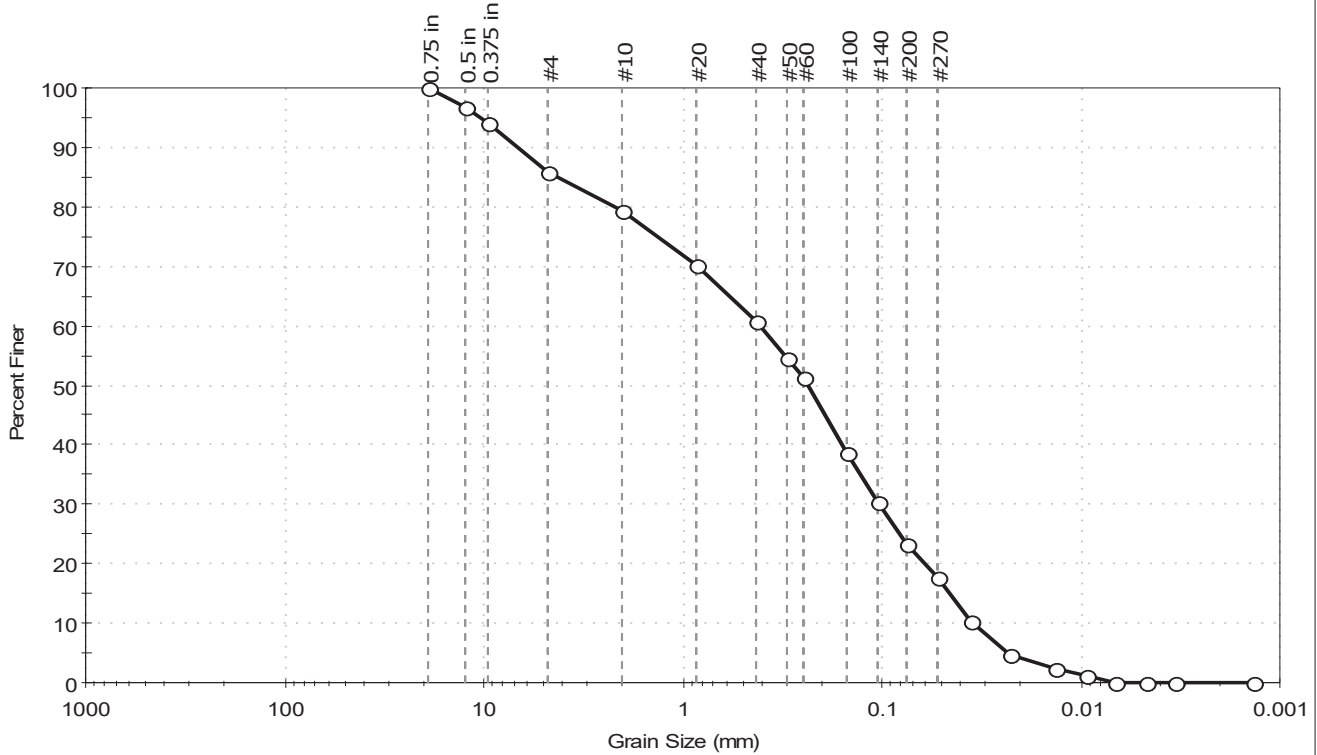
- Sand: material passing 2.0 mm and retained on 0.05 mm diameter
- Silt: material passing 0.05 mm and retained on 0.002 mm diameter
- Clay: material passing 0.002 mm diameter





Client: Sanborn, Head & Associates, Inc.
 Project: 61 Waverly St
 Location: Ashland, MA
 Project No: GTX-320345
 Boring ID: SH-TP-106
 Sample Type: Bag
 Tested By: ajl
 Sample ID: C
 Test Date: 05/16/25
 Checked By: ank
 Depth: 17-90"
 Test Id: 815703
 Test Comment: ---
 Visual Description: Moist, light brownish gray silty sand
 Sample Comment: ---

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	14.0	62.7	23.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	97		
0.375 in	9.50	94		
#4	4.75	86		
#10	2.00	79		
#20	0.85	70		
#40	0.42	61		
#50	0.30	55		
#60	0.25	51		
#100	0.15	39		
#140	0.11	30		
#200	0.075	23		
#270	0.053	18		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0362	10		
---	0.0230	5		
---	0.0134	2		
---	0.0095	1		
---	0.0067	0		
---	0.0047	0		
---	0.0034	0		
---	0.0014	0		

Coefficients

D ₈₅ = 4.1784 mm	D ₃₀ = 0.1045 mm
D ₆₀ = 0.4055 mm	D ₁₅ = 0.0459 mm
D ₅₀ = 0.2380 mm	D ₁₀ = 0.0349 mm
C _u = 11.619	C _c = 0.772

Classification

ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Dispersion Device : Apparatus A - Mech Mixer

