Notice of Intent

Bussey Brook Meadow – Arboretum Road Green Link
Roslindale, Massachusetts

Prepared for:

City of Boston Transportation Department
One City Hall Square, Room 811
Boston, MA 02201

Prepared by:

Horsley Witten Group, Inc.
294 Washington Street, Suite 801
Boston, MA 02108

Horsley Witten Group
Sustainable Environmental Solutions
294 Washington Street • Suite 801 • Boston, MA 02108
857-263-8193 • horsleywitten.com

May 24, 2018

Boston Conservation Commission
One City Hall Square, Room 709
Boston, MA 02201

c/o Amelia Croteau, Executive Secretary

Re: Notice of Intent – Arboretum Road Green Link
South Street, Roslindale (Boston), MA

Dear Members of the Boston Conservation Commission:

On behalf of the Applicant, the City of Boston, the Horsley Witten Group, Inc. (HW) is pleased to submit the enclosed Notice of Intent (NOI) and supporting documentation for the above-referenced project. The proposed project is designed to provide an accessible, multi-modal path connection between the existing Blackwell Footpath and the end of Arboretum Road. The project is part of a larger multi-modal path approximately 1.5 miles that connects Roslindale Village to the Blackwell Footpath through the Arnold Arboretum and portions of the Massachusetts Bay Transportation Authority (MBTA) right-of-way.

Proposed activities will occur within the 25-foor Riverfront Area and within the 100-foot Buffer Zone to inland Bank associated with Bussey Brook, jurisdictional areas under the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131 § 40).

Enclosed for your review and consideration, please find eight copies of the completed NOI application along with supporting materials and project plans, as well as an electronic copy of all materials. All abutters have been notified in accordance with the Massachusetts Wetlands Protection Act regulations. As a municipal entity, the Applicant is exempt from filing fees.

Thank you in advance for your review of this RDA. We look forward to meeting with you on June 5, 2019. Should you have any questions or require additional information, please do not hesitate to contact me at (508) 833-6600.

Sincerely,

Horsley Witten Group, Inc.

Jennifer Relstab, P.E.
Senior Water Resources Engineer

Enclosures

cc: MassDEP, Northeast Regional Office
Charlotte Fleetwood, Boston Transportation Department

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

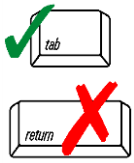
Provided by MassDEP:

MassDEP File Number

Document Transaction Number

BOSTON
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):

South Street — a. Street Address
Roslinedale — b. City/Town
02130 — c. Zip Code

Latitude and Longitude:
42.297279 — d. Latitude
-71.120171 — e. Longitude

Ward 19 — f. Assessors Map/Plat Number
Parcel 2823 — g. Parcel /Lot Number

2. Applicant:

Gregory T. — a. First Name
Rooney — b. Last Name
Boston Transportation Department — c. Organization
One City Hall Square. Room 811 — d. Street Address
Boston — e. City/Town
MA — f. State
02201 — g. Zip Code
617-635-4100 — h. Phone Number
i. Fax Number
gregory.rooney@boston.gov — j. Email Address

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

Ryan — a. First Name
Woods — b. Last Name
City of Boston (Parks and Recreation Dept.) — c. Organization
1010 Massachusetts Avenue — d. Street Address
Boston — e. City/Town
MA — f. State
02118 — g. Zip Code
617-635-4505 — h. Phone Number
i. Fax Number
ryan.woods@boston.gov — j. Email address

4. Representative (if any):

Jennifer — a. First Name
Relstab, P.E. — b. Last Name
Horsley Witten Group, Inc. — c. Company
294 Washington Street, Suite 801 — d. Street Address
Boston — e. City/Town
MA — f. State
02108 — g. Zip Code
857-263-8193 — h. Phone Number
i. Fax Number
jrelstab@horsleywitten.com — j. Email address

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

waived - municipal project — a. Total Fee Paid
b. State Fee Paid
c. City/Town Fee Paid

Massachusetts Department of Environmental Protection
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A. General Information (continued)

6. General Project Description:

The Arboretum Road Green Link is a proposed 10-foot wide multi-modal path connection to the existing Blackwell Path, primarily consisting of a stabilized soil with a small section of dense grade stone at existing Blackwell Footpath connection. The Applicant proposes to install stormwater management practices and implement erosion and sedimentation controls (see attached).

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:

a. County	b. Certificate # (if registered land)
Suffolk	
c. Book	d. Page Number
N/A	N/A

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

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

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

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

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

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

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

2. Width of Riverfront Area (check one):

☒ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 276,925 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.
1,910	N/A	N/A

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

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

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

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

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

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

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

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

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

4. ☐ Restoration/Enhancement

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

a. square feet of BVW

b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings

b. number of replacement stream crossings

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C. Other Applicable Standards and Requirements

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

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

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

   a. ☐ Yes ☒ No

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

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

   August 1, 2017
   b. Date of map

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

   c. Submit Supplemental Information for Endangered Species Review*

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

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

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

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

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

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/). Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

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

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

(c) ☐ MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). 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, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

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

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

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

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

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

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

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: DMF.EnvReview-South@state.ma.us

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: DMF.EnvReview-North@state.ma.us

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.

Massachusetts Department of Environmental Protection
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C. Other Applicable Standards and Requirements (cont'd)

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

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

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

   b. ACEC

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

   a. ☐ Yes ☒ No

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

   a. ☐ Yes ☒ No

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

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

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

      2. ☒ A portion of the site constitutes redevelopment

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

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

      1. ☐ Single-family house

      2. ☐ Emergency road repair

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

D. Additional Information

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

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

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

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

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

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D. Additional Information (cont'd)

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

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

Arboretum Road Green Link
a. Plan Title

Horsley Witten Group, Inc.
b. Prepared By

Richard A. Claytor, Jr., P.E.
c. Signed and Stamped by

May 2019
d. Final Revision Date

1" = 20'
e. Scale

f. Additional Plan or Document Title

g. Date

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

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

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

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

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

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

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

authority, or the Massachusetts Bay Transportation Authority.

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

2. Municipal Check Number	3. Check date
4. State Check Number	5. Check date
6. Payor name on check: First Name	7. Payor name on check: Last Name

F. Signatures and Submittal Requirements

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

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

1. Signature of Applicant	2. Date 5/23/19
3. Signature of Property Owner (if different)	4. Date 5/23/19
5. Signature of Representative (if any)	6. Date

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.

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

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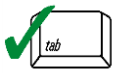
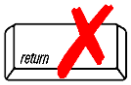




A. Applicant Information

1. Location of Project:

South Street	Roslindale
a. Street Address	b. City/Town
N/A - fee exempt	
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Gregory T.		Rooney	
a. First Name		b. Last Name	
Boston Transportation Department			
c. Organization			
One City Hall Square Room 811			
d. Mailing Address			
Boston	MA	02201	
e. City/Town	f. State	g. Zip Code	
617-635-4100		gregory.rooney@boston.gov	
h. Phone Number	i. Fax Number	j. Email Address	

3. Property Owner (if different):

Ryan		Woods	
a. First Name		b. Last Name	
City of Boston (Parks and Recreation)			
c. Organization			
1010 Massachusetts Ave., 3rd Floor			
d. Mailing Address			
Boston	MA	02118	
e. City/Town	f. State	g. Zip Code	
617-635-4505		ryan.woods@boston.gov	
h. Phone Number	i. Fax Number	j. Email Address	

B. Fees

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

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.

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
(Fee Exempt - municipal project)			

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

Total Project Fee: _____ a. Total Fee from Step 5

State share of filing Fee: _____ b. 1/2 Total Fee **less $**12.50

City/Town share of filling Fee: _____ c. 1/2 Total Fee **plus** $12.50

C. Submittal Requirements

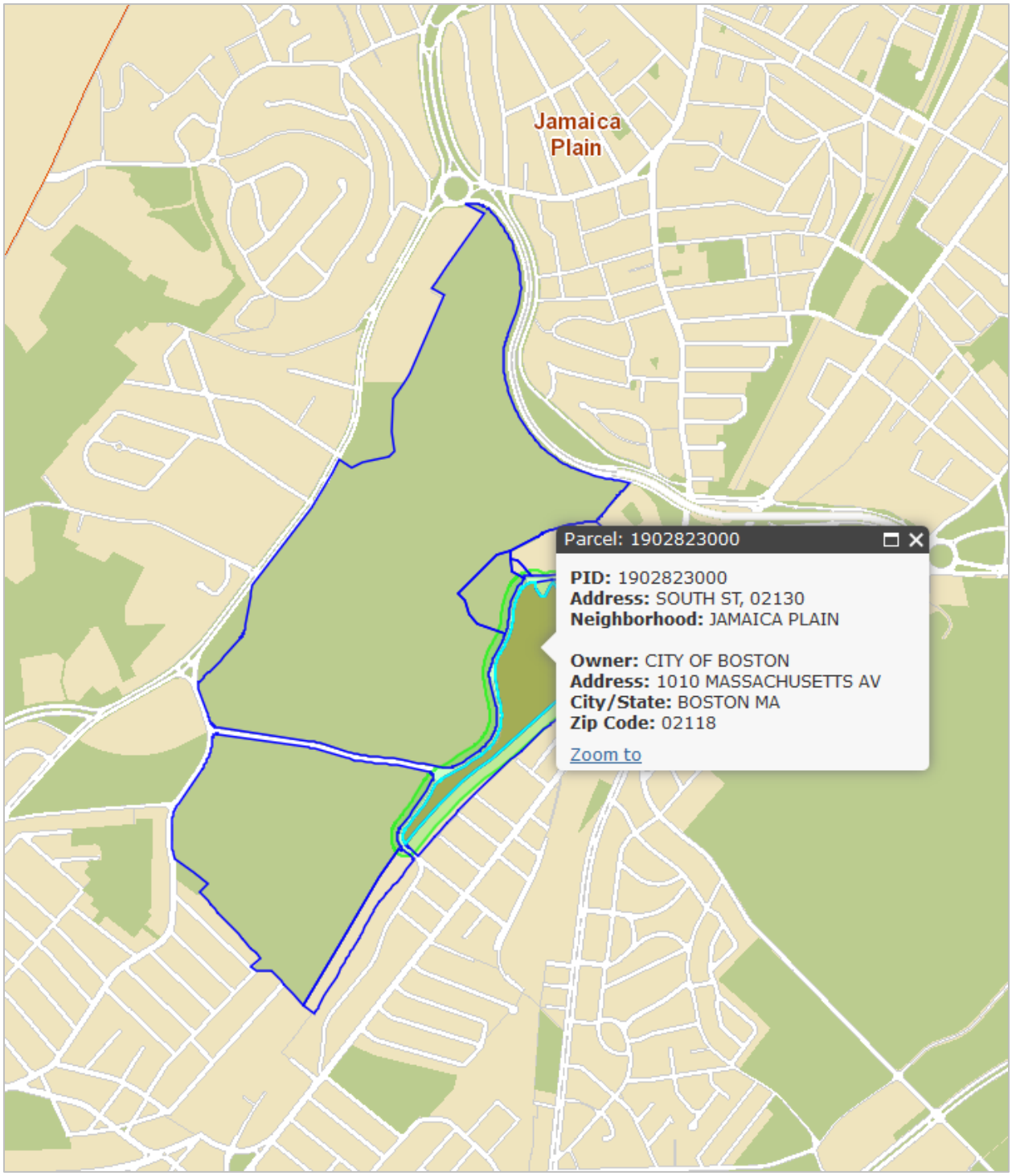
a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

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.)

Assessor's Map



List of Abutters

Bussey Brook Meadow - Arboretum Road Green Link

Roslindale, MA

PID	OWNER	ADDRESSEE	MLG_ADDRESS	MLG_CITYSTATE	MLG_ ZIPCODE	LOC_ADDRESS	LOC_CITY	LOC_ ZIPCODE
1902795000	CITY OF BOSTON	CITY OF BOSTON	ARBORWAY	JAMAICA PLAIN MA	02130	125 ARBORWAY ST	JAMAICA PLAIN	02130
1902796000	COMMONWEALTH OF MASS	COMMONWEALTH OF MASS	375 SOUTH	JAMAICA PLAIN MA	02130	375 307 SOUTH ST	JAMAICA PLAIN	02130
1902797010	WORCESTER CITY CAMPUS CORP	WORCESTER CITY CAMPUS CORP	100 CENTURY DR	WORCESTER MA	01606	383 SOUTH ST	JAMAICA PLAIN	02130
1902797020	HARVARD COLL PRES & FELLOWS	HARVARD COLL PRES & FELLOWS	383 SOUTH ST	JAMAICA PLAIN MA	02130	SOUTH ST	JAMAICA PLAIN	02130
1902798000	MASS BAY TRANSPORTATION AUTH	MASS BAY TRANSPORTATION AUTH	SOUTH	JAMAICA PLAIN MA	02130	SOUTH ST	JAMAICA PLAIN	02130
1902799000	CITY OF BOSTON	CITY OF BOSTON	BUSSEY	JAMAICA PLAIN MA	02130	BUSSEY ST	JAMAICA PLAIN	02130
1902822000	MASS BAY TRANSPORTATION AUTH	MASS BAY TRANSPORTATION AUTH	WASHINGTON ST	JAMAICA PLAIN MA	02130	WASHINGTON ST	JAMAICA PLAIN	02130
1902822010	APW LLC	APW LLC	PO BOX 300173	JAMAICA PLAIN MA	02130	WASHINGTON ST	JAMAICA PLAIN	02130
1902823000	CITY OF BOSTON	CITY OF BOSTON	1010 MASSACHUSETTS AV	BOSTON MA	02118	SOUTH ST	JAMAICA PLAIN	02130
1902823010	HAY IDA	HAY IDA	31 FORBES AVE	NORTHAMPTON MA	01060	380 SOUTH ST	JAMAICA PLAIN	02130
1902824000	CITY OF BOSTON	CITY OF BOSTON	SOUTH	JAMAICA PLAIN MA	02130	360 SOUTH ST	JAMAICA PLAIN	02130
1902836000	CITY OF BOSTON	CITY OF BOSTON	CHOCORUA	JAMAICA PLAIN MA	02130	WASHINGTON ST	JAMAICA PLAIN	02130

NOTICE OF INTENT
ABUTTER NOTIFICATION LETTER

DATE: May 24, 2019

RE: Upcoming Bsoton Conservation Commission Public Hearing

To Whom It May Concern:

As an abutter within 100 feet of the project site, please be advised that a Notice of Intent application was filed with the Boston Conservation Commission and the Massachusetts Department of Environmental Protection (MassDEP) regarding the project described below.

APPLICANT:	Gregory T. Rooney, Boston Transportation Dept.
PROJECT LOCATION:	South Street, Roslindale (across from Arnold Arboretum)
ASSESSOR'S MAP & PARCEL:	Ward 19, Parcel 2823
PROJECT DESCRIPTION:	The Arboretum Road Green Link is a proposed 10-foot wide multi-modal path connection to the existing Blackwell Path, primarily consisting of a stabilized soil with a small section of dense grade stone at existing Blackwell Footpath connection. The Applicant proposes to install stormwater management practices and implement erosion and sedimentation controls.
APPLICANT'S AGENT:	Horsley Witten Group c/o Jennifer Relstab, P.E. 294 Washington St, Suite 801, Boston, MA 02903 (508) 833-6600
PUBLIC HEARING LOCATION:	Boston City Hall, Piemonte Room, 5th Floor
DATE:	June 5, 2019
TIME:	beginning at 6:00 p.m.

NOTE: Plans and application materials describing the project site are on file with the Boston Conservation Commission, Boston City Hall, 1 City Hall Square, Room 709, Boston, MA 02201 (617-635-3850), and the MassDEP, Northeast Regional Office, 205B Lowell Street, Wilmington, MA 01887 (978-694-3200).

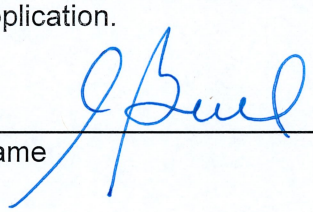
AFFIDAVIT OF SERVICE

Under the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131, § 40)

I, Amy M. Ball, hereby certify under the pains and penalties of perjury that on May 24, 2019, Horsley Witten Group gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the *Massachusetts Department of Environmental Protection Guide to Abutter Notification* dated April 8, 1994, in connection with the following matter:

> A Notice of Intent (NOI) application was filed under the Massachusetts Wetlands Protection Act by the applicant, Gregory T. Rooney (representing the Boston Transportation Department), with the Boston Conservation Commission on May 22, 2019, regarding the construction of a 10-foot wide multi-modal pathway connector from Blackwell Path to Arboretum Road at South Street (across from the Arnold Arboretum) in Roslindale, MA (Ward 19, Parcel 2823).

The form of the notification and a list of abutters to whom notification was sent are attached to this Affidavit of Service and are included as an attachment in the NOI application.



Name

5/24/19

Date

cc: DEP – Northeast Regional Office

Project Narrative

Notice of Intent
Bussey Brook Meadow – Arboretum Road Green Link
Roslindale, MA

May 2019

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ATTACHMENTS

Notice of Intent
Bussey Brook Meadow – Arboretum Road Green Link
Roslindale, MA

May 2019

1.0 INTRODUCTION

The Massachusetts Department of Conservation and Recreation (DCR) recently awarded the City of Boston Transportation Department with grant funding provided under the 2018 Recreational Trails Program for the project entitled, “Bussey Brook Meadow – Arboretum Road Green Link”. The proposed project is designed to provide an accessible, multi-modal path connection between the existing Blackwell Footpath and the end of Arboretum Road. The project is part of a larger multi-modal path approximately 1.5 miles that connects Roslindale Village to the Blackwell Footpath through the Arnold Arboretum and portions of the Massachusetts Bay Transportation Authority right-of-way.

2.0 GENERAL SITE DESCRIPTION

The Project Site is located along the southeastern side of South Street adjacent to the Arnold Arboretum along the outskirts of Bussey Brook Meadow in Roslindale (Boston), MA (Figures 1 and 2). Bussey Brook, a perennial stream, flows beneath South Street at the northern portion of the project site (Photo 1). The Project Site includes a low area situated between the steeply sloping embankment along South Street and the MBTA rail bed, approximately 350 feet south of the Bussey Brook Meadow gate. This area receives stormwater runoff from South Street overland, which has resulted in an erosion gully and sedimentation into the existing meadow in the right of way (ROW) (Photo 2). This water continues overland as it flows to the northeast.

Photo 1. The project site is located southeast of South Street (in foreground) connecting perpendicularly to the existing Blackwell Path visible to the left of this photo on the outskirts of Bussey Brook Meadow (in background) (Google street images 2019).

Photo 2. The low point on South Street which currently receives flow from South Street and portions of the Arnold Arboretum. Additional overland flow also drains to this low area.

2.1 FEMA Designation

According to the FEMA National Flood Hazard Map (Community Panel No. 25025C0086G, effective 9/25/2009), the majority of the site is designated within Zone X or Area of Minimal Flood Hazard (Figures 3 and 3A).

2.2 State-listed Rare Species Habitat

According to the most recent version of the *Massachusetts Natural Heritage Atlas* (14th Edition, August 1, 2017), the project corridor does not fall within areas of *Estimated Habitat of Rare Wildlife and Certified Vernal Pools* and/or *Priority Habitat of Rare Species* as designated by the Massachusetts Natural Heritage and Endangered Species Program (NHESP)(Figure 4).

2.3 Wetland Resource Areas

2.3.1 Resource Area Delineation Methodology

Horsley Witten Group, Inc. (HW) conducted site visits on November 2, 2015 and May 6, 2019 to review site conditions and identify and determine the boundaries of wetland resource areas. Bussey Brook, a perennial stream, and its associated inland Bank are the only resource areas in the vicinity of the project site.

The mean annual high water line (MAHW) of a river is defined as "*the line that is apparent from visible markings or changes in the character of soils or vegetation due to the prolonged presence of water and that distinguishes between predominantly aquatic and predominantly terrestrial land*" (310 CMR 10.58(2)(a) 2). Pursuant to these regulations, both the first break in slope along the river, as well as other field indicators of "bankfull conditions" (changes in slope, changes in vegetation, stain lines, top of point bars, changes in bank materials or bank undercuts) were used to define the limit of the MAHW associated with Bussey Brook. In 2015, HW initially delineated the southern bank of Bussey Brook with blue flagging stations labeled MAHW 1 through 15, and later (2019) delineated the northern bank (MAHW 1N through 3N) as well as a portion of the northern and southern banks west of South Street (MAHW 101N through 103N and MHAW 101 through 103, respectively) such that the full extent of Riverfront Area could be shown on the project plans.

A brief description of the regulatory definitions and the observed resources areas is provided below.

2.3.2 Riverfront Area

Riverfront Area is defined at 310 CMR 10.58(2)(a)3 as "*the area of land between a river's mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away, except that the parallel line is located 25 feet away in Boston, Brockton, Cambridge, Chelsea, Everett, Fall River, Lawrence, Lowell, Malden, New Bedford, Somerville, Springfield, Winthrop, and Worcester;*"

A river or perennial stream is defined under 310 CMR 10.58(2)(a)1 as "*any natural flowing body of water that empties to any ocean, lake, pond, or other river and which flows throughout the year*. (…)" and is further qualified under 310 CMR 10.58(2)(a)3.a. such that "*A river or stream shown as perennial on the current United States Geological Survey (USGS) or more recent map provided by the Department is perennial*."

Bussey Brook is identified as a perennial stream on the current USGS Topographic map (Boston South, 1987; Figure 1). This perennial stream flows beneath South Street through a 72-inch semi-circular stone and brick culvert at the northern reaches of the project site.

Bussey Brook has a 25-foot Riverfront Area. At the time of our initial site visit in the fall of 2015, the stream was dry. However, we observed evidence of high velocity flows including areas of scour beyond the rip-rapped stream where water had overtopped the banks in several areas. Flow was observed during our spring 2019 (Photos 3 and 4).

Riverfront Area at this project site is comprised largely of mowed meadow, and encompasses a portion of the road (South Street) and the stone wall that runs parallel to the road (see Photo 1).

Photo 3. View of Bussey Brook looking upgradient (north of South Street) (L) and downgradient (R). The blue flagging represents the limit of mean annual high water (MAHW). Bussey Brook was observed to be dry at the time of the November 2, 2015 site visit.

Photo 4. Bussey Brook, view facing east/northeast. Photo taken from above the culvert on May 6, 2019.

2.3.3 Inland Bank

Bank is defined at 310 CMR 10.54(2)(a) as "*the portion of land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent floodplain, or, in the absence of these, it occurs between a water body and an upland. A Bank may be partially or totally vegetated, or it may be comprised of exposed soil, gravel or stone. The upper boundary of a Bank is first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level*" [310 CMR 10.54(2)(c)].

The Banks of Bussey Brook are well-defined, consisting of rocks and cobbles and overgrown with herbaceous vegetation in the immediate vicinity of the project site. There is a 100-foot jurisdictional buffer zone to Inland Bank.

3.0 PROPOSED PROJECT

The Arboretum Road Green Link is a proposed 10-foot wide multi-modal path connection to the existing Blackwell Path. This proposed pathway will extend from the existing path in a southerly direction parallel to South Street and the adjacent stone wall (Photo 5), connecting to Arboretum Road through a tunnel within the MBTA ROW. The path will primarily consist of a stabilized soil with a small section of dense grade stone at existing Blackwell Footpath connection. The Applicant proposes to install stormwater management practices consisting of a shallow landscaped depression at the intersection of Blackwell Footpath as well as a grass swale adjacent to the main path that discharges to a sand filter to encourage filtration and groundwater recharge.

Photo 5. View of proposed pathway looking approximately south along south Street. Bussey Brook is located to the left of the photo beyond the stone headwall (left image). Riverfront Area extends 25 feet to the north and south of the Bussey Brook MAHW and consists of an existing maintained grass area, and the overgrown gravel entrance to the existing Blackwell Path.

3.1 Design Considerations

The design of the Arboretum Road Green Link includes three sections: the connection to the Blackwell Footpath (including work within the 100-foot buffer and Riverfront Area), the path along the meadow, and the path spur through the MBTA ROW connecting to Arboretum Road. The overall design is intended to provide limited impact to the existing experience of Bussey Brook and Bussey Brook Meadow and minimize required maintenance to existing practices already occurring onsite, including mowing and minor repairs to the path and landscaping as necessary. Consequently the proposed path materials (dense grade stone, stabilized soil) and landscaping (seed mix of fescues and meadow grasses) are similar to existing conditions. The narrative below describes the design considerations for each of the three path sections:

3.1.1 Connection to the Blackwell Footpath

The existing Blackwell Footpath, which extends from Washington Street to South Street, is a 12-foot dense grade stone path that serves to connect users from the Forest Hills station to the Arnold Arboretum. It is currently being used by pedestrians and bicyclists as well as necessary maintenance vehicles. Portions of the footpath are planning on being repaired in the near future, including the area in the vicinity of the pedestrian entrance at the Bussey Brook Meadow gate.

The design of the connection to the Blackwell Footpath includes restoration of the dense grade stone that currently exists through the vehicle access gate (Photos 6 and 7), which will be impacted by the construction entrance access. The area of dense grade stone is bounded by two cobble thresholds and the Bussey Brook Meadow Gate. A shallow (6-inch) depression was included in the design to attempt to capture any materials or stormwater which may runoff toward the Brook undetained.

The main 10-foot wide path, a stabilized stone material (Photo 8), then extends to the south, paralleling the existing stone wall and crossing over the existing culvert that carries Bussey Brook. A wooden fence was included in the path design for the safety of pedestrians and bicyclists.

Photo 6. View of the existing Blackwell Footpath (looking east from Bussey Brook Meadow Gate). The existing material is a dense grade stone.

Photo 7. Views of the Bussey Brook Meadow Gate (looking to the west, towards South Street and looking to the north, from Bussey Brook).

Photo 8. Photos of dense grade stone along the Blackwell Footpath (left) and stabilized soil in Quincy, MA (right).

3.1.2 Main Path

The 10-foot wide stabilized soil path alignment continues to the south and gently meanders within an area that is currently mowed, between the existing stone wall on South Street to the west and the Bussey Brook Meadow to the east. The path will include a 2-foot shoulder (1 foot to be stabilized soil or similar alternative) to allow safe passing widths for pedestrians and bicyclists. The path will be pitched (sloped) to the west at a 1.5% slope to direct stormwater to a shallow (6-inch) vegetated swale. The intent is to keep path materials away from the meadow and direct stormwater to a proposed sand filter where it might be treated before entering the meadow.

The proposed path design also includes the incorporation of a pretreatment structure (e.g., oil and sand separator) and a sand filter to manage stormwater runoff from South Street. Runoff is currently discharging undeterred into the meadow causing erosion and sedimentation (Photo 9). Plans proposed by the City of Boston Public Works (to be completed in the summer of 2019) will include regrading of South Street and installation of two catch basins; the proposed pretreatment structure and sand filter will be connected to those structures. The intent is to improve the water quality to the meadow (including portions in the Riverfront Area and 100-foot buffer zone to Bank), restore degraded areas to the extent possible, and ensure pedestrian safety. The existing opening in the wall and a turf reinforced grass will accommodate maintenance vehicles for cleaning of the proposed structures.

Photo 9. Views of the location where stormwater runoff from South Street flows into Bussey Brook Meadow. Erosion and sedimentation has impacted the existing slope and meadow.

3.1.3 Path Spur to Arboretum Road

The proposed 10-foot wide stabilized soil path continues into the MBTA ROW and transitions to a concrete path as it enters the tunnel. A proposed cobble swale, sediment forebays and a bioretention area would manage stormwater from the tunnel and the gateway plaza area. The proposed plaza includes bike racks, landscaping (including invasive species removal), and a stone wall with bollard and chain at the entrance. As of this submittal, MBTA is undergoing a design review of these proposed elements. Currently the area is unimproved, with exposed soil, invasives (primarily Japanese knotweed and Oriental bittersweet), and trash and debris present (Photo 10).

Photo 10. Views of the tunnel and gateway area. The MBTA ROW is mostly unimproved, with exposed soil, invasives and trash and debris present.

3.2 Affected Jurisdictional Areas

The proposed project will occur within the 25-foot Riverfront Area as well as within the 100-foot buffer zone to Inland Bank associated with Bussey Brook. The project will also implement erosion and sedimentation controls during construction which will remain in place until soils are stabilized.

Table 1. Summary of Jurisdictional Area Impacts

Jurisdictional Resource	Total (SF)
Riverfront Area	1,910 (or 0.7%)
Total Riverfront Area on property (estimated)	276,925
100-foot buffer to Bank (from MAHW flags)	4,350

Details of the proposed project are provided on the attached plans entitled, Arboretum Road Green Link," prepared by Horsley Witten Group, Inc. and dated May 2019. Additional details regarding the proposed stormwater practices are provided on the plans and in the discussion below.

4.0 STORMWATER MANAGEMENT

The proposed project is designed to meet the Massachusetts Stormwater Management Standards (MASWMS) to the extent practicable. The purpose of the proposed project is to construct a multi-modal pathway connecting the existing Blackwell Footpath to the end of Arboretum Road. Proposed low impact development (LID) stormwater treatment practices will treat runoff from the proposed path and the connection plaza. The proposed site design conforms to the Standards by incorporating LID elements to the maximum extent practicable.

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.

No new untreated stormwater will be discharged or cause erosion to a water of the Commonwealth. Stormwater runoff from the proposed path west of the MBTA right-of-way (ROW) will be filtered and recharged onsite through the use of a vegetated swale which will be directed to the proposed sand filter. Additional runoff from South Street that currently discharges onto the Project Site will be directed into catch basins that will be directed towards a pretreatment practice and a sand filter. Storms greater than the water quality event (1-inch rainfall) will be allowed to flow overland via an emergency spillway directed towards the existing meadow.

Stormwater runoff from the path within the MBTA ROW, through the tunnel and from the gateway area at the end of Arboretum Road is proposed to be managed through a sediment forebay and a bioretention area. The practice is designed for the 1-inch rainfall event.

Standard 2. Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Peak stormwater discharge rates are being managed to the maximum extent practicable through the use of stormwater management practices as noted. Table 1 provides the peak runoff rates and

volumes for the drainage areas contributing to the proposed sand filter at the meadow. Further details are provided in Attachment B.

Table 1: Peak Runoff Rates and Volumes

STUDY POINT 1 (SP1) – Meadow Study Point

DESIGN STORM	PRE-DEVELOPMENT		POST-DEVELOPMENT	
	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW (CFS)	VOLUME (AF)
1 YR	0.37	0.062	0.03	0.001
2 YR	0.91	0.115	0.78	0.031
10 YR	3.88	0.348	4.00	0.231
25 YR	6.87	0.581	7.13	0.456
100 YR	14.12	1.149	15.15	1.052

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

Recharge in post-development will be equal or greater than pre-development conditions with the addition of the shallow depression, vegetated swale, sand filter and bioretention area, all which are intended to collect and retain runoff to promote filtration and infiltration to groundwater resources.

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:

- ***Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;***
- ***Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and***
- ***Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.***

The project satisfies all three of the above requirements. Source controls and pollution prevention will be controlled by the methods outlined in the Stormwater Operation and Maintenance Plan. The stormwater management treatment system has been selected and sized to equal or exceed the required 80% average annual load of TSS, as follows:

Sand Filter:	Recommended design rate:	80% (with pretreatment)
Bioretention Area:	Recommended design rate:	80% (with pretreatment)

Standard 5. For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Not applicable. No area on the proposed site has been designated as a land use with higher potential pollutant loads.

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 determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

Not applicable. The site is not within a Zone II wellhead protection recharge area for public water supply or any of the State designated critical areas listed above.

Standard 7. A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The project is multi-modal (bike/pedestrian) path and is therefore considered a redevelopment project. This project is meeting standards 1, 2, 3, 4, 5 and 6 to the maximum extent practicable.

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

The erosion and sediment control devices that will be implemented during construction of the project are shown on the site preparation and demo plan. They include a linear barrier (siltation sock,

construction fence, and/or equal) along the perimeter of the work zone. Catchbasins will be equipped with temporary silt sacks. Details are provided on the site plans. The project does not include an actual discharge to a water of the Commonwealth and therefore compliance with the National Pollutant Discharge Elimination System (NPDES) requirements is not applicable.

Standard 9. A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

An operations and maintenance plan will be implemented by the Owner and designated Site Operator. See Post Construction Operation and Maintenance requirements.

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

There will be no illicit discharges to any resource area or stormwater management system/structure as part of this project.

5.0 POST CONSTRUCTION OPERATION AND MAINTENANCE

In conformance with Standard 9 of the Stormwater Standards we offer the following information for Post Construction Operation and Maintenance of the stormwater system associated with the proposed improvements.

5.1 Responsible Parties

Owner:

Name: City of Boston Parks and Recreation Department
Address: 1010 Massachusetts Avenue, 3rd Floor, Boston, MA 02218
Phone:617-635-4505

Party Responsible for Operation and Maintenance (Stormwater Management Structures):

Name: City of Boston Water and Sewer Commission
Address: 980 Harrison Avenue, Boston, MA 02119
Phone: 617-989-7600

Party Responsible for Operation and Maintenance (Stormwater Management Vegetation):

Name: The Arnold Arboretum of Harvard University
Address: 1300 Centre Street, Boston, MA 02131
Phone: 617-524-1718

5.2 Stormwater Maintenance Tasks

All stormwater management and controls will be operated and maintained appropriately during regular operation of the site in the post-construction period. The stormwater control system will be regularly inspected to ensure proper performance. In general, the following operation and maintenance provisions will be provided:

- All stormwater management systems will be cleared of accumulated foreign debris, including leaves and lawn cuttings;
- All stormwater management systems will be inspected for slope integrity and erosion where applicable;
- A snow removal plan will be adhered to by the Owner and entities performing maintenance of the path and stormwater management systems;
- A maintenance inspection report will be made after each inspection. A copy of the form to be completed by the inspector is attached;
- All measures will be maintained in good working order, if a repair is necessary, it will be initiated within 48 hours of discovery; and
- All sediment and debris materials will be disposed of properly in a pre-approved off-site location.

The stormwater controls will be inspected on a routine basis to prevent deficiencies in the effectiveness of the systems due to sediment build-up, damage, or deterioration. Stormwater controls will be operated and maintained appropriately during regular operation of the site in the post-construction period.

Sand Filters
General maintenance of the seeded sand filter falls under landscaping practices. A general inspection of the bioretention area shall be conducted annually and after storm events greater than or equal to the 1-year, 24-hour Type III precipitation event.

Materials deposited on the surface of the sand filter (e.g., trash and litter) should be removed manually on a quarterly basis. Correction of any side slope erosion gullying, animal burrowing or slope slumping, and replanting as necessary. If standing water is observed more than 48 hours after a storm event, then the following steps should be taken:

- The drainage structures and pipes upgradient of the sand filter should be flushed and debris, sediment and trash should be removed.
- The emergency spillway should be inspected to ensure that there are no blockages.
- If other inspection and maintenance conditions require further action, the top 6 inches of sand should be removed and replaced with new materials. If discolored or contaminated material is found below this removed surface, then that material should also be removed and replaced until all contaminated sand has been removed from the filter chamber. The sand should be disposed of in accordance with all applicable federal and local regulations.

Loam and reseed with the specified seed mix as shown on the Landscape Plan sheets of the Construction Plans as necessary. The seed mix specified for the sand filter is a low mow seed mix and the grass should be allowed to grow to depths of 12” to maintain a meadow appearance. Mowing shall occur 4 times per growing season. When mowing near either use a mulching blade or remove clippings from the filter bed area. Fresh grass clippings are high in nitrogen and should not be left in the filter bed as they will compromise the facility’s pollutant reduction effectiveness or cause outlet structure clogging. Proper grass seed selection during establishment of vegetation should eliminate the need for fertilizers and pesticides. Watering is necessary during the first grass establishment period 30 days min., and during drought conditions.

All structural components, which include the outlet structure, pipes, frame and grate, underdrain system, and timber check dams, should be inspected and any deficiencies should be reported.

Vegetated (Dry) Swales and Shallow Depression: The maintenance objective for this practice includes maintaining the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass/vegetation cover. The following activities are recommended on an annual basis or as needed:

- Mowing
- Litter and debris removal
- Stabilization of eroded side slopes and bottom
- Dethatching swale bottom and removal of thatching

Vegetated swales and the shallow depression will be inspected on an annual basis and just after storms greater than or equal to the 1-yr, 24-hour (Type III) storm event. Both the vegetative and structural components will be inspected and repaired as necessary. When sediment accumulates to a depth of one-half of the original design depth, sediment will be removed, and the swale will be reconfigured to its original dimensions. Sediment will be disposed of properly in a pre-approved off-site location. If the surface of the vegetated swale or shallow depression becomes clogged to the point that standing water is observed on the surface 48 hours after precipitation events, the top six (6) inches of soil along the bottom of the swale will be roto-tilled or cultivated to break up any hard-packed sediment, and then reseeded. Trash and debris will be removed and properly disposed. Side slopes will be checked for stability and any burrowing from animals should be repaired. Any minor soil erosions gullies will be repaired when they occur.

Scraping of the swale bottom and removal of sediment may be needed every 5-10 years to restore the original cross section and infiltration rate, and re-seeding or sodding to restore ground cover will be conducted as necessary.

Sediment Forebays: Sediment forebays will be inspected on an annual basis and just after storms greater than or equal to the 1-yr, 24-hour (Type III) storm event. Collected sediment and sand will be cleaned out of the forebay when it accumulates to a depth of more than one-half (½) the design depth. Sediment will be disposed of properly in a pre-approved off-site location. Trash and debris will be removed when found during normal inspections.

Bioretention Areas: The maintenance objective for this practice includes maintaining the hydraulic and removal efficiency of the bioretention system and maintaining a dense, healthy vegetative cover. The following activities are recommended on an annual basis or as needed:

- Vegetation management;
- Litter and debris removal; and
- Stabilization of eroded side slopes and bottom (replace lost soil and re-seed).

During the six months immediately after construction, bioretention areas will be inspected at least twice or more following precipitation events of at least 1.0 inch to ensure that the system is functioning properly. Thereafter, inspections will be conducted on an annual basis and after storm events of greater than or equal to the 1-year, 24-hour precipitation event.

Both the vegetative and structural components will be inspected and repaired. General maintenance of the bioretention falls under landscaping practices. The planting soil media will be monitored for erosion, percolation, and aeration. When sediment accumulates to a depth of one (1) inch over the filter bed it will be removed and disposed of properly in a pre-approved off-site location. If the surface of bioretention area becomes clogged to the point that standing water is observed on the surface 48

hours after precipitation events, the top three inches of discolored material will be removed and replaced with new material meeting the original design specification. Ill-established, dead, or severely diseased plants will be removed and replaced as needed. All barren areas within the extents of the facility will be replenished and re-vegetated to the original design standards. Grasses in the bioretention will be cut if over-growth is found during the inspection. Trash and debris will be removed and properly disposed. During inspection, any structural components of the system, including weir walls, drainage inlets, pipes, and overflow structures, will be checked for proper function. Any clogged openings will be cleaned out and repairs will be made where necessary.

Sediment build-up at the stone/forebay inlet locations will be removed as described above. The overflow spillways will be repaired or replaced when necessary. Stone at the inlet and/or outlet locations will be inspected annually and repaired as necessary.

Herbaceous vegetation root stock will be pruned when overcrowding is observed, or approximately once every three (3) years. If at least 50 percent vegetation coverage is not established after two (2) years, a reinforcement planting will be performed. The embankments will be checked for stability and any burrowing animals will be removed. Any minor soil erosions gullies will be repaired when they occur.

Catch Basins, area drains and drainage network: All catch basins, area drains and drain manholes will be inspected bi-annually to monitor for proper operation, collection of solids, litter and/or trash, and structural deterioration. The structures will be cleaned bi-annually, or when the depth of sediment exceeds one half the depth from the bottom of the invert and repaired when required.

5.3 Long-Term Pollution Prevention Plan

Long-term pollution prevention measures will be implemented at the site to further reduce pollutants to stormwater discharges after construction. The following general maintenance practices will be employed:

Mowing – Herbaceous material along the shoulder and bottom of the stormwater management facilities will be mowed a minimum of two times per year or as necessary. Extent of mowing is intended to accommodate access for maintenance of the path and stormwater facilities.

Invasive Plant Control and Removal of Vegetation – Any invasive vegetation that is encroaching the tunnel gateway and/or the stormwater management features will be eradicated through hand tool removal or selective, direct application of herbicides (e.g., cut and drip). Invasive species targeted for management include Japanese knotweed (*Polygonum cuspidatum*) and Oriental bittersweet (*Celastrus orbiculatus*), as well as other non-native invasive species determined to be necessary for removal. The removal of invasives will be approved by the Conservation Commission and/or its agent.

Bituminous Asphalt or Concrete Pavement – Repair surface with patching as necessary. Inspect and document heaving and any cracking. Repair concrete and seal pavement as necessary. Full pavement replacement will be conducted every 15-20 years or as determined necessary due to field conditions.

Curbing, Stone/Rock, Walls, and Stone – Inspection will be annually. Remove and replace as necessary.

Snow Management/Removal Plan – Plowed snow will be deposited onto available pervious locations and where available to be directed to stormwater management systems for treatment. Plowing and to be conducted to provide safe pedestrian access as well as access for maintenance vehicles.

Litter/Trash Collection – Litter a trash collection from the property to be conducted bi-annually or as required during other operation activity.

Pet Waste Management – Residents and visitors to be encouraged to pick up after their pets with signage along lawn areas. Waste to be collected if found during other maintenance.

Soil/Surface Erosion Management – Soil erosion to be monitored and remediated as necessary. Soil washout into adjacent properties and/or resource areas to be removed and surface to be re-established.

Graffiti Control – Graffiti to be reported to the Police Department and removed by environmentally safe detergent and water or repainted as necessary.

Vandalism – Vandalism to be reported to the Police Department and repaired as necessary.

Illicit Discharges - No sewer pipes will be connected to the drainage network. All wastewater will be connected to in approved locations.

5.4 Estimated Operation and Maintenance Budget

The estimated average annual operating and maintenance budget for the project is as follows:

General Maintenance	$1,000
Sand Filter and Associated Structures	$2,500
Vegetated Swale and Shallow Depression	$500
Bioretention Area and Sediment Forebays	$1,000
Estimated Total Annual Maintenance Cost:	*$5,000*

5.5 Operation and Maintenance Log Form

Operation and maintenance log form is provided below:

Operation and Maintenance Checklist

Owner: City of Boston Parks and Recreation
Operator: City of Boston Water and Sewer Commission and
the Arnold Arboretum of Harvard University

Location:

Date/Time:

Inspector:

Last Precipitation Event and Approximate Depth:

	Description	Maintenance Required? (Y/N)
1. Sediment Forebay		
Sediment Removal and Trash Removal	Remove sediment from the forebay when sediment buildup is ½ of the design depth. Remove trash and debris.	
Structural	Remove and replace stone and/or block pavers where found defective. Supplement as necessary.	
2. Dry Swale/Shallow Depression- Inspect annually and after major storms		
Sediment Removal	Remove sediment from riprap inlets and basins when sediment buildup is half of the design depth.	
Side Slopes and Surface	Repair any soil gullying and revegetate/ replenish topsoil on barren areas as necessary.	
Outlet Structures	Remove sediment as needed. Remove trash and debris.	
Infiltration Capacity Maintenance	If standing water is observed 48 hrs after a storm event, the top 3" will be roto-tilled to break up hard-packed soil and then reseeded.	
Vegetation Management	Remove weeds by hand. Water grass during establishment period. Cut grasses up to twice annually to maintain grass heights less than 12 inches.	
3. Catch Basins, Drain Manholes, Area Drains, Drain Pipe – Inspect twice annually		
Debris Cleanout	Remove all trash, debris, and sediment from all structures twice annually or as needed. Remove all debris from pretreatment structure at least twice annually or when sediment buildup is half the sump depth.	
Structures	Repair as necessary.	

	Description	Maintenance Required? (Y/N)
4. Bioretention Facility – Inspect annually and after major storms		
Sediment Removal	Remove sediment from the filter bed when sediment buildup is >1”.	
Side Slopes and Surface	Repair any soil gullying and revegetate/ replenish topsoil on barren areas as necessary.	
Inlet/Outlet Structures	Repair or replace as necessary. Remove sediment as needed to maintain positive drainage. Remove trash and debris.	
Vegetation Management	Confirmation of plant materials by landscape professional. Replace dead or dying vegetation as necessary.	
Pruning	Prune for sight visibility as necessary. Separation of herbaceous vegetation root stock is necessary when over-crowding is observed (1x/3yrs).	
Infiltration Capacity Maintenance	If standing water is observed 48 hrs after a storm event, the top 3" will be roto-tilled to break up hard-packed soil and then revegetated.	
Mowing	Cut grasses up to twice annually to maintain grass heights less than 12 inches.	
5. Sand Filter – Inspect twice annually		
Debris Cleanout	Remove all trash, debris, and sediment from all structures twice annually or as needed. Remove all debris from chamber and/or galley at least twice annually or when sediment buildup is half the one quarter of the storage.	
Structures	Repair and replace as necessary.	
Sediment Removal	Sediments are to be removed vacuum from the underground chambers where possible.	
Vegetation Management	Confirmation of plant materials by landscape professional. Replace dead or dying vegetation as necessary. Water under drought conditions only.	
Mowing	Cut grasses up to twice annually to maintain grass heights at 12 inches.	
7. Routine Maintenance – Perform annually		
Debris Removal	Remove trash from paved and perimeter areas.	
Pavement Sweeping	Sweep pavement after spring thaw.	
Drainage Network	Check pipes and remove debris when found.	

Comments:

Actions to be taken:

6.0 PROTECTION OF RESOURCE AREA INTERESTS

As noted, the proposed project will occur within the 25-foot Riverfront Area to Bussey Brook, and within the 100-foot buffer zone to Inland Bank. The following provides a discussion of how these resources and their respective interests will be protected.

6.1 Erosion and Sedimentation Control

The Applicant proposes to protect downgradient resource areas by implementing an erosion and sediment control plan during construction. An erosion and sediment control barrier consisting of siltation sock will be placed at the limit of work and will remain in place and will be maintained in good condition until all work is complete and all soils have been stabilized.

6.2 Riverfront Area Performance Standards

The proposed project will occur within the 25-foot Riverfront Area, which includes the multi-modal path as well as associated grading and stormwater management practices. The proposed project will result in alterations to the 25-foot Riverfront Area.

The performance standards for new work in Riverfront Area include:

> *(a) Protection of Other Resource Areas. The work shall meet the performance standards for all other resource areas within the riverfront area, as identified in 310 CMR 10.30 (Coastal Bank), 10.32 (Salt Marsh), 10.55 (Bordering Vegetated Wetland), and 10.57 (Land Subject to Flooding). When work in the riverfront area is also within the buffer zone to another resource area, the performance standards for the riverfront area shall contribute to the protection of the interests of M.G.L. c. 131, § 40 in lieu of any additional requirements that might otherwise be imposed on work in the buffer zone within the riverfront area.*

The proposed project will not occur within any other resource area but will occur within the 100-foot buffer zone to Bank. Proposed erosion controls and stormwater practices will provide water quality protection for down gradient resource areas and all disturbed areas beyond the path will be stabilized with a native seed mix designed to blend in with the adjacent plant community.

> *(b) Protection of Rare Species. No project may be permitted within the riverfront area which will have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, as identified by the procedures established under 310 CMR 10.59 or 10.37, or which will have any adverse effect on vernal pool habitat certified prior to the filing of the Notice of Intent.*

Not applicable. The site is not mapped as rare species habitat by NHESP.

> *(c) Practicable and Substantially Equivalent Economic Alternatives. There must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests identified in M.G.L. c. 131 § 40.*

The purpose and intent of this project is to an accessible, multi-modal path connection between the existing Blackwell Footpath and the end of Arboretum Road, and the project is part of a larger multi-modal path that connects Roslindale Village to the Blackwell Footpath through the Arnold Arboretum

and portions of the MBTA right-of-way. In accordance with the provisions under 310 CMR 10.58(4)(c)2., the "*Scope of Alternatives under consideration shall be commensurate with the type and size of the project*."

> *c. Except as allowed under 310 CMR 10.58(4)(c)2.b., the area under consideration for practicable alternatives extends to the original parcel and the subdivided parcels, any adjacent parcels, and any other land which can reasonably be obtained within the municipality for* […]:
>
> *ii. activities conducted by* ***municipal government****.*

As this project is initiated by the City of Boston, the scope of this project extends city-wide. However, the specific nature of the project as part of a larger connector project necessitates that the project be located in this general vicinity to allow for a connection to the existing Blackwell Footpath. Bussey Brook (and its associated Riverfront Area) bisects the project site at the proposed connection point, and as such, work within Riverfront Area is inevitable. The project is supported by a 2018 DCR grant through their Recreational Trails Program for the overall "Bussey Brook Meadow – Arboretum Road Green Link" project.

> *(d) <u>No Significant Adverse Impact</u>. The work, including proposed mitigation measures, must have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c. 131, § 40.*

Per 310 CMR 10.58(4)(d)2.,

> *2. Within 25 foot riverfront areas, any proposed work shall cause no significant adverse impact by:*
>
> *a. Limiting alteration to the maximum extent feasible, and at a minimum, preserving or establishing a corridor of undisturbed vegetation of a maximum feasible width. Replication and compensatory storage required to meet other resource area performance standards are allowed within this area; structural stormwater management measures shall be allowed only when there is no practicable alternative;*

As noted, the proposes connector pathway extends perpendicular to the Bussey Brook Riverfront Area, and therefore work within this resource area is unavoidable. The Riverfront Area in this location is largely comprised by a maintained grass meadow adjacent to South Street. Proposed stormwater practices that are also located within Riverfront Area are sited in areas where stormwater runoff would occur, and are designed to protect the water quality of the downgradient resource areas.

> *b. Providing stormwater management according to standards established by the Department;*

The project is designed to meet the Massachusetts Stormwater Standards to the extent practicable, as described above.

> *c. Preserving the capacity of the riverfront area to provide important wildlife habitat functions. Work shall not result in an impairment of the capacity to provide vernal pool habitat when identified by evidence from a competent source but not yet certified; and*

Not applicable.

> *d. Proposed work shall not impair groundwater or surface water quality by incorporating erosion and sedimentation controls and other measures to attenuate nonpoint source pollution.*

Erosion control measures are proposed prior to construction and will remain in place until the site is stabilized with vegetation.

Attachment A – Locus Maps

Document Path: H:\Projects\2016\16073 Livable Streets_Arboretum Gateway Path, Roslindale\16073B Design of Arboretum Road Green Link\GIS\Maps\190508_ArbUSGS.mxd

Legend

Approximate Project Limit

0 1000

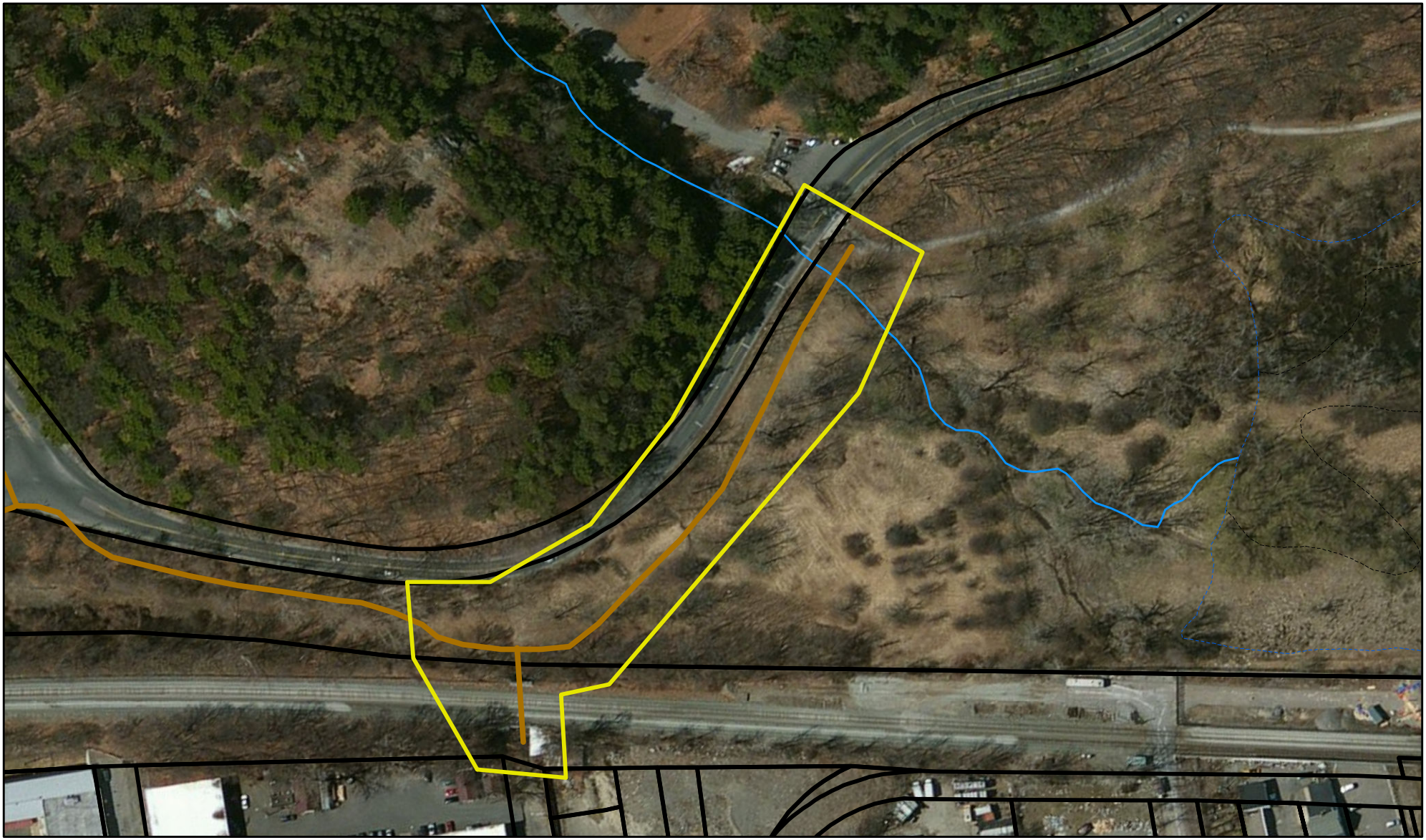
1" = 1000 feet

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Unit 1 • Sandwich, MA 02563
508-833-6600 • horsleywitten.com

USGS Locus Map
Arnold Arboretum
Boston, MA

Date: 5/10/2019

Figure 1



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Legend

Approximate Project Limit

*ESRI Clarity Worldview

0 150

1" = 150 feet

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Unit 1 • Sandwich, MA 02563
508-833-6600 • horsleywitten.com

Aerial View
Arnold Arboretum
Boston, MA

Date: 5/10/2019

Figure 2

Document Path: H:\Projects\2016\16073 Livable Streets_Arboretum Gateway Path, Roslindale\16073B Design of Arboretum Road Green Link\GIS\Maps\190508_ArbFEMA.mxd

Legend

Approximate Project Limit

FEMA Floodzone

X (1% Drainage Area Less than 1 Sq Mile)

X (Area of Minimal Flood Hazard)

*ESRI Clarity Worldview

0 150

1" = 150 feet

Horsley Witten Group
Sustainable Environmental Solutions
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FEMA Floodzones
Arnold Arboretum
Boston, MA

Date: 5/10/2019

Figure 3

National Flood Hazard Layer FIRMette

FEMA

42°18'8.11"N

71°7'7.75"W

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

1:6,000

42°17'41.50"N

71°6'40.29"W

Legend

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

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

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

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

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

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

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

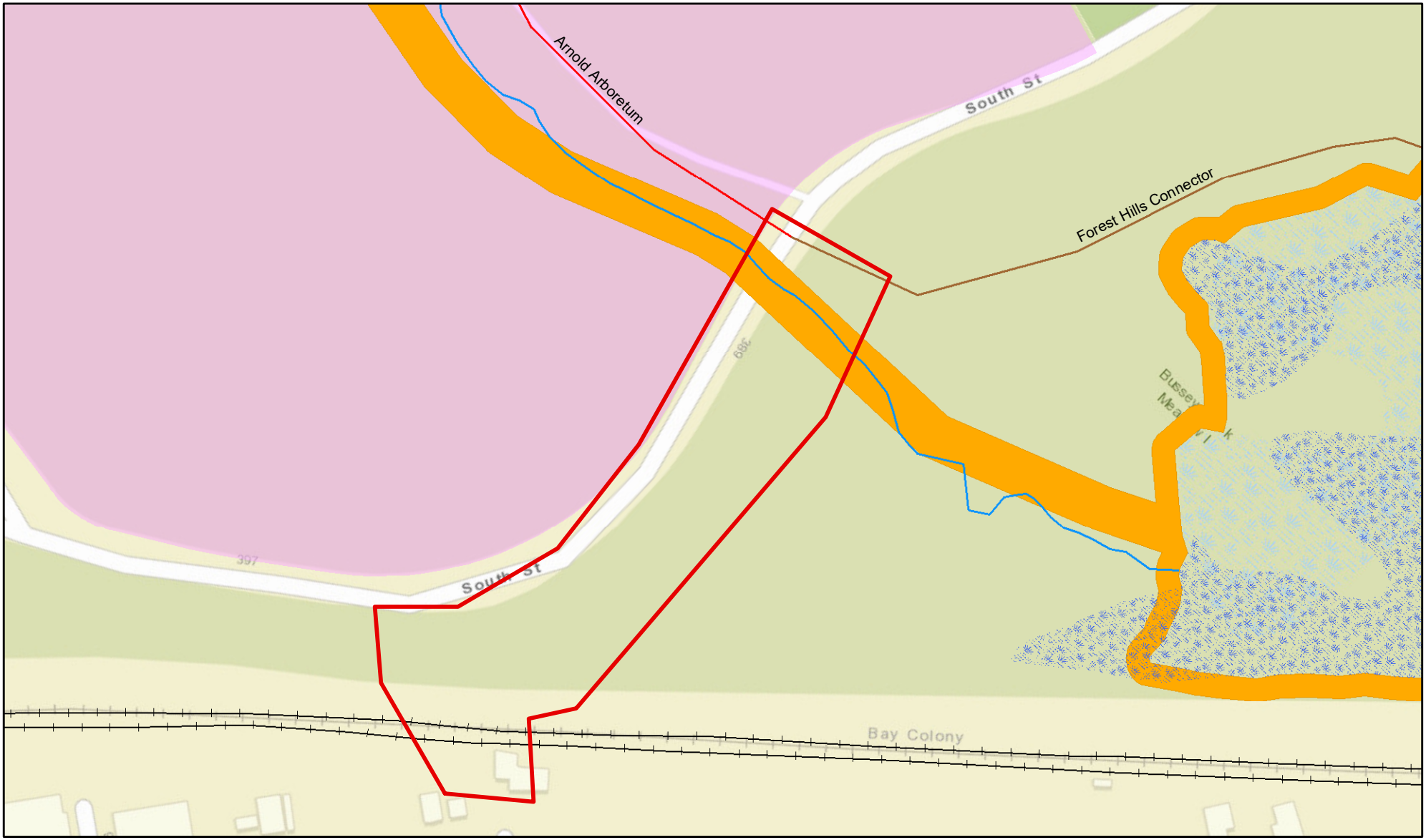
N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/2/2019 at 11:33:04 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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



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*ESRI Topographic Worldmap

Legend

- Approximate Project Limit
- Recreation&Conservation Open Space (Municipal, Protected in Perpetuity)
- Marsh/Bog
- Title 5 Setback Areas
- Hydrologic Connection
- Existing Bicycle Trail
- Potential Bicycle Trail
- Active Rail Service

0 150

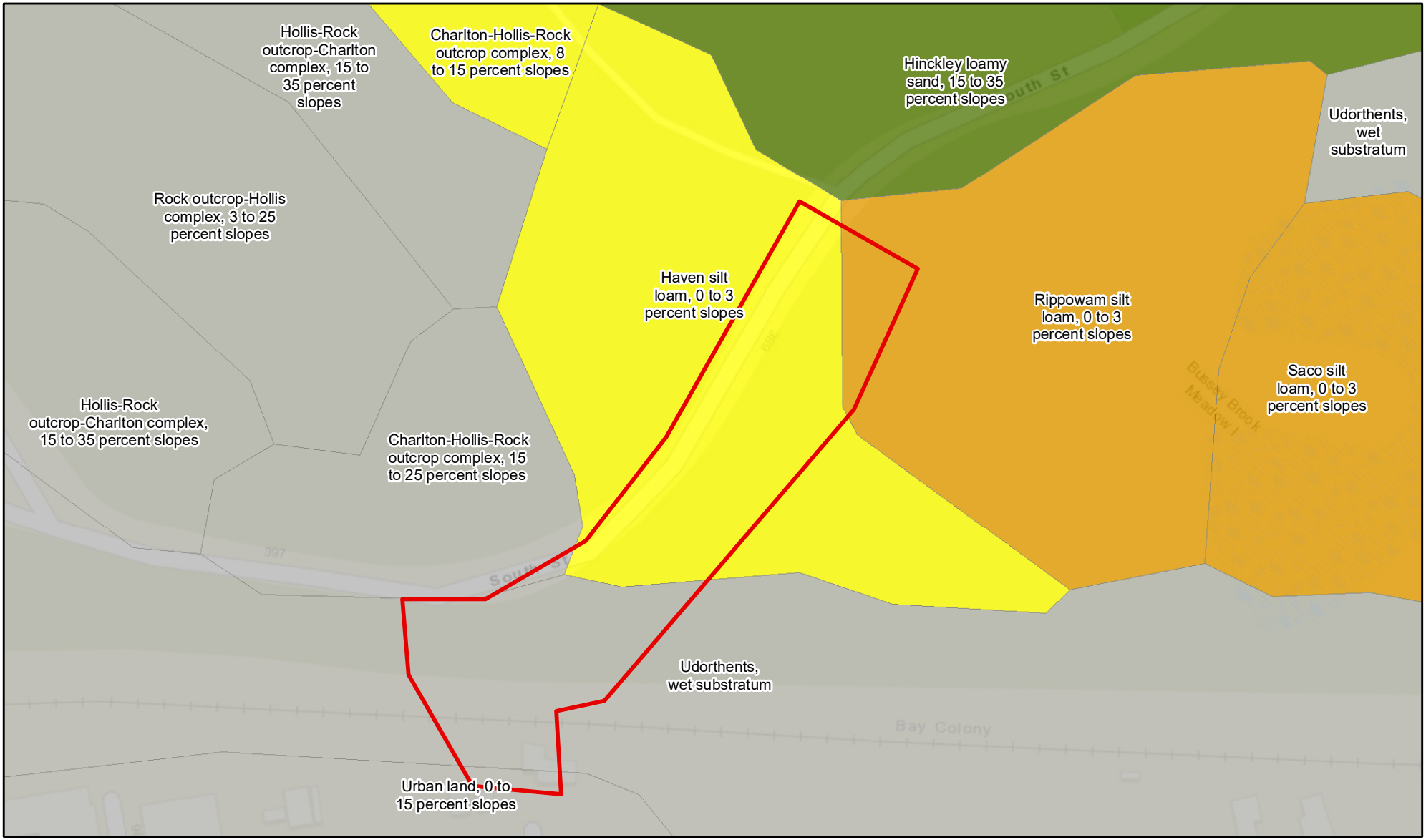
1" = 150 feet

Horsley Witten Group
Sustainable Environmental Solutions

Site Constraints
Arnold Arboretum
Boston, MA

Date: 5/10/2019

Figure 4



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Legend

Approximate Project Limit

Hydrologic Soil Group

- Unknown
- A
- B
- D

*ESRI Topographic Map

0 150

1" = 150 feet

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Sustainable Environmental Solutions
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508-833-6600 • horsleywitten.com

Soil
Arnold Arboretum
Boston, MA

Date: 5/10/2019

Figure 5

Attachment B – Stormwater Management Supporting Data

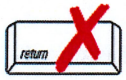
Stormwater Checklist
Other Supporting Data

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

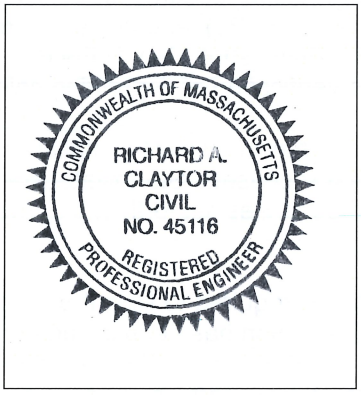
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



5-21-19

Signature and Date

Checklist

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

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☒ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

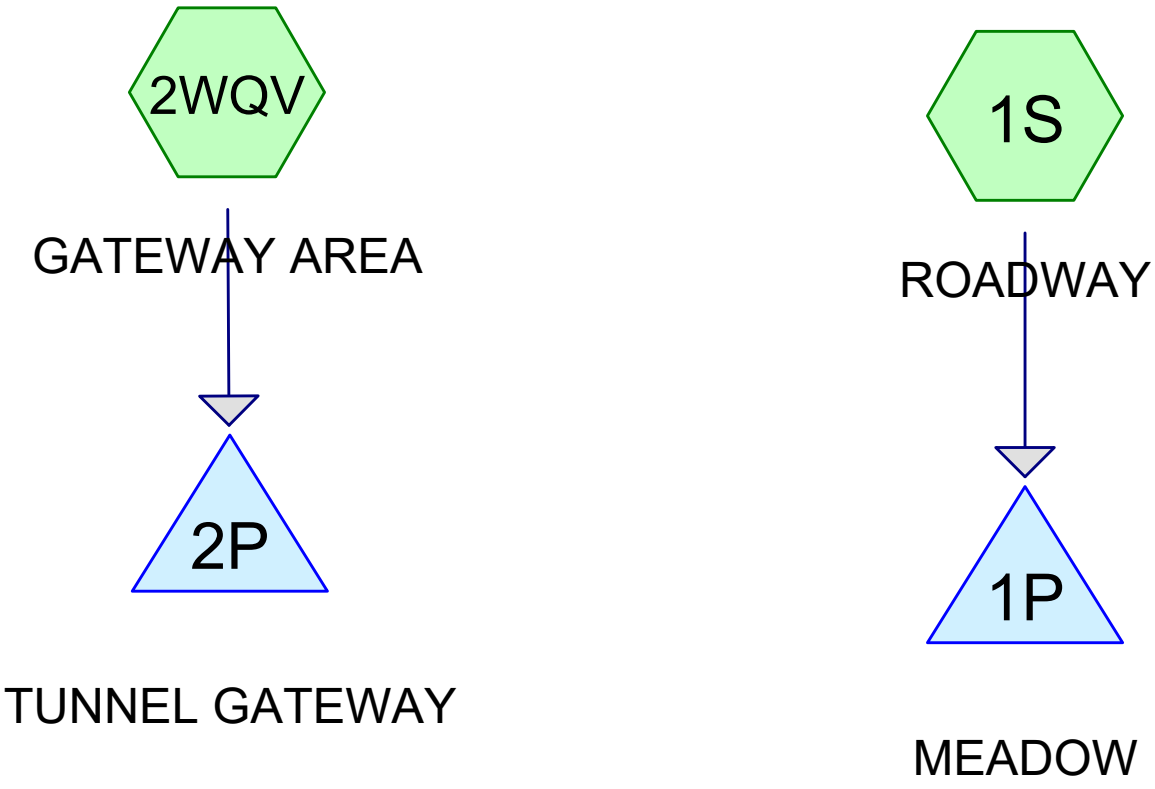
- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity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

Standard 10: Prohibition of Illicit Discharges

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

☐ An Illicit Discharge Compliance Statement is attached;

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



Subcat Reach Pond Link

Routing Diagram for PRE
Prepared by Windows User, Printed 5/21/2019

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth>0.20"
Flow Length=848' Tc=12.1 min CN=60 Runoff=0.37 cfs 0.062 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth>2.32"
Tc=0.0 min CN=98 Runoff=0.37 cfs 0.024 af

Pond 1P: MEADOW Peak Elev=41.89' Storage=2,684 cf Inflow=0.37 cfs 0.062 af
Outflow=0.00 cfs 0.000 af

Pond 2P: TUNNEL GATEWAY Peak Elev=38.53' Storage=1,055 cf Inflow=0.37 cfs 0.024 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 3.855 ac Runoff Volume = 0.086 af Average Runoff Depth = 0.27"
75.45% Pervious = 2.909 ac 24.55% Impervious = 0.947 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 0.37 cfs @ 12.41 hrs, Volume= 0.062 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-YEAR Rainfall=2.71"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.37 cfs @ 12.00 hrs, Volume= 0.024 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-YEAR Rainfall=2.71"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: MEADOW

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth > 0.20" for 1-YEAR event
Inflow = 0.37 cfs @ 12.41 hrs, Volume= 0.062 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 41.89' @ 20.00 hrs Surf.Area= 1,673 sf Storage= 2,684 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	108,394 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	575	0	0
60.00	10,000	108,394	108,394

Summary for Pond 2P: TUNNEL GATEWAY

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth > 2.32" for 1-YEAR event
Inflow = 0.37 cfs @ 12.00 hrs, Volume= 0.024 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 38.53' @ 20.00 hrs Surf.Area= 1,145 sf Storage= 1,055 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	20,920 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
45.00	5,000	20,920	20,920

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth>0.37"
Flow Length=848' Tc=12.1 min CN=60 Runoff=0.91 cfs 0.115 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth>2.82"
Tc=0.0 min CN=98 Runoff=0.45 cfs 0.029 af

Pond 1P: MEADOW Peak Elev=43.09' Storage=5,020 cf Inflow=0.91 cfs 0.115 af
Outflow=0.00 cfs 0.000 af

Pond 2P: TUNNEL GATEWAY Peak Elev=38.72' Storage=1,280 cf Inflow=0.45 cfs 0.029 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 3.855 ac Runoff Volume = 0.145 af Average Runoff Depth = 0.45"
75.45% Pervious = 2.909 ac 24.55% Impervious = 0.947 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 0.91 cfs @ 12.26 hrs, Volume= 0.115 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.25"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.45 cfs @ 12.00 hrs, Volume= 0.029 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.25"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: MEADOW

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth > 0.37" for 2-YEAR event
Inflow = 0.91 cfs @ 12.26 hrs, Volume= 0.115 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 43.09' @ 20.00 hrs Surf.Area= 2,224 sf Storage= 5,020 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	108,394 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	575	0	0
60.00	10,000	108,394	108,394

Summary for Pond 2P: TUNNEL GATEWAY

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth > 2.82" for 2-YEAR event
Inflow = 0.45 cfs @ 12.00 hrs, Volume= 0.029 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 38.72' @ 20.00 hrs Surf.Area= 1,257 sf Storage= 1,280 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	20,920 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
45.00	5,000	20,920	20,920

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth>1.12"
Flow Length=848' Tc=12.1 min CN=60 Runoff=3.88 cfs 0.348 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth>4.33"
Tc=0.0 min CN=98 Runoff=0.69 cfs 0.045 af

Pond 1P: MEADOW Peak Elev=46.46' Storage=15,124 cf Inflow=3.88 cfs 0.348 af
Outflow=0.00 cfs 0.000 af

Pond 2P: TUNNEL GATEWAY Peak Elev=39.21' Storage=1,965 cf Inflow=0.69 cfs 0.045 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 3.855 ac Runoff Volume = 0.393 af Average Runoff Depth = 1.22"
75.45% Pervious = 2.909 ac 24.55% Impervious = 0.947 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 3.88 cfs @ 12.19 hrs, Volume= 0.348 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.69 cfs @ 12.00 hrs, Volume= 0.045 af, Depth> 4.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: MEADOW

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth > 1.12" for 10-YEAR event
Inflow = 3.88 cfs @ 12.19 hrs, Volume= 0.348 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 46.46' @ 20.00 hrs Surf.Area= 3,773 sf Storage= 15,124 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	108,394 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	575	0	0
60.00	10,000	108,394	108,394

Summary for Pond 2P: TUNNEL GATEWAY

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth > 4.33" for 10-YEAR event
Inflow = 0.69 cfs @ 12.00 hrs, Volume= 0.045 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 39.21' @ 20.00 hrs Surf.Area= 1,548 sf Storage= 1,965 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	20,920 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
45.00	5,000	20,920	20,920

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth>1.87"
Flow Length=848' Tc=12.1 min CN=60 Runoff=6.87 cfs 0.581 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth>5.51"
Tc=0.0 min CN=98 Runoff=0.87 cfs 0.057 af

Pond 1P: MEADOW Peak Elev=48.81' Storage=25,295 cf Inflow=6.87 cfs 0.581 af
Outflow=0.00 cfs 0.000 af

Pond 2P: TUNNEL GATEWAY Peak Elev=39.54' Storage=2,502 cf Inflow=0.87 cfs 0.057 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 3.855 ac Runoff Volume = 0.639 af Average Runoff Depth = 1.99"
75.45% Pervious = 2.909 ac 24.55% Impervious = 0.947 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 6.87 cfs @ 12.18 hrs, Volume= 0.581 af, Depth> 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=6.20"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.87 cfs @ 12.00 hrs, Volume= 0.057 af, Depth> 5.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YEAR Rainfall=6.20"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: MEADOW

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth > 1.87" for 25-YEAR event
Inflow = 6.87 cfs @ 12.18 hrs, Volume= 0.581 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 48.81' @ 20.00 hrs Surf.Area= 4,857 sf Storage= 25,295 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	108,394 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	575	0	0
60.00	10,000	108,394	108,394

Summary for Pond 2P: TUNNEL GATEWAY

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth > 5.51" for 25-YEAR event
Inflow = 0.87 cfs @ 12.00 hrs, Volume= 0.057 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 39.54' @ 20.00 hrs Surf.Area= 1,742 sf Storage= 2,502 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	20,920 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
45.00	5,000	20,920	20,920

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth>3.70"
Flow Length=848' Tc=12.1 min CN=60 Runoff=14.12 cfs 1.149 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth>7.94"
Tc=0.0 min CN=98 Runoff=1.25 cfs 0.083 af

Pond 1P: MEADOW Peak Elev=53.05' Storage=50,028 cf Inflow=14.12 cfs 1.149 af
Outflow=0.00 cfs 0.000 af

Pond 2P: TUNNEL GATEWAY Peak Elev=40.11' Storage=3,606 cf Inflow=1.25 cfs 0.083 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 3.855 ac Runoff Volume = 1.232 af Average Runoff Depth = 3.83"
75.45% Pervious = 2.909 ac 24.55% Impervious = 0.947 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 14.12 cfs @ 12.17 hrs, Volume= 1.149 af, Depth> 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=8.88"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.25 cfs @ 12.00 hrs, Volume= 0.083 af, Depth> 7.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=8.88"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: MEADOW

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth > 3.70" for 100-YEAR event
Inflow = 14.12 cfs @ 12.17 hrs, Volume= 1.149 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 53.05' @ 20.00 hrs Surf.Area= 6,807 sf Storage= 50,028 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	108,394 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	575	0	0
60.00	10,000	108,394	108,394

Summary for Pond 2P: TUNNEL GATEWAY

[82] Warning: Early inflow requires earlier time span

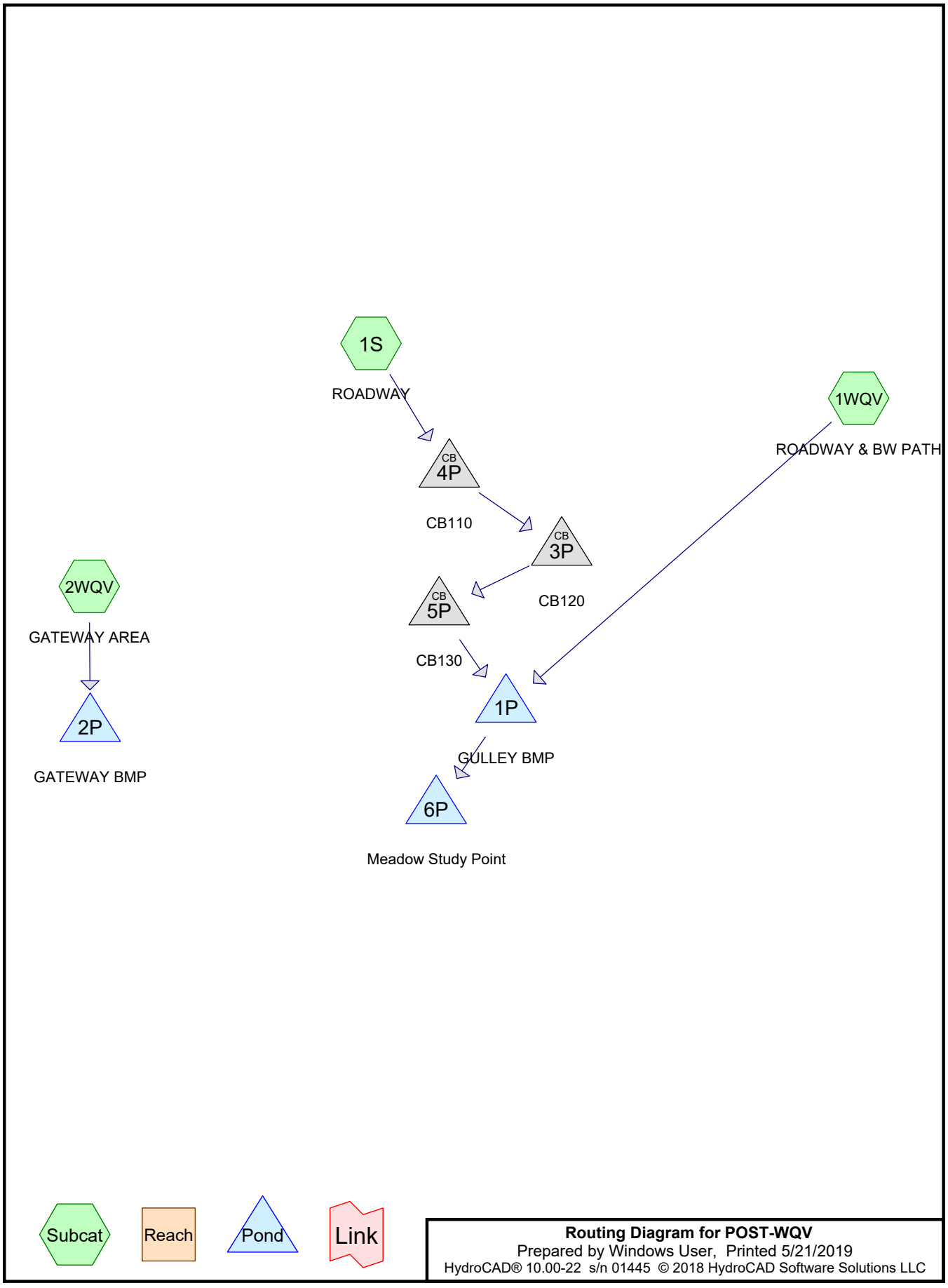
Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth > 7.94" for 100-YEAR event
Inflow = 1.25 cfs @ 12.00 hrs, Volume= 0.083 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 40.11' @ 20.00 hrs Surf.Area= 2,086 sf Storage= 3,606 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	20,920 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
45.00	5,000	20,920	20,920



Routing Diagram for POST-WQV
Prepared by Windows User, Printed 5/21/2019

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth=0.24"
Flow Length=848' Tc=12.1 min CN=60 Runoff=0.37 cfs 0.073 af

Subcatchment 1WQV: ROADWAY & BW Runoff Area=6,200 sf 100.00% Impervious Runoff Depth=2.48"
Flow Length=1,400' Slope=0.0500 '/' Tc=5.5 min CN=98 Runoff=0.38 cfs 0.029 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth=2.48"
Tc=0.0 min CN=98 Runoff=0.40 cfs 0.026 af

Pond 1P: GULLEY BMP Peak Elev=42.01' Storage=512 cf Inflow=0.48 cfs 0.103 af
Discarded=0.22 cfs 0.102 af Primary=0.03 cfs 0.001 af Outflow=0.25 cfs 0.103 af

Pond 2P: GATEWAY BMP Peak Elev=37.57' Storage=159 cf Inflow=0.40 cfs 0.026 af
Discarded=0.02 cfs 0.017 af Primary=0.37 cfs 0.009 af Outflow=0.38 cfs 0.026 af

Pond 3P: CB120 Peak Elev=42.02' Inflow=0.37 cfs 0.073 af
24.0" Round Culvert n=0.013 L=21.0' S=0.0738 '/' Outflow=0.37 cfs 0.073 af

Pond 4P: CB110 Peak Elev=43.06' Inflow=0.37 cfs 0.073 af
24.0" Round Culvert n=0.013 L=25.0' S=0.0588 '/' Outflow=0.37 cfs 0.073 af

Pond 5P: CB130 Peak Elev=42.01' Inflow=0.37 cfs 0.073 af
Outflow=0.37 cfs 0.073 af

Pond 6P: Meadow Study Point Inflow=0.03 cfs 0.001 af
Primary=0.03 cfs 0.001 af

Total Runoff Area = 3.998 ac Runoff Volume = 0.129 af Average Runoff Depth = 0.39"
72.76% Pervious = 2.909 ac 27.24% Impervious = 1.089 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.71"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 1WQV: ROADWAY & BW PATH

Runoff = 0.38 cfs @ 12.08 hrs, Volume= 0.029 af, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.71"

	Area (sf)	CN	Description
*	6,200	98	Pavement & Wall, HSG C
	6,200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow, Roadway - Sheet Flow** Smooth surfaces n= 0.011 P2= 3.25"
5.0	1,350	0.0500	4.54		**Shallow Concentrated Flow, Roadway - Shallow Concentrated** Paved Kv= 20.3 fps
5.5	1,400	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.40 cfs @ 12.00 hrs, Volume= 0.026 af, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-YEAR Rainfall=2.71"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: GULLEY BMP

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=312)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 0.32" for 1-YEAR event
Inflow = 0.48 cfs @ 12.35 hrs, Volume= 0.103 af
Outflow = 0.25 cfs @ 12.71 hrs, Volume= 0.103 af, Atten= 49%, Lag= 21.4 min
Discarded = 0.22 cfs @ 12.71 hrs, Volume= 0.102 af
Primary = 0.03 cfs @ 12.71 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.01' @ 12.71 hrs Surf.Area= 1,138 sf Storage= 512 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 13.0 min (910.7 - 897.8)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	1,500 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	850	0	0
42.75	1,550	1,500	1,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	42.00'	**6.0' long x 0.5' breadth OVERFLOW SPILLWAY**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.22 cfs @ 12.71 hrs HW=42.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.03 cfs @ 12.71 hrs HW=42.01' TW=0.00' (Dynamic Tailwater)
2=OVERFLOW SPILLWAY (Weir Controls 0.03 cfs @ 0.34 fps)

Summary for Pond 2P: GATEWAY BMP

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=229)

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth = 2.48" for 1-YEAR event
Inflow = 0.40 cfs @ 12.00 hrs, Volume= 0.026 af
Outflow = 0.38 cfs @ 12.01 hrs, Volume= 0.026 af, Atten= 4%, Lag= 0.6 min
Discarded = 0.02 cfs @ 12.01 hrs, Volume= 0.017 af
Primary = 0.37 cfs @ 12.01 hrs, Volume= 0.009 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 37.57' @ 12.01 hrs Surf.Area= 330 sf Storage= 159 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 42.2 min (796.6 - 754.5)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	19,493 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
37.85	380	259	259
45.00	5,000	19,233	19,493

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	37.50'	**24.0" Horiz. OUT TO BWSC** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.01 hrs HW=37.57' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.37 cfs @ 12.01 hrs HW=37.57' (Free Discharge)
2=OUT TO BWSC (Weir Controls 0.37 cfs @ 0.85 fps)

Summary for Pond 3P: CB120

[57] Hint: Peaked at 42.02' (Flood elevation advised)
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=139)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 0.24" for 1-YEAR event
Inflow = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af
Outflow = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.02' @ 12.71 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	40.25'	**24.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 40.25' / 38.70' S= 0.0738 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.37 cfs @ 12.41 hrs HW=41.88' TW=41.88' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.37 cfs @ 0.13 fps)

Summary for Pond 4P: CB110

[57] Hint: Peaked at 43.06' (Flood elevation advised)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 0.24" for 1-YEAR event
Inflow = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af
Outflow = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 43.06' @ 12.41 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.78'	**24.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 42.78' / 41.31' S= 0.0588 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.37 cfs @ 12.41 hrs HW=43.06' TW=41.88' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.37 cfs @ 1.41 fps)

Summary for Pond 5P: CB130

[57] Hint: Peaked at 42.01' (Flood elevation advised)
[80] Warning: Exceeded Pond 3P by 1.55' @ 24.22 hrs (8.74 cfs 2.774 af)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 0.24" for 1-YEAR event
Inflow = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af
Outflow = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.41 hrs, Volume= 0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.01' @ 12.71 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	41.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.37 cfs @ 12.41 hrs HW=41.88' TW=41.88' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 0.37 cfs @ 0.37 fps)

Summary for Pond 6P: Meadow Study Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 0.00" for 1-YEAR event
Inflow = 0.03 cfs @ 12.71 hrs, Volume= 0.001 af
Primary = 0.03 cfs @ 12.71 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth=0.43"
Flow Length=848' Tc=12.1 min CN=60 Runoff=0.91 cfs 0.133 af

Subcatchment 1WQV: ROADWAY & BW Runoff Area=6,200 sf 100.00% Impervious Runoff Depth=3.02"
Flow Length=1,400' Slope=0.0500 '/' Tc=5.5 min CN=98 Runoff=0.46 cfs 0.036 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth=3.02"
Tc=0.0 min CN=98 Runoff=0.48 cfs 0.031 af

Pond 1P: GULLEY BMP Peak Elev=42.13' Storage=646 cf Inflow=1.12 cfs 0.169 af
Discarded=0.23 cfs 0.138 af Primary=0.78 cfs 0.031 af Outflow=1.01 cfs 0.169 af

Pond 2P: GATEWAY BMP Peak Elev=37.58' Storage=162 cf Inflow=0.48 cfs 0.031 af
Discarded=0.02 cfs 0.019 af Primary=0.45 cfs 0.012 af Outflow=0.46 cfs 0.031 af

Pond 3P: CB120 Peak Elev=42.14' Inflow=0.91 cfs 0.133 af
24.0" Round Culvert n=0.013 L=21.0' S=0.0738 '/' Outflow=0.91 cfs 0.133 af

Pond 4P: CB110 Peak Elev=43.22' Inflow=0.91 cfs 0.133 af
24.0" Round Culvert n=0.013 L=25.0' S=0.0588 '/' Outflow=0.91 cfs 0.133 af

Pond 5P: CB130 Peak Elev=42.13' Inflow=0.91 cfs 0.133 af
Outflow=0.91 cfs 0.133 af

Pond 6P: Meadow Study Point Inflow=0.78 cfs 0.031 af
Primary=0.78 cfs 0.031 af

Total Runoff Area = 3.998 ac Runoff Volume = 0.200 af Average Runoff Depth = 0.60"
72.76% Pervious = 2.909 ac 27.24% Impervious = 1.089 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.25"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 1WQV: ROADWAY & BW PATH

Runoff = 0.46 cfs @ 12.08 hrs, Volume= 0.036 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.25"

	Area (sf)	CN	Description
*	6,200	98	Pavement & Wall, HSG C
	6,200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow, Roadway - Sheet Flow** Smooth surfaces n= 0.011 P2= 3.25"
5.0	1,350	0.0500	4.54		**Shallow Concentrated Flow, Roadway - Shallow Concentrated** Paved Kv= 20.3 fps
5.5	1,400	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.031 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YEAR Rainfall=3.25"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: GULLEY BMP

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=351)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 0.52" for 2-YEAR event
Inflow = 1.12 cfs @ 12.22 hrs, Volume= 0.169 af
Outflow = 1.01 cfs @ 12.35 hrs, Volume= 0.169 af, Atten= 10%, Lag= 7.8 min
Discarded = 0.23 cfs @ 12.35 hrs, Volume= 0.138 af
Primary = 0.78 cfs @ 12.35 hrs, Volume= 0.031 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.13' @ 12.35 hrs Surf.Area= 1,202 sf Storage= 646 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.1 min (904.3 - 888.2)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	1,500 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	850	0	0
42.75	1,550	1,500	1,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	42.00'	**6.0' long x 0.5' breadth OVERFLOW SPILLWAY**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.23 cfs @ 12.35 hrs HW=42.13' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.78 cfs @ 12.35 hrs HW=42.13' TW=0.00' (Dynamic Tailwater)
2=OVERFLOW SPILLWAY (Weir Controls 0.78 cfs @ 1.01 fps)

Summary for Pond 2P: GATEWAY BMP

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=191)

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth = 3.02" for 2-YEAR event
Inflow = 0.48 cfs @ 12.00 hrs, Volume= 0.031 af
Outflow = 0.46 cfs @ 12.01 hrs, Volume= 0.031 af, Atten= 4%, Lag= 0.6 min
Discarded = 0.02 cfs @ 12.01 hrs, Volume= 0.019 af
Primary = 0.45 cfs @ 12.01 hrs, Volume= 0.012 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 37.58' @ 12.01 hrs Surf.Area= 332 sf Storage= 162 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 40.7 min (791.2 - 750.5)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	19,493 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
37.85	380	259	259
45.00	5,000	19,233	19,493

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	37.50'	**24.0" Horiz. OUT TO BWSC** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.01 hrs HW=37.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.45 cfs @ 12.01 hrs HW=37.58' (Free Discharge)
2=OUT TO BWSC (Weir Controls 0.45 cfs @ 0.91 fps)

Summary for Pond 3P: CB120

[57] Hint: Peaked at 42.14' (Flood elevation advised)
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=9)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 0.43" for 2-YEAR event
Inflow = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af
Outflow = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.0 min
Primary = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.14' @ 12.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	40.25'	**24.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 40.25' / 38.70' S= 0.0738 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.91 cfs @ 12.25 hrs HW=42.09' TW=42.08' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.91 cfs @ 0.30 fps)

Summary for Pond 4P: CB110

[57] Hint: Peaked at 43.22' (Flood elevation advised)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 0.43" for 2-YEAR event
Inflow = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af
Outflow = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.0 min
Primary = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 43.22' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.78'	**24.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 42.78' / 41.31' S= 0.0588 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.91 cfs @ 12.25 hrs HW=43.22' TW=42.09' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.91 cfs @ 1.78 fps)

Summary for Pond 5P: CB130

[57] Hint: Peaked at 42.13' (Flood elevation advised)
[80] Warning: Exceeded Pond 3P by 1.55' @ 24.49 hrs (8.74 cfs 2.726 af)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 0.43" for 2-YEAR event
Inflow = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af
Outflow = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.0 min
Primary = 0.91 cfs @ 12.25 hrs, Volume= 0.133 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.13' @ 12.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	41.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.91 cfs @ 12.25 hrs HW=42.08' TW=42.08' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 0.91 cfs @ 0.26 fps)

Summary for Pond 6P: Meadow Study Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 0.10" for 2-YEAR event
Inflow = 0.78 cfs @ 12.35 hrs, Volume= 0.031 af
Primary = 0.78 cfs @ 12.35 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth=1.24"
Flow Length=848' Tc=12.1 min CN=60 Runoff=3.92 cfs 0.386 af

Subcatchment 1WQV: ROADWAY & BW Runoff Area=6,200 sf 100.00% Impervious Runoff Depth=4.66"
Flow Length=1,400' Slope=0.0500 '/' Tc=5.5 min CN=98 Runoff=0.69 cfs 0.055 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth=4.66"
Tc=0.0 min CN=98 Runoff=0.73 cfs 0.049 af

Pond 1P: GULLEY BMP Peak Elev=42.37' Storage=958 cf Inflow=4.34 cfs 0.442 af
Discarded=0.26 cfs 0.211 af Primary=4.00 cfs 0.231 af Outflow=4.25 cfs 0.442 af

Pond 2P: GATEWAY BMP Peak Elev=37.60' Storage=171 cf Inflow=0.73 cfs 0.049 af
Discarded=0.02 cfs 0.024 af Primary=0.69 cfs 0.025 af Outflow=0.71 cfs 0.049 af

Pond 3P: CB120 Peak Elev=42.49' Inflow=3.92 cfs 0.386 af
24.0" Round Culvert n=0.013 L=21.0' S=0.0738 '/' Outflow=3.94 cfs 0.386 af

Pond 4P: CB110 Peak Elev=43.74' Inflow=3.92 cfs 0.386 af
24.0" Round Culvert n=0.013 L=25.0' S=0.0588 '/' Outflow=3.92 cfs 0.386 af

Pond 5P: CB130 Peak Elev=42.38' Inflow=3.94 cfs 0.386 af
Outflow=3.94 cfs 0.386 af

Pond 6P: Meadow Study Point Inflow=4.00 cfs 0.231 af
Primary=4.00 cfs 0.231 af

Total Runoff Area = 3.998 ac Runoff Volume = 0.490 af Average Runoff Depth = 1.47"
72.76% Pervious = 2.909 ac 27.24% Impervious = 1.089 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 3.92 cfs @ 12.19 hrs, Volume= 0.386 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 1WQV: ROADWAY & BW PATH

Runoff = 0.69 cfs @ 12.08 hrs, Volume= 0.055 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	6,200	98	Pavement & Wall, HSG C
	6,200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow, Roadway - Sheet Flow** Smooth surfaces n= 0.011 P2= 3.25"
5.0	1,350	0.0500	4.54		**Shallow Concentrated Flow, Roadway - Shallow Concentrated** Paved Kv= 20.3 fps
5.5	1,400	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.73 cfs @ 12.00 hrs, Volume= 0.049 af, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YEAR Rainfall=4.90"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: GULLEY BMP

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 1.37" for 10-YEAR event
Inflow = 4.34 cfs @ 12.17 hrs, Volume= 0.442 af
Outflow = 4.25 cfs @ 12.20 hrs, Volume= 0.442 af, Atten= 2%, Lag= 1.8 min
Discarded = 0.26 cfs @ 12.20 hrs, Volume= 0.211 af
Primary = 4.00 cfs @ 12.20 hrs, Volume= 0.231 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.37' @ 12.20 hrs Surf.Area= 1,340 sf Storage= 958 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 13.4 min (879.2 - 865.7)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	1,500 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	850	0	0
42.75	1,550	1,500	1,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	42.00'	**6.0' long x 0.5' breadth OVERFLOW SPILLWAY**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.26 cfs @ 12.20 hrs HW=42.37' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=4.00 cfs @ 12.20 hrs HW=42.37' TW=0.00' (Dynamic Tailwater)
2=OVERFLOW SPILLWAY (Weir Controls 4.00 cfs @ 1.78 fps)

Summary for Pond 2P: GATEWAY BMP

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=84)

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth = 4.66" for 10-YEAR event
Inflow = 0.73 cfs @ 12.00 hrs, Volume= 0.049 af
Outflow = 0.71 cfs @ 12.01 hrs, Volume= 0.049 af, Atten= 3%, Lag= 0.5 min
Discarded = 0.02 cfs @ 12.01 hrs, Volume= 0.024 af
Primary = 0.69 cfs @ 12.01 hrs, Volume= 0.025 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 37.60' @ 12.01 hrs Surf.Area= 337 sf Storage= 171 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 37.5 min (780.3 - 742.8)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	19,493 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
37.85	380	259	259
45.00	5,000	19,233	19,493

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	37.50'	**24.0" Horiz. OUT TO BWSC** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.01 hrs HW=37.60' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.69 cfs @ 12.01 hrs HW=37.60' (Free Discharge)
2=OUT TO BWSC (Weir Controls 0.69 cfs @ 1.05 fps)

Summary for Pond 3P: CB120

[57] Hint: Peaked at 42.49' (Flood elevation advised)
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=598)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 1.24" for 10-YEAR event
Inflow = 3.92 cfs @ 12.19 hrs, Volume= 0.386 af
Outflow = 3.94 cfs @ 12.19 hrs, Volume= 0.386 af, Atten= 0%, Lag= 0.1 min
Primary = 3.94 cfs @ 12.19 hrs, Volume= 0.386 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.49' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	40.25'	**24.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 40.25' / 38.70' S= 0.0738 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.94 cfs @ 12.19 hrs HW=42.49' TW=42.38' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.94 cfs @ 1.25 fps)

Summary for Pond 4P: CB110

[57] Hint: Peaked at 43.74' (Flood elevation advised)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 1.24" for 10-YEAR event
Inflow = 3.92 cfs @ 12.19 hrs, Volume= 0.386 af
Outflow = 3.92 cfs @ 12.19 hrs, Volume= 0.386 af, Atten= 0%, Lag= 0.0 min
Primary = 3.92 cfs @ 12.19 hrs, Volume= 0.386 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 43.74' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.78'	**24.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 42.78' / 41.31' S= 0.0588 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.91 cfs @ 12.19 hrs HW=43.74' TW=42.49' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.91 cfs @ 2.63 fps)

Summary for Pond 5P: CB130

[57] Hint: Peaked at 42.38' (Flood elevation advised)
[80] Warning: Exceeded Pond 3P by 1.55' @ 24.22 hrs (8.74 cfs 2.664 af)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 1.24" for 10-YEAR event
Inflow = 3.94 cfs @ 12.19 hrs, Volume= 0.386 af
Outflow = 3.94 cfs @ 12.19 hrs, Volume= 0.386 af, Atten= 0%, Lag= 0.0 min
Primary = 3.94 cfs @ 12.19 hrs, Volume= 0.386 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.38' @ 12.20 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	41.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.94 cfs @ 12.19 hrs HW=42.38' TW=42.37' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 3.94 cfs @ 0.54 fps)

Summary for Pond 6P: Meadow Study Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 0.71" for 10-YEAR event
Inflow = 4.00 cfs @ 12.20 hrs, Volume= 0.231 af
Primary = 4.00 cfs @ 12.20 hrs, Volume= 0.231 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth=2.05"
Flow Length=848' Tc=12.1 min CN=60 Runoff=6.95 cfs 0.638 af

Subcatchment 1WQV: ROADWAY & BW Runoff Area=6,200 sf 100.00% Impervious Runoff Depth=5.96"
Flow Length=1,400' Slope=0.0500 '/' Tc=5.5 min CN=98 Runoff=0.88 cfs 0.071 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth=5.96"
Tc=0.0 min CN=98 Runoff=0.93 cfs 0.062 af

Pond 1P: GULLEY BMP Peak Elev=42.54' Storage=1,181 cf Inflow=7.51 cfs 0.709 af
Discarded=0.27 cfs 0.253 af Primary=7.13 cfs 0.456 af Outflow=7.40 cfs 0.709 af

Pond 2P: GATEWAY BMP Peak Elev=37.62' Storage=177 cf Inflow=0.93 cfs 0.062 af
Discarded=0.02 cfs 0.027 af Primary=0.88 cfs 0.035 af Outflow=0.90 cfs 0.062 af

Pond 3P: CB120 Peak Elev=42.89' Inflow=6.95 cfs 0.638 af
24.0" Round Culvert n=0.013 L=21.0' S=0.0738 '/' Outflow=6.97 cfs 0.638 af

Pond 4P: CB110 Peak Elev=44.12' Inflow=6.95 cfs 0.638 af
24.0" Round Culvert n=0.013 L=25.0' S=0.0588 '/' Outflow=6.95 cfs 0.638 af

Pond 5P: CB130 Peak Elev=42.55' Inflow=6.97 cfs 0.638 af
Outflow=6.97 cfs 0.638 af

Pond 6P: Meadow Study Point Inflow=7.13 cfs 0.456 af
Primary=7.13 cfs 0.456 af

Total Runoff Area = 3.998 ac Runoff Volume = 0.771 af Average Runoff Depth = 2.32"
72.76% Pervious = 2.909 ac 27.24% Impervious = 1.089 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 6.95 cfs @ 12.18 hrs, Volume= 0.638 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.20"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 1WQV: ROADWAY & BW PATH

Runoff = 0.88 cfs @ 12.08 hrs, Volume= 0.071 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.20"

	Area (sf)	CN	Description
*	6,200	98	Pavement & Wall, HSG C
	6,200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow, Roadway - Sheet Flow** Smooth surfaces n= 0.011 P2= 3.25"
5.0	1,350	0.0500	4.54		**Shallow Concentrated Flow, Roadway - Shallow Concentrated** Paved Kv= 20.3 fps
5.5	1,400	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.93 cfs @ 12.00 hrs, Volume= 0.062 af, Depth= 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YEAR Rainfall=6.20"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: GULLEY BMP

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 2.20" for 25-YEAR event
Inflow = 7.51 cfs @ 12.17 hrs, Volume= 0.709 af
Outflow = 7.40 cfs @ 12.19 hrs, Volume= 0.709 af, Atten= 1%, Lag= 1.2 min
Discarded = 0.27 cfs @ 12.19 hrs, Volume= 0.253 af
Primary = 7.13 cfs @ 12.19 hrs, Volume= 0.456 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.54' @ 12.19 hrs Surf.Area= 1,430 sf Storage= 1,181 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 12.7 min (866.9 - 854.2)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	1,500 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	850	0	0
42.75	1,550	1,500	1,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	42.00'	**6.0' long x 0.5' breadth OVERFLOW SPILLWAY**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.27 cfs @ 12.19 hrs HW=42.54' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=7.13 cfs @ 12.19 hrs HW=42.54' TW=0.00' (Dynamic Tailwater)
2=OVERFLOW SPILLWAY (Weir Controls 7.13 cfs @ 2.22 fps)

Summary for Pond 2P: GATEWAY BMP

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth = 5.96" for 25-YEAR event
Inflow = 0.93 cfs @ 12.00 hrs, Volume= 0.062 af
Outflow = 0.90 cfs @ 12.01 hrs, Volume= 0.062 af, Atten= 3%, Lag= 0.5 min
Discarded = 0.02 cfs @ 12.01 hrs, Volume= 0.027 af
Primary = 0.88 cfs @ 12.01 hrs, Volume= 0.035 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 37.62' @ 12.01 hrs Surf.Area= 340 sf Storage= 177 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 36.0 min (775.1 - 739.1)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	19,493 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
37.85	380	259	259
45.00	5,000	19,233	19,493

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	37.50'	**24.0" Horiz. OUT TO BWSC** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.01 hrs HW=37.62' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.88 cfs @ 12.01 hrs HW=37.62' (Free Discharge)
2=OUT TO BWSC (Weir Controls 0.88 cfs @ 1.14 fps)

Summary for Pond 3P: CB120

[57] Hint: Peaked at 42.89' (Flood elevation advised)
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=612)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 2.05" for 25-YEAR event
Inflow = 6.95 cfs @ 12.18 hrs, Volume= 0.638 af
Outflow = 6.97 cfs @ 12.17 hrs, Volume= 0.638 af, Atten= 0%, Lag= 0.0 min
Primary = 6.97 cfs @ 12.17 hrs, Volume= 0.638 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.89' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	40.25'	**24.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 40.25' / 38.70' S= 0.0738 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.96 cfs @ 12.17 hrs HW=42.89' TW=42.55' (Dynamic Tailwater)
1=Culvert (Inlet Controls 6.96 cfs @ 2.21 fps)

Summary for Pond 4P: CB110

[57] Hint: Peaked at 44.12' (Flood elevation advised)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 2.05" for 25-YEAR event
Inflow = 6.95 cfs @ 12.18 hrs, Volume= 0.638 af
Outflow = 6.95 cfs @ 12.18 hrs, Volume= 0.638 af, Atten= 0%, Lag= 0.0 min
Primary = 6.95 cfs @ 12.18 hrs, Volume= 0.638 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 44.12' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.78'	**24.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 42.78' / 41.31' S= 0.0588 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.95 cfs @ 12.18 hrs HW=44.12' TW=42.89' (Dynamic Tailwater)
1=Culvert (Inlet Controls 6.95 cfs @ 3.11 fps)

Summary for Pond 5P: CB130

[57] Hint: Peaked at 42.55' (Flood elevation advised)
[80] Warning: Exceeded Pond 3P by 1.55' @ 24.22 hrs (8.74 cfs 2.590 af)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 2.05" for 25-YEAR event
Inflow = 6.97 cfs @ 12.17 hrs, Volume= 0.638 af
Outflow = 6.97 cfs @ 12.17 hrs, Volume= 0.638 af, Atten= 0%, Lag= 0.0 min
Primary = 6.97 cfs @ 12.17 hrs, Volume= 0.638 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.55' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	41.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.96 cfs @ 12.17 hrs HW=42.55' TW=42.53' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 6.96 cfs @ 0.74 fps)

Summary for Pond 6P: Meadow Study Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 1.41" for 25-YEAR event
Inflow = 7.13 cfs @ 12.19 hrs, Volume= 0.456 af
Primary = 7.13 cfs @ 12.19 hrs, Volume= 0.456 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: ROADWAY Runoff Area=162,490 sf 22.02% Impervious Runoff Depth=4.01"
Flow Length=848' Tc=12.1 min CN=60 Runoff=14.21 cfs 1.246 af

Subcatchment 1WQV: ROADWAY & BW Runoff Area=6,200 sf 100.00% Impervious Runoff Depth=8.64"
Flow Length=1,400' Slope=0.0500 '/' Tc=5.5 min CN=98 Runoff=1.26 cfs 0.102 af

Subcatchment 2WQV: GATEWAY AREA Runoff Area=5,450 sf 100.00% Impervious Runoff Depth=8.64"
Tc=0.0 min CN=98 Runoff=1.33 cfs 0.090 af

Pond 1P: GULLEY BMP Peak Elev=42.84' Storage=1,500 cf Inflow=14.99 cfs 1.348 af
Discarded=0.30 cfs 0.296 af Primary=15.15 cfs 1.052 af Outflow=15.44 cfs 1.348 af

Pond 2P: GATEWAY BMP Peak Elev=37.66' Storage=189 cf Inflow=1.33 cfs 0.090 af
Discarded=0.02 cfs 0.031 af Primary=1.28 cfs 0.059 af Outflow=1.30 cfs 0.090 af

Pond 3P: CB120 Peak Elev=44.31' Inflow=14.21 cfs 1.246 af
24.0" Round Culvert n=0.013 L=21.0' S=0.0738 '/' Outflow=14.21 cfs 1.246 af

Pond 4P: CB110 Peak Elev=45.71' Inflow=14.21 cfs 1.246 af
24.0" Round Culvert n=0.013 L=25.0' S=0.0588 '/' Outflow=14.21 cfs 1.246 af

Pond 5P: CB130 Peak Elev=42.89' Inflow=14.21 cfs 1.246 af
Outflow=14.21 cfs 1.246 af

Pond 6P: Meadow Study Point Inflow=15.15 cfs 1.052 af
Primary=15.15 cfs 1.052 af

Total Runoff Area = 3.998 ac Runoff Volume = 1.438 af Average Runoff Depth = 4.32"
72.76% Pervious = 2.909 ac 27.24% Impervious = 1.089 ac

Summary for Subcatchment 1S: ROADWAY

Runoff = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.88"

	Area (sf)	CN	Description
*	35,780	98	Pavement & Wall, HSG C
	68,200	30	Woods, Good, HSG A
	13,110	55	Woods, Good, HSG B
	21,390	77	Woods, Good, HSG D
	24,010	74	>75% Grass cover, Good, HSG C
	162,490	60	Weighted Average
	126,710		77.98% Pervious Area
	35,780		22.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0800	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.25"
1.6	300	0.3700	3.04		**Shallow Concentrated Flow, Woods flow (B-C)** Woodland Kv= 5.0 fps
3.5	498	0.0140	2.40		**Shallow Concentrated Flow, Street flow (C-END)** Paved Kv= 20.3 fps
12.1	848	Total			

Summary for Subcatchment 1WQV: ROADWAY & BW PATH

Runoff = 1.26 cfs @ 12.08 hrs, Volume= 0.102 af, Depth= 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.88"

	Area (sf)	CN	Description
*	6,200	98	Pavement & Wall, HSG C
	6,200		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	50	0.0500	1.74		**Sheet Flow, Roadway - Sheet Flow** Smooth surfaces n= 0.011 P2= 3.25"
5.0	1,350	0.0500	4.54		**Shallow Concentrated Flow, Roadway - Shallow Concentrated** Paved Kv= 20.3 fps
5.5	1,400	Total			

Summary for Subcatchment 2WQV: GATEWAY AREA

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.33 cfs @ 12.00 hrs, Volume= 0.090 af, Depth= 8.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YEAR Rainfall=8.88"

Area (sf)	CN	Description
5,200	98	Paved parking, HSG C
250	98	Roofs, HSG C
5,450	98	Weighted Average
5,450		100.00% Impervious Area

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

Summary for Pond 1P: GULLEY BMP

[93] Warning: Storage range exceeded by 0.09'
[90] Warning: Qout>Qin may require smaller dt or Finer Routing
[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=3)
[80] Warning: Exceeded Pond 5P by 0.01' @ 24.44 hrs (0.18 cfs 0.001 af)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 4.18" for 100-YEAR event
Inflow = 14.99 cfs @ 12.17 hrs, Volume= 1.348 af
Outflow = 15.44 cfs @ 12.17 hrs, Volume= 1.348 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.30 cfs @ 12.12 hrs, Volume= 0.296 af
Primary = 15.15 cfs @ 12.17 hrs, Volume= 1.052 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.84' @ 12.17 hrs Surf.Area= 1,550 sf Storage= 1,500 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.9 min (847.1 - 838.3)

Volume	Invert	Avail.Storage	Storage Description
#1	41.50'	1,500 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
41.50	850	0	0
42.75	1,550	1,500	1,500

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	42.00'	**6.0' long x 0.5' breadth OVERFLOW SPILLWAY**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.30 cfs @ 12.12 hrs HW=42.77' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=15.13 cfs @ 12.17 hrs HW=42.84' TW=0.00' (Dynamic Tailwater)
2=OVERFLOW SPILLWAY (Weir Controls 15.13 cfs @ 3.02 fps)

Summary for Pond 2P: GATEWAY BMP

Inflow Area = 0.125 ac,100.00% Impervious, Inflow Depth = 8.64" for 100-YEAR event
Inflow = 1.33 cfs @ 12.00 hrs, Volume= 0.090 af
Outflow = 1.30 cfs @ 12.01 hrs, Volume= 0.090 af, Atten= 3%, Lag= 0.5 min
Discarded = 0.02 cfs @ 12.01 hrs, Volume= 0.031 af
Primary = 1.28 cfs @ 12.01 hrs, Volume= 0.059 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 37.66' @ 12.01 hrs Surf.Area= 346 sf Storage= 189 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 33.2 min (767.6 - 734.4)

Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	19,493 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.00	230	0	0
37.85	380	259	259
45.00	5,000	19,233	19,493

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	37.50'	**24.0" Horiz. OUT TO BWSC** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.01 hrs HW=37.66' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.27 cfs @ 12.01 hrs HW=37.66' (Free Discharge)
2=OUT TO BWSC (Weir Controls 1.27 cfs @ 1.29 fps)

Summary for Pond 3P: CB120

[57] Hint: Peaked at 44.31' (Flood elevation advised)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 4.01" for 100-YEAR event
Inflow = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af
Outflow = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af, Atten= 0%, Lag= 0.0 min
Primary = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3

Peak Elev= 44.31' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	40.25'	**24.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 40.25' / 38.70' S= 0.0738 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=14.20 cfs @ 12.17 hrs HW=44.30' TW=42.89' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 14.20 cfs @ 4.52 fps)

Summary for Pond 4P: CB110

[57] Hint: Peaked at 45.71' (Flood elevation advised)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 4.01" for 100-YEAR event
Inflow = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af
Outflow = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af, Atten= 0%, Lag= 0.0 min
Primary = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 45.71' @ 12.18 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	42.78'	**24.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 42.78' / 41.31' S= 0.0588 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=14.07 cfs @ 12.17 hrs HW=45.69' TW=44.30' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 14.07 cfs @ 4.48 fps)

Summary for Pond 5P: CB130

[57] Hint: Peaked at 42.89' (Flood elevation advised)
[80] Warning: Exceeded Pond 3P by 1.60' @ 24.42 hrs (9.16 cfs 3.275 af)

Inflow Area = 3.730 ac, 22.02% Impervious, Inflow Depth = 4.01" for 100-YEAR event
Inflow = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af
Outflow = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af, Atten= 0%, Lag= 0.0 min
Primary = 14.21 cfs @ 12.17 hrs, Volume= 1.246 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 42.89' @ 12.17 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	41.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

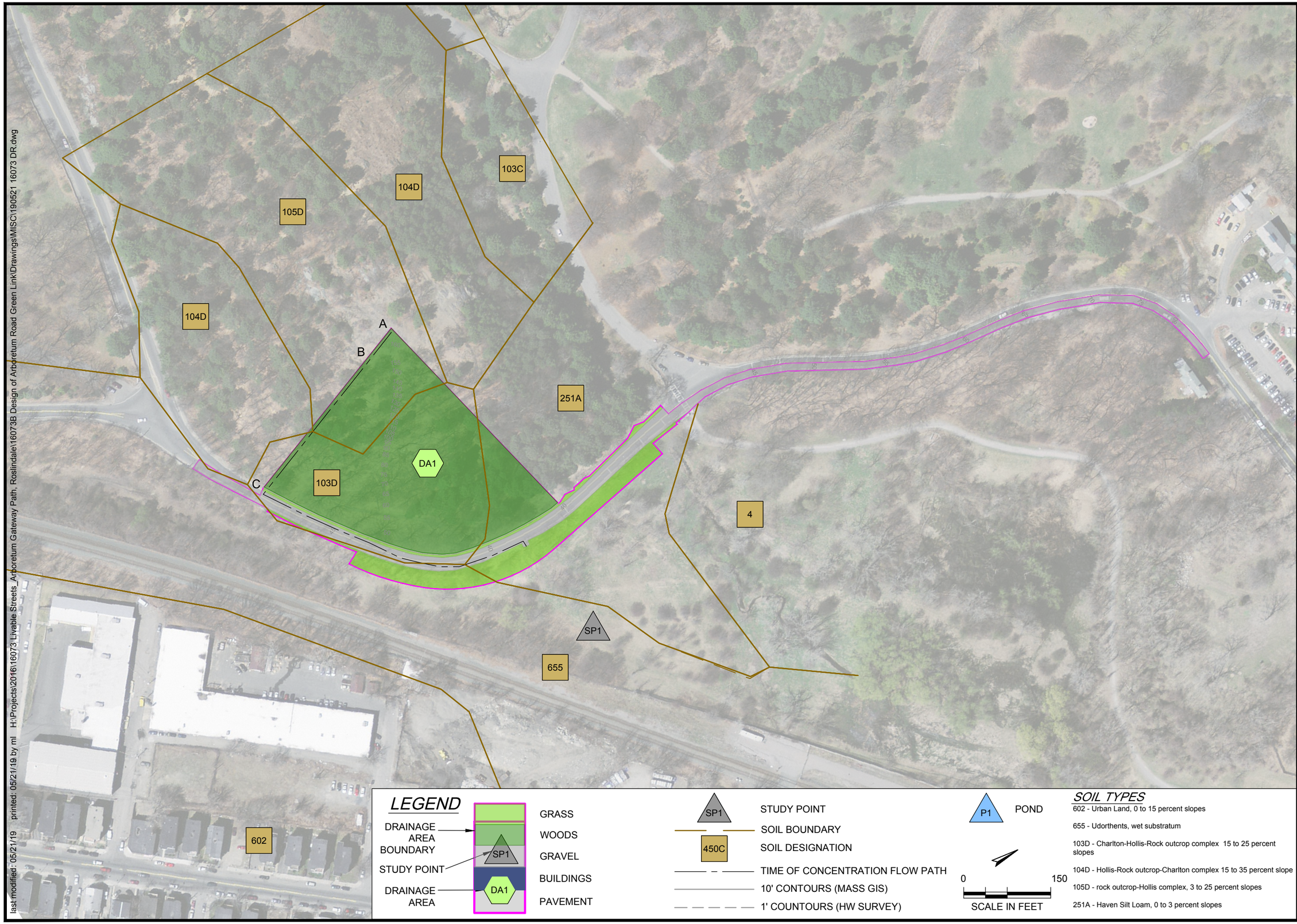
Primary OutFlow Max=14.20 cfs @ 12.17 hrs HW=42.89' TW=42.83' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 14.20 cfs @ 1.13 fps)

Summary for Pond 6P: Meadow Study Point

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.873 ac, 24.89% Impervious, Inflow Depth = 3.26" for 100-YEAR event
Inflow = 15.15 cfs @ 12.17 hrs, Volume= 1.052 af
Primary = 15.15 cfs @ 12.17 hrs, Volume= 1.052 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs / 3



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Revisions

Rev	Date	By	ADD'	Description

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
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508-833-3150 fax

Checked By:
Drawn By: ALA
Design By:
Date: March 2019

Plan Set: ARBORETUM ROAD GREEN LINK
ROSLINDALE, MASSACHUSETTS

Plan Title: PRE-CONSTRUCTION DA MAP

Prepared For:
Phone:
Fax:

Survey Provided By:
Horsley Witten Group
90 Route 6A Sandwich, MA 02563
Phone:(508) 833-6600
Fax:(508) 833-3150
Dated: February, 2006

Registration:

Project Number: 16073B

Sheet Number: 1 of 1

LEGEND

DRAINAGE AREA BOUNDARY

STUDY POINT (SP1)

DRAINAGE AREA (DA1)

GRASS

WOODS

GRAVEL

BUILDINGS

PAVEMENT

SP1 STUDY POINT

SOIL BOUNDARY

450C SOIL DESIGNATION

TIME OF CONCENTRATION FLOW PATH

10' CONTOURS (MASS GIS)

1' COUNTOURS (HW SURVEY)

P1 POND

0 150

SCALE IN FEET

SOIL TYPES

602 - Urban Land, 0 to 15 percent slopes

655 - Udorthents, wet substratum

103D - Charlton-Hollis-Rock outcrop complex 15 to 25 percent slopes

104D - Hollis-Rock outcrop-Charlton complex 15 to 35 percent slope

105D - rock outcrop-Hollis complex, 3 to 25 percent slopes

251A - Haven Silt Loam, 0 to 3 percent slopes

Revisions

Rev:	Date:	By:	Appr:	Description:

Horsley Witten Group, Inc.
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Checked By:

Drawn By: ALA

Design By:

Date: March 2019

Plan Set: ARBORETUM ROAD GREEN LINK
ROSLINDALE, MASSACHUSETTS

Plan Title: POST-CONSTRUCTION DA MAP

Prepared For:

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Dated: February, 2006

Registration:

Project Number: 16073B

Sheet Number: 1 of 1

last modified: 05/21/19 printed: 05/21/19 by ml H:\Projects\2016\16073 Livable Streets_Arboretum Gateway Path, Roslindale\16073B Design of Arboretum Road Green Link\Drawings\MISC\190521 16073 DR.dwg

Attachment C – Project Plans

Arboretum Road Green Link, Roslindale, MA
prepared by Horsley Witten Group, Inc.
May 2019

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VICINITY MAP
Graphic Scale
1-inch = 250-feet

Sheet List Table	
Sheet Number	Sheet Title
1	COVER SHEET
2	EXISTING CONDITIONS PLAN (1)
3	EXISTING CONDITIONS PLAN (2)
4	CONSTRUCTION NOTES & LEGEND
5	SITE PREPARATION & DEMO PLAN
6	SITE PLAN
7	SITE PLAN INSETS
8	GRADING & DRAINAGE PLAN
9	PROFILES
10	DETAILS (1)
11	DETAILS (2)
12	DETAILS (3)
13	PLANTING PLAN
14	LANDSCAPE DETAILS

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508-833-6600

SUB-CONTRACTOR:
Halvorson Design Partnership
www.halvorsondesign.com/
25 Kingston Street, 5th Floor,
Boston, MA, 02111, United
States (617) 536-0380

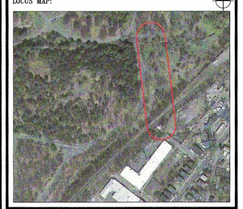
REVISION HISTORY:

Rev.	Date	By	Appr.	Description

USE DISCLAIMER:
PERMITTING ONLY
NOT FOR CONSTRUCTION

ARCHITECT'S STAMP:

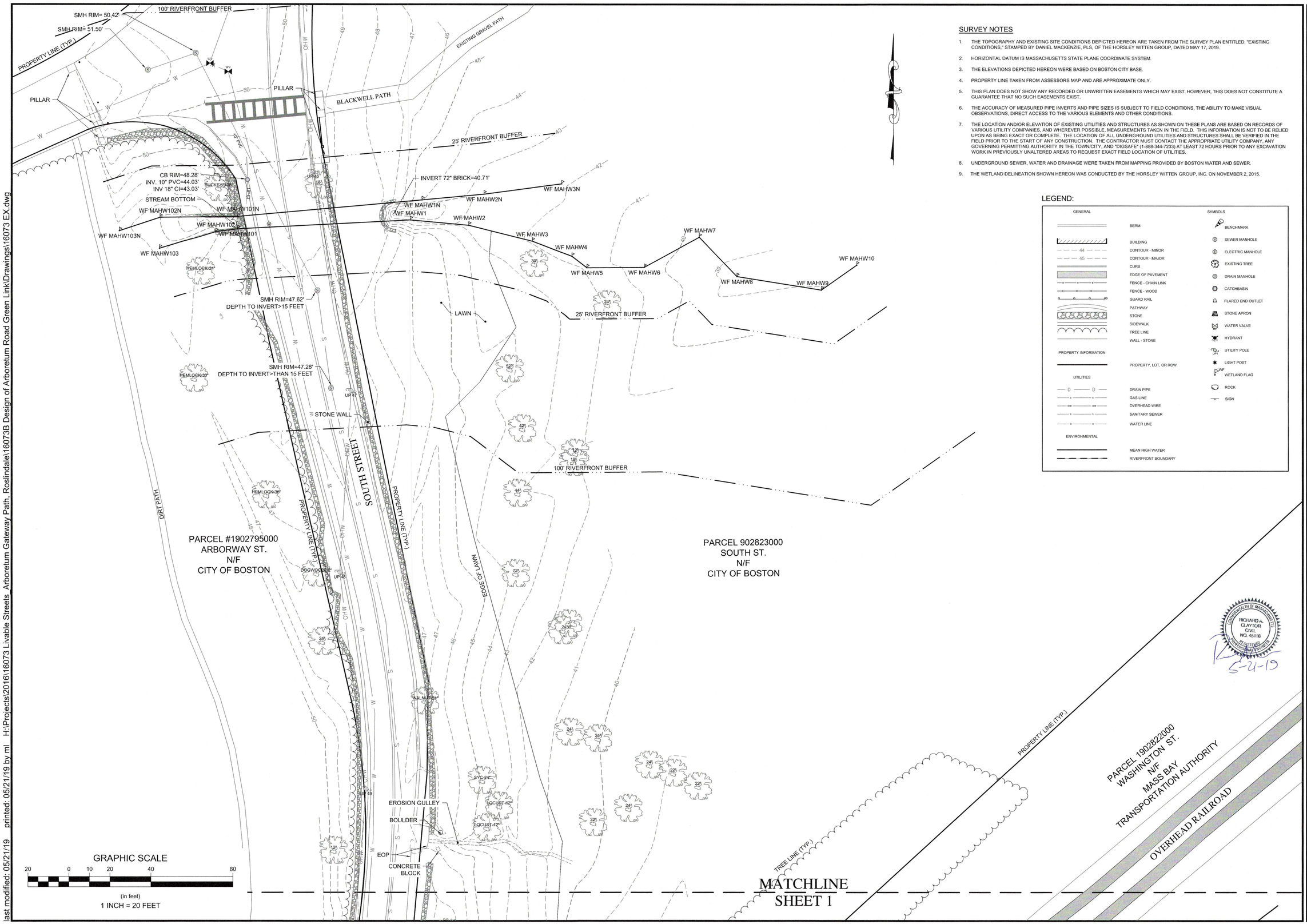
LOCUS MAP:



PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
COVER SHEET

DATE: MAY 2019			
CAD FILE NAME: 16073 CV.dwg			
DRAWING SCALE: ---		PROJECT NO: 16073B	
DRAWING NUMBER: C - 1	AREA: X	SHEET NUMBER: 1 OF 14	



SURVEY NOTES

1. THE TOPOGRAPHY AND EXISTING SITE CONDITIONS DEPICTED HEREON ARE TAKEN FROM THE SURVEY PLAN ENTITLED, "EXISTING CONDITIONS," STAMPED BY DANIEL MACKENZIE, PLS, OF THE HORSLEY WITTEN GROUP, DATED MAY 17, 2019.
2. HORIZONTAL DATUM IS MASSACHUSETTS STATE PLANE COORDINATE SYSTEM.
3. THE ELEVATIONS DEPICTED HEREON WERE BASED ON BOSTON CITY BASE.
4. PROPERTY LINE TAKEN FROM ASSESSORS MAP AND ARE APPROXIMATE ONLY.
5. THIS PLAN DOES NOT SHOW ANY RECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. HOWEVER, THIS DOES NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.
6. THE ACCURACY OF MEASURED PIPE INVERTS AND PIPE SIZES IS SUBJECT TO FIELD CONDITIONS, THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS AND OTHER CONDITIONS.
7. THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF VARIOUS UTILITY COMPANIES, AND WHEREVER POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD PRIOR TO THE START OF ANY CONSTRUCTION. THE CONTRACTOR MUST CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY IN THE TOWN/CITY, AND "DIGSAFE" (1-888-344-7233) AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES.
8. UNDERGROUND SEWER, WATER AND DRAINAGE WERE TAKEN FROM MAPPING PROVIDED BY BOSTON WATER AND SEWER.
9. THE WETLAND DELINEATION SHOWN HEREON WAS CONDUCTED BY THE HORSLEY WITTEN GROUP, INC. ON NOVEMBER 2, 2015.

LEGEND:

GENERAL
- BERM
- BUILDING
- CONTOUR - MINOR
- CONTOUR - MAJOR
- CURB
- EDGE OF PAVEMENT
- FENCE - CHAIN LINK
- FENCE - WOOD
- GUARD RAIL
- PATHWAY
- STONE
- SIDEWALK
- TREE LINE
- WALL - STONE

PROPERTY INFORMATION
- PROPERTY, LOT, OR ROW

UTILITIES
- DRAIN PIPE
- GAS LINE
- OVERHEAD WIRE
- SANITARY SEWER
- WATER LINE

ENVIRONMENTAL
- MEAN HIGH WATER
- RIVERFRONT BOUNDARY

SYMBOLS
- BENCHMARK
- SEWER MANHOLE
- ELECTRIC MANHOLE
- EXISTING TREE
- DRAIN MANHOLE
- CATCHBASIN
- FLARED END OUTLET
- STONE APRON
- WATER VALVE
- HYDRANT
- UTILITY POLE
- LIGHT POST
- WETLAND FLAG
- ROCK
- SIGN

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Sustainable Environmental Solutions
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90 Route 6A Sandwich, MA 02563
508-833-6600

SUB-CONTRACTOR:
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25 Kingston Street, 5th Floor,
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States (617) 536-0380

REVISION HISTORY:

Rev.	Date	By	Appr.	Description

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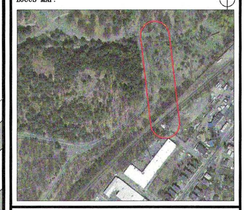
ARCHITECT'S STAMP:

COMMONWEALTH OF MASSACHUSETTS
RICHARD A. CLAYTOR
CIVIL
NO. 45116
REGISTERED PROFESSIONAL ENGINEER
5-21-19

LOCUS MAP:



PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
EXISTING CONDITIONS
PLAN (1)

DATE	MAY 2019
CAD FILE NAME	16073 EX.dwg
DRAWING SCALE	1"=20'
PROJECT NO.	16073B
DRAWING NUMBER	C - 2
AREA	X
SHEET NUMBER	20F14

last modified: 05/21/19 printed: 05/21/19 by ml H:\Projects\2016\16073 Livable Streets Arboretum Gateway Path, Roslindale\16073B Design of Arboretum Road Green Link\Drawings\16073 EX.dwg

MATCHLINE
SHEET 2

PARCEL 1902795000
ARBORWAY ST.
N/F
CITY OF BOSTON

PARCEL 902823000
SOUTH ST.
N/F
CITY OF BOSTON

PARCEL 1902822000
WASHINGTON ST.
N/F
MASS BAY
TRANSPORTATION AUTHORITY

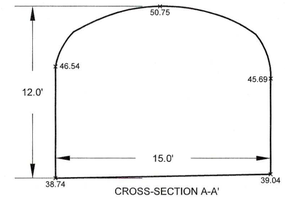
PARCEL
1902862000
ARBORETUM RD
N/F
ALBERT TODESCA

PARCEL 1902878000
22-18 ARBORETUM RD
N/F
GERTEL MAURICE TRUST

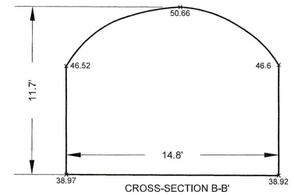
SOUTH STREET
OVERHEAD RAILROAD
ARBORETUM ROAD
LANESVILLE TERRACE
DIRT PATH
EDGE OF LAWN
TREE LINE (TYP.)
PROPERTY LINE (TYP.)
EOP
STONE WALL
STONE WALL
SMH RIM=49.43'
DEPTH TO
INVERT>THAN 15 FEET
INVERT 36" RCP
FES=36.53'
RIPRAP (TYP.)
INVERT 36" RCP
FES=37.2'
16" WATERLINE
BOULDER
(TYP.)
CONCRETE
BLOCK (TYP.)
LAWN
ARCHED
TUNNEL
MBTA STORAGE
SHED
STONE BRIDGE
ABUTMENTS (TYP.)
CHAIN LINK FENCE (TYP.)
DIRT
SHED
SHED
SMH RIM=37.84'
HYDRANT (TYP.)
DMH RIM=37.77'
GATE POST (TYP.)
CB RIM=37.40'
INV(12")=34.00'
CB RIM=37.12'
INV(12")=33.84'
LOCUST 24"
(FALLING)
CORRUGATED METAL FENCE
BIT PAVEMENT
WATER VALVE (TYP.)
JERSEY
BARRIER (TYP.)
GRAVEL
SMH RIM=38.65'
DMH RIM=38.71'
HONEYLOCUST 30"
MAPLE 36"
OAK 18"
LOCUST 24"
UP 50
UP 52
UP NO.
UP 11113

GRAPHIC SCALE
20 0 10 20 40 80
(in feet)
1 INCH = 20 FEET

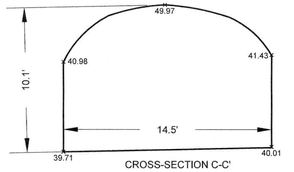
TUNNEL CROSS SECTIONS



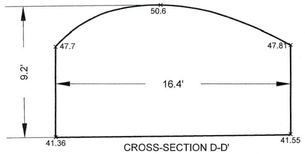
CROSS-SECTION A-A'



CROSS-SECTION B-B'



CROSS-SECTION C-C'



CROSS-SECTION D-D'

1 INCH = 5 FEET

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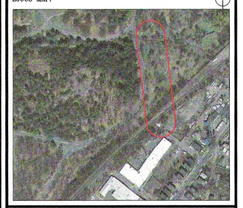


PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
EXISTING CONDITIONS
PLAN (2)

DATE	MAY 2019
CAD FILE NAME	16073 EX.dwg
DRAWING SCALE	1"=20'
PROJECT NO.	16073B
DRAWING NUMBER	C - 3
AREA	X
SHEET NUMBER	3 OF 14

COMMONWEALTH OF MASSACHUSETTS
RICHARD A. CLAYTOR
CIVIL
NO. 45116
REGISTERED PROFESSIONAL ENGINEER
5-21-19

GENERAL CONSTRUCTION NOTES:

1. ALL SITE WORK TO COMPLETE THIS PROJECT AS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
2. IMMEDIATELY CONTACT AND COORDINATE WITH THE ENGINEER AND OWNER IF ANY DEVIATION OR ALTERATION OF THE WORK PROPOSED ON THESE DRAWINGS IS REQUIRED.
3. UTILIZE ALL PRECAUTIONS AND MEASURES TO ENSURE THE SAFETY OF THE PUBLIC, ALL PERSONNEL AND PROPERTY DURING CONSTRUCTION IN ACCORDANCE WITH OSHA STANDARDS, INCLUDING THE INSTALLATION OF TEMPORARY FENCING BARRICADES, SAFETY LIGHTING, CONES, POLICE DETAIL AND/OR FLAGMEN AS DETERMINED NECESSARY BY THE TOWN/CITY/LOCAL MUNICIPALITY. THE CONTRACTOR IS RESPONSIBLE FOR THE COST OF POLICE DETAIL AND FOR COORDINATING WITH THE LOCAL OR STATE POLICE DEPARTMENT FOR ALL REQUIRED POLICE DETAIL.
4. MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS, PAY ALL FEES INCLUDING POLICE DETAILS AND POST ALL BONDS, IF NECESSARY, ASSOCIATED WITH THE SAME, AND COORDINATE WITH THE OWNER AND THE ENGINEER.
5. ALL EXISTING CONDITIONS SHOWN ARE APPROXIMATE AND ARE BASED ON THE BEST INFORMATION AVAILABLE. PRIOR TO THE START CONSTRUCTION VERIFY THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLING ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.
6. THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS INDICATED ON THE DRAWINGS ARE BASED ON RECORDS OF VARIOUS UTILITY COMPANIES, AND WHEREVER POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES IN THE FIELD PRIOR TO THE START OF CONSTRUCTION. CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY IN THE TOWN, AND "DIGSAFE" (1-888-344-7233) AT LEAST THREE BUSINESS DAYS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES. THE CONTRACTOR MUST RESOLVE CONFLICTS BETWEEN THE PROPOSED UTILITIES AND FIELD-LOCATED UTILITIES AND REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED, INCOMPLETELY OR INACCURATELY SHOWN. THE CONTRACTOR MUST MAINTAIN ACCURATE RECORDS OF THE LOCATION AND ELEVATION OF ALL WORK INSTALLED AND EXISTING UTILITIES FOUND DURING CONSTRUCTION FOR THE PREPARATION OF THE AS-BUILT PLAN.
7. COORDINATE AND MAKE ALL CONNECTION ARRANGEMENTS WITH UTILITY COMPANIES, AS REQUIRED.
8. THE CONTRACTOR MUST MAINTAIN ALL EXISTING UTILITIES IN WORKING ORDER AND FREE FROM DAMAGE DURING THE ENTIRE DURATION OF THE PROJECT. REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR ALL COST RELATED TO THE REPAIR OF UTILITIES. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES MUST BE DONE BY HAND.
9. COORDINATE ALL TRENCHING WORK WITHIN ROADWAYS WITH THE PROPER LOCAL & STATE AGENCY. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRENCH SAFETY INCLUDING ANY LOCAL AND/OR STATE PERMITS REQUIRED FOR THE TRENCH WORK. IF THIS WORK IS REQUIRED TO OCCUR OUTSIDE THE AGREED UPON HOURS OF OPERATION FOR THE FACILITY, THE CONTRACTOR MUST PLAN ACCORDINGLY.
10. SAWCUT ALL TRENCH WORK WITHIN EXISTING PAVEMENT AS INDICATED ON THE DRAWINGS. BACKFILL AND COMPACT TRENCH WORK AS INDICATED ON THE DRAWING AND IN THE SPECIFICATIONS. IF SETTLEMENT OCCURS DUE TO INADEQUATE COMPACTION, AS DETERMINED BY THE ENGINEER, WITHIN THE WARRANTY PERIOD, CONTRACTOR IS REQUIRED TO REMOVE, PATCH AND REPAVE AFTER ONE COMPLETE 12-MONTH CYCLE.
11. IMPORT ONLY CLEAN MATERIAL. MATERIAL FROM AN EXISTING OR FORMER 21E SITE AS DEFINED BY THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.0000 WILL NOT BE ACCEPTED .
12. WASH ALL TOOLS, BUCKETS, AND MACHINERY THAT COME IN CONTACT WITH INVASIVE SPECIES AND INFESTED SOIL. ALL WASHING SHALL OCCUR IN A LOCATION THAT DOES NOT DISCHARGE TOWARD THE PROJECT OR RESOURCE AREA. SEE SPECIES FOR INVASIVE SPECIES MANAGEMENT AND PROPER DISPOSAL.
13. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH AND MAINTAIN ALL CONTROL POINTS AND BENCHMARKS DURING CONSTRUCTION INCLUDING BENCHMARK LOCATIONS AND ELEVATIONS AT CRITICAL AREAS. COORDINATE WITH THE ENGINEER THE LOCATION OF ALL CONTROL POINTS AND BENCHMARKS.
14. SITE LAYOUT SURVEY REQUIRED FOR CONSTRUCTION MUST BE PROVIDED BY THE CONTRACTOR AND PERFORMED BY A MASSACHUSETTS' REGISTERED PROFESSIONAL LAND SURVEYOR. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE SURVEYOR FOR ALL SITE SURVEY WORK.
15. MAINTAIN ALL GRADE STAKES SET BY THE SURVEYOR. GRADE STAKES ARE TO REMAIN UNTIL A FINAL INSPECTION OF THE ITEM HAS BEEN COMPLETED BY THE ENGINEER. RE-STAKING OF PREVIOUSLY SURVEYED SITE FEATURES IS THE RESPONSIBILITY (INCLUDING COST) OF THE CONTRACTOR.
16. UNLESS OTHERWISE INDICATED ON THE DRAWINGS AND/OR IN THE SPECIFICATIONS, ALL SITE CONSTRUCTION MATERIALS AND METHODOLOGIES ARE TO CONFORM TO THE MOST RECENT VERSION OF THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS (THE MASSACHUSETTS HIGHWAY DEPARTMENT 1988 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE 2002 SUPPLEMENTAL SPECIFICATIONS, AND THE 2005 STANDARD SPECIAL PROVISIONS).
17. PROVIDE ALL CONSTRUCTION SERVICE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING NOISE, VIBRATION, DUST, SEDIMENTATION CONTAINMENT, AND TRENCH WORK.
18. COLLECT SOLID WASTES AND STORE IN A SECURED DUMPSTER. THE DUMPSTER MUST MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS.
19. RESTORE ALL SURFACES EQUAL TO THEIR ORIGINAL CONDITION AFTER CONSTRUCTION IS COMPLETE PER SPECIFICATIONS. LEAVE ALL AREAS NOT DISTURBED BY CONSTRUCTION IN THEIR NATURAL STATE. TAKE CARE TO PREVENT DAMAGE TO SHRUBS, TREES, OTHER LANDSCAPING AND/OR NATURAL FEATURES. WHEREAS THE PLANS DO NOT SHOW ALL LANDSCAPE FEATURES, EXISTING CONDITIONS MUST BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF THE WORK.
20. CONSTRUCT ALL WHEELCHAIR RAMPS IN ACCORDANCE WITH MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS AND CONSTRUCTION AND TRAFFIC STANDARD DETAILS (1996) DRAWING NUMBER 107.1.0 AND 107.2.0. CONSTRUCT RAMPS WITH AN 8% MAX. SLOPE AND 2% CROSS SLOPE.
21. PROVIDE A UNIT PRICE COST IN CUBIC YARD MEASURE FOR LEDGE AND/OR BOULDER REMOVAL. LEDGE AND/OR BOULDERS LESS THAN 1 CUBIC YARD IN SIZE BASED ON THE AVERAGE DIMENSIONS WILL NOT BE CONSIDERED PAYABLE ROCK. PROVIDE UNIT PRICES FOR BOTH ON AND OFF SITE DISPOSAL. IF ADDITIONAL FILL MATERIAL IS REQUIRED INCLUDE THE COST OF ALL FILL MATERIAL.
22. REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. PROMPTLY REMOVE ALL DEMOLITION DEBRIS FROM THE SITE TO AN APPROVED DUMP SITE.
23. ALL TRUCKS LEAVING THE SITE MUST BE COVERED.
24. DO NOT WASH ANY CONCRETE TRUCKS ONSITE. REMOVE BY HAND ANY CEMENT OR CONCRETE DEBRIS LEFT IN THE DISTURBED AREA.
25. BURIAL OF ANY STUMPS, SOLID DEBRIS, AND/OR STONES/BOULDERS ONSITE IS PROHIBITED. DO NOT USE ROAD SALT OR OTHER DE-ICING CHEMICALS ON THE ACCESS ROADWAY.
26. IMMEDIATELY CONTACT AND COORDINATE WITH THE ENGINEER AND OWNER IF ANY DEVIATION OR ALTERATION OF THE WORK PROPOSED IN THESE DRAWINGS IS REQUIRED.
27. AT THE END OF CONSTRUCTION, REMOVE ALL CONSTRUCTION DEBRIS AND SURPLUS MATERIALS FROM THE SITE [AS INDICATED IN THE SPECIFICATIONS]. PERFORM A THOROUGH INSPECTION OF THE WORK PERIMETER. COLLECT AND REMOVE ALL MATERIALS AND BLOWN OR WATER CARRIED DEBRIS FROM THE SITE.

CONSTRUCTION SEQUENCE:

THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE USED AS A GENERAL GUIDELINE. COORDINATE WITH THE OWNER, ENGINEERS, AND LANDSCAPE ARCHITECTS AND SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

1. SURVEY AND STAKE THE PROPOSED LIMIT OF DISTURBANCE AND LIMIT OF SEDIMENTATION BARRIERS.
2. IDENTIFY AND MARK INVASIVE SPECIES. PLANT IDENTIFICATION SHALL BE PERFORMED BY QUALIFIES PERSONNEL ONLY, AS INDICATED IN THE SPECIFICATIONS.
3. PLACE SEDIMENTATION BARRIERS (STRAWBALES, SILT SOCK, SILT FENCE, ETC.) AS INDICATED ON DRAWINGS AND STAKED OUT IN THE FIELD. UNDER NO CIRCUMSTANCES IS THE LIMIT OF WORK TO EXTEND BEYOND THE SEDIMENTATION BARRIERS/LIMIT OF DISTURBANCE AS INDICATED ON DRAWINGS AS APPROVED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP).
4. INSTALL TEMPORARY CONSTRUCTION ENTRANCES IN LOCATIONS INDICATED ON DRAWINGS. NO OTHER ENTRANCES ARE TO BE USED TO GAIN ACCESS TO THE SITE BY ANY CONSTRUCTION OR DELIVERY VEHICLES.
5. BEGIN CLEARING THE SITE AS REQUIRED. SEE SPECIFICATIONS ON INVASIVE SPECIES MANAGEMENT.
6. SURVEY AND STAKE CENTERLINE OF THE PROPOSED PATHS, STORMWATER MANAGEMENT AREAS, AND DRAINAGE LINES.
7. EXCAVATE AND ROUGH GRADE THE PROPOSED STORMWATER MANAGEMENT AREAS AND ANY ADDITIONAL TEMPORARY BASINS NECESSARY TO CONTROL SITE RUNOFF AND SEDIMENTS. TEMPORARILY SEED PERMANENT STORMWATER MANAGEMENT AREAS. COMPLETE PERMANENT STORMWATER MANAGEMENT AREA SEEDING AND PLANTING AFTER THE CONTRIBUTING AREA TO THE BASIN HAS REACHED A MINIMUM OF 80% STABILIZATION AND IS NO LONGER REQUIRED AS A CONSTRUCTION SEDIMENTATION BASIN.
8. BEGIN CLEARING AND GRUBBING THE AREAS OF PATHWAY AND STORMWATER MANAGEMENT AREAS. TOPSOIL IS TO BE STRIPPED FROM THE AREA OF THE PROPOSED PATHWAY AND STORMWATER MANAGEMENT AREAS AND STOCKPILED IN APPROVED LOCATIONS. TOPSOIL STOCKPILES MUST BE PROTECTED BY A SEDIMENT BARRIER.
9. INSTALL TEMPORARY CONVEYANCE DEVICES (SWALES, CHECK DAMS, PIPES, ETC.) AS NECESSARY TO CONVEY RUNOFF TO TREATMENT AREAS.
10. BEGIN ROUGH GRADING AREAS FOR PATHWAY AND PLAZA. BRING ROUGH GRADING TO PROPER ELEVATIONS AS SOON AS PRACTICABLE. COORDINATE WORK TO MINIMIZE TIME SOILS ARE UN-STABILIZED.
11. BEGIN UTILITY CONSTRUCTION. THE CONTRACTOR IS FREE TO INSTALL THE UTILITIES IN THE SEQUENCE HE/SHE CHOOSES. IMMEDIATELY REPAIR, REPLACE AND STABILIZE ANY EROSION CONTROL DEVICES DISTURBED DURING THE UNDERGROUND UTILITY CONSTRUCTION. MODIFY TEMPORARY CONVEYANCE DEVICES, AS NECESSARY, TO CONVEY RUNOFF TO TREATMENT AREAS.
12. INSTALL DRAINAGE PIPES, DRAINAGE MANHOLES, CATCH BASINS, AND UNDERGROUND DRAINAGE STRUCTURES. BEGIN WORK AT THE STORMWATER MANAGEMENT AREAS AND PROGRESS UP-GRADIENT. PROTECT DISCHARGE OUTLETS WITH RIP-RAP APRONS. THE STORMWATER MANAGEMENT AREA AND DRAINAGE NETWORK ARE TO BE PROTECTED FROM SEDIMENTATION UNTIL ALL UN-STABILIZED AREAS ARE STABILIZED WITH STONE SUB-BASE OR VEGETATION. INSTALL SEDIMENT BARRIERS AT ALL POINTS OF ENTRY INTO THE DRAINAGE NETWORK. TAKE PARTICULAR CARE TO PROTECT THE UNDERGROUND STRUCTURES FROM SEDIMENT.
13. PERMANENTLY SEED ALL DISTURBED AREAS OUTSIDE OF THE PATHWAY OR AREA TO BE PAVED.
14. UPON COMPLETION OF UNDERGROUND UTILITIES INSTALLATION, PLACE COMPACTED GRAVEL FOUNDATION AND ROUGH GRADE THE PATHWAY IN ACCORDANCE WITH THE SITE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS AS SOON AS POSSIBLE.
15. BEGIN PATHWAY CONSTRUCTION PER SITE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS. DO NOT PAVE UNTIL THE ENTIRE PERMANENT DRAINAGE SYSTEM HAS BEEN INSTALLED AND ALL PIPE CONNECTIONS COMPLETE.
16. FINISH PERMANENT STABILIZATION. SWEEP THE PAVEMENT TO REMOVE ALL SEDIMENTS. REPAIR DRAINAGE OUTLETS AND BASINS AS REQUIRED. CLEAN AND FLUSH THE DRAINAGE STRUCTURES AND PIPES AT THE END OF CONSTRUCTION AND REMOVE ALL ACCUMULATED SEDIMENTS IN THE STORMWATER MANAGEMENT AREAS. CONTRACTOR MUST INSPECT THE DRAINAGE NETWORK AND REPAIR ANY DAMAGE IMMEDIATELY.
17. COMPLETE ALL REMAINING PLANTING AND SEEDING.
18. ENGINEER TO APPROVE THE REMOVAL OF ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES FOLLOWING VEGETATIVE ESTABLISHMENT OF ALL DISTURBED AREAS AND DETERMINE WHEN THE CONTRIBUTING AREA HAS REACHED A MINIMUM OF 80% STABILIZATION.

GENERAL GRADING AND DRAINAGE NOTES:

1. ALL CUT AND FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
2. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
3. PROPOSED GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
4. ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.
5. PROVIDE POSITIVE DRAINAGE AWAY FROM SHED, WING WALLS, AND STONE WALLS FOR ALL NATURAL AND PAVED AREAS. IMMEDIATELY NOTIFY THE ENGINEER IF POSITIVE DRAINAGE CANNOT BE PROVIDED.
6. PROPOSED ELEVATIONS ARE SHOWN TO FINISH PAVEMENT OR GRADE UNLESS NOTED OTHERWISE.
7. ALL DRAINAGE STRUCTURES AND PIPES MUST BE CONNECTED TO THE DRAINAGE SYSTEM PRIOR TO THE INSTALLATION OF ANY PAVEMENT. PAVING WILL NOT BE ALLOWED IF THE DRAINAGE SYSTEM FOR THE PROPOSED PAVED AREA IS NOT COMPLETELY AND PROPERLY INSTALLED. THIS INCLUDES THE STABILIZATION OF ALL DISTURBED AREAS CONTRIBUTING TO THE DRAINAGE SYSTEMS AND ANY STORMWATER BASIN FLOORS AND SIDE SLOPES

STORMWATER FACILITY OPERATION & MAINTENANCE:

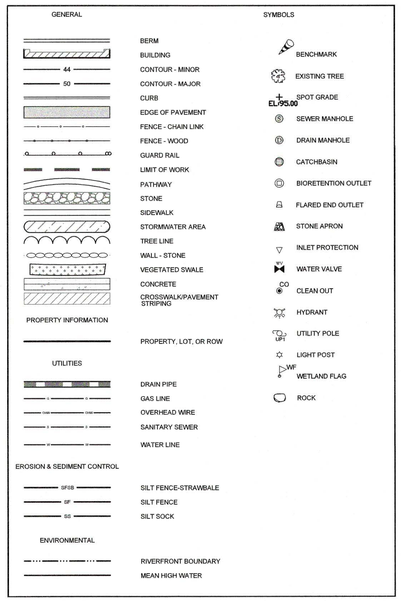
THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSPECTION AND MAINTENANCE OF ALL STORMWATER MANAGEMENT FACILITIES AS OUTLINED BELOW DURING CONSTRUCTION AND UNTIL SUCH TIME THAT THE PATHWAY AND ASSOCIATED UTILITIES ARE ACCEPTED BY THE OWNER AND THE ENGINEER.

1. INSPECT AND RESTORE/CLEAN ALL FACILITIES (INLETS, MANHOLES, INFILTRATION BASINS, STORMWATER MANAGMENT AREAS AS DESCRIBED BELOW OF SEDIMENT AND DEBRIS PRIOR TO THE OWNER'S ACCEPTANCE.
2. REMOVE AND DISPOSE ALL SEDIMENT AND DEBRIS TO A PRE-APPROVED LOCATION.
3. AT A MINIMUM INSPECT MONTHLY AFTER EVERY AND AFTER STORM EVENTS GREATER THAN OR EQUAL TO 1" OF RAINFALL OR MORE FREQUENTLY AS REQUIRED FOR THE ENTIRE DURATION OF THE CONSTRUCTION PROJECT AND THE FIRST 3 MONTHS AFTER CONSTRUCTION TO ENSURE PROPER STABILIZATION AND CONSTRUCTION.
4. SPECIFIC ANNUAL MAINTENANCE REQUIRED DURING CONSTRUCTION:
   - A. DRAINAGE STRUCTURES (INLETS, MANHOLES, CATCHBASINS, DIVERSION STRUCTURE, WATER QUALITY UNITS): MONITOR AND REGULARLY INSPECT ALL EXISTING AND PROPOSED DRAINAGE STRUCTURES FOR PROPER OPERATION, COLLECTION OF LITTER OR TRASH, AND STRUCTURAL DETERIORATION. CLEAN AND REMOVE SEDIMENT FRO THE STRUCTURES (INCLUDING SUMPS) AS NECESSARY, AND REPAIR WHEN REQUIRED.
   - B. SEDIMENT FOREBAY: REGULARLY INSPECT TO ENSURE PROPER FUNCTION. REMOVE SEDIMENT BUILD-UP ON THE FLOOR OF THE FOREBAY AND PROPERLY DISPOSE , AS NECESSARY TO LIMIT SEDIMENT BUILDUP. CLEAN SEDIMENT FOREBAYS PRIOR TO COMPLETION OF CONSTRUCTION.
   - C. BIORETENTION SYSTEMS AND RAINGARDENS: MONITOR AND REGULARLY INSPECT TO ENSURE PROPER FUNCTION. PRIOR THE COMPLETION OF CONSTRUCTION REMOVE AND REPLACE ILL-ESTABLISHED, DEAD OR SEVERELY DISEASED PLANTS, REMOVE SEDIMENT BUILD-UP AS NEEDED, AND REPLACE SOIL WHEN NECESSARY
   - D. GRASS SWALES: PERFORM A GENERAL INSPECTION OF THE SWALE AFTER STORM EVENTS GREATER THAN OR EQUAL TO 1" OF RAINFALL OR MORE FREQUENTLY AS NEEDED. MAINTENANCE CONSISTS OF REMOVAL OF ANY TRASH AND/OR DEBRIS FROM THE BOTTOM OF THE SWALE, REMOVAL OF SEDIMENT BUILDUP WITHIN THE SWALE, CORRECTING ANY EROSION GULLYING, AND RE-SEEDING, AS NECESSARY. DISPOSE SEDIMENT OFF-SITE IN A PRE-APPROVED LOCATION.
   - E. ROUTINE MAINTENANCE: OTHER ROUTINE MAINTENANCE INCLUDES THE REMOVAL OF TRASH AND LITTER FROM PAVED AND PERIMETER AREAS, AND STREET AND PARKING LOT SWEEPING UPON COMPLETION OF CONSTRUCTION TO AVOID EXCESSIVE ACCUMULATION OF SEDIMENT IN THE DRAINAGE SYSTEM. INSPECT THE PIPES AND STRCUTURES FOR SEDIMENT ACCUMULATION AND PROPER FLOW.

EROSION & SEDIMENT CONTROL NOTES:

1. DESIGNATE THE SITE CONSTRUCTION FOREMAN AS THE ON-SITE PERSONNEL RESPONSIBLE FOR THE DAILY INSPECTION AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS AND IMPLEMENTATION OF ALL NECESSARY MEASURES TO CONTROL EROSION AND PREVENT SEDIMENT FROM LEAVING THE SITE.
2. INSTALL ALL EROSION AND SEDIMENT CONTROL (ESC) MEASURES AS INDICATED ON DRAWINGS IN CONSULTATION WITH THE CONSERVATION AGENT, AND ENGINEER BEFORE ANY CONSTRUCTION ACTIVITIES BEGIN. INSPECT, MAINTAIN REPAIR AND REPLACE EROSION CONTROL MEASURES, AS NECESSARY, DURING THE ENTIRE CONSTRUCTION PERIOD OF THE PROJECT. THE SITE PERIMETER EROSION CONTROLS ARE THE DESIGNATED LIMIT OF WORK. INFORM ALL PERSONNEL WORKING ON THE PROJECT SITE THAT NO CONSTRUCTION ACTIVITY IS TO OCCUR BEYOND THE LIMIT OF WORK AT ANY TIME THROUGHOUT THE CONSTRUCTION PERIOD.
3. MAINTAIN A MINIMUM SURPLUS OF 100 FEET OF EROSION CONTROL BARRIER (SILT FENCE, STRAWBALE, &/OR SILT SOCK) ONSITE AT ALL TIMES.
4. PROTECT THE ADJACENT RESOURCE AREA FROM SEDIMENTATION DURING PROJECT CONSTRUCTION UNTIL ACCEPTANCE BY THE OWNER & IN CONFORMANCE WITH THE ORDER OF CONDITIONS.
5. PROVIDE CONSTRUCTION EXITS AS INDICATED ON DRAWINGS TO SHED DIRT FROM CONSTRUCTION VEHICLE TIRES. CLEAN