Dispersion Period : 1 minute

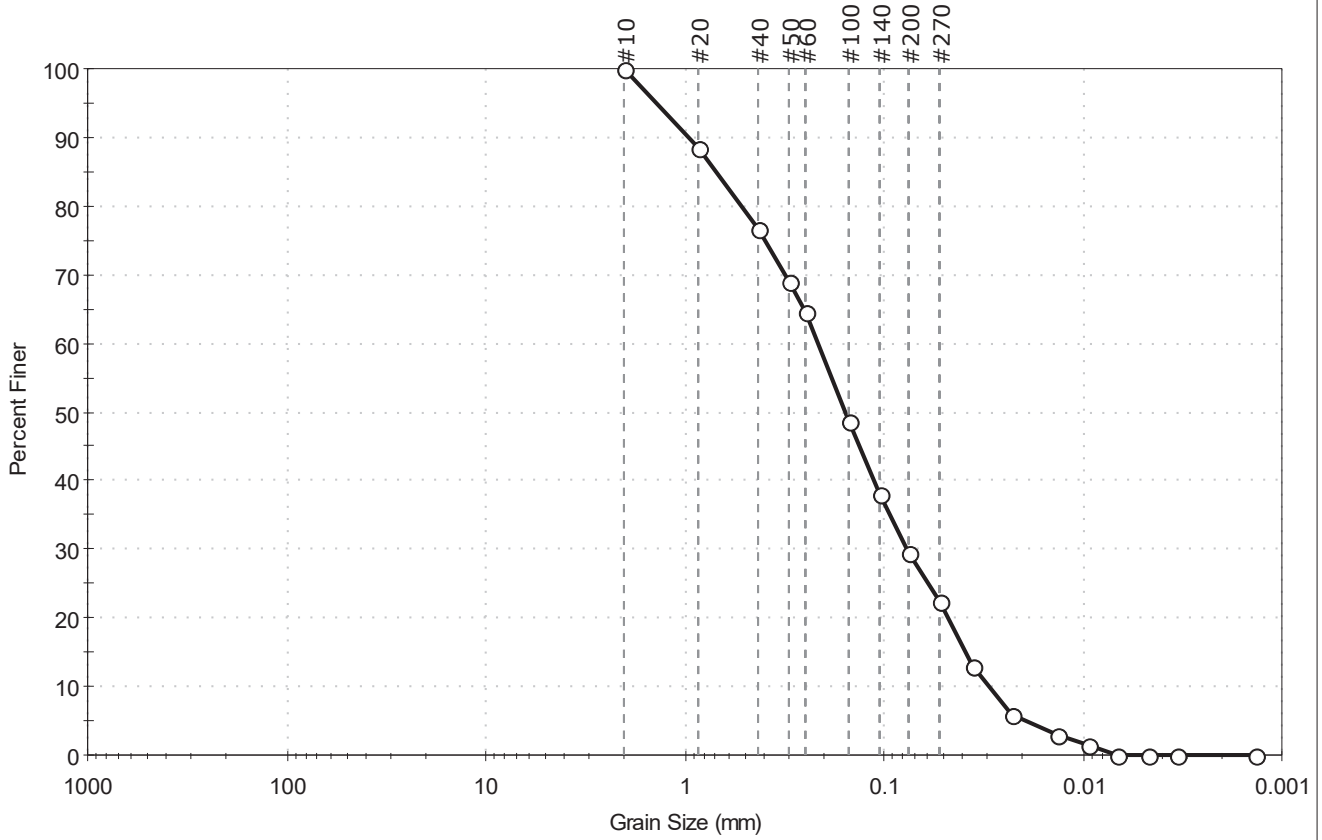
Est. Specific Gravity : 2.65

Separation of Sample: #200 Sieve



Client: Sanborn, Head & Associates, Inc.	Project No: GTX-320345
Project: 61 Waverly St	
Location: Ashland, MA	
Boring ID: SH-TP-106	Sample Type: Bag
Sample ID: C	Tested By: ajl
Depth: 17-90"	Test Date: 05/16/25
	Checked By: ank
	Test Id: 815703
Test Comment: Only minus No. 10 sieve for USDA classification	
Visual Description: Moist, light brownish gray silty sand	
Sample Comment: ---	

Particle Size Analysis - ASTM D6913/D7928



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	0.0	70.6	29.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#10	2.00	100		
#20	0.85	89		
#40	0.42	77		
#50	0.30	69		
#60	0.25	65		
#100	0.15	49		
#140	0.11	38		
#200	0.075	29		
#270	0.053	22		
Hydrometer	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0362	13		
---	0.0230	6		
---	0.0134	3		
---	0.0095	1		
---	0.0067	0		
---	0.0047	0		
---	0.0034	0		
---	0.0014	0		

Coefficients	
D ₈₅ = 0.6893 mm	D ₃₀ = 0.0769 mm
D ₆₀ = 0.2160 mm	D ₁₅ = 0.0392 mm
D ₅₀ = 0.1564 mm	D ₁₀ = 0.0299 mm
C _u = 7.224	C _c = 0.916

Classification	
ASTM	N/A
AASHTO	Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description
Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD
Dispersion Device : Apparatus A - Mech Mixer
Dispersion Period : 1 minute
Est. Specific Gravity : 2.65
Separation of Sample: #200 Sieve

4.06 Site Permit Plans

SMMA / smma.com

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275 Promenade St. / Suite 275
Providence, RI 02908
401.519.0665

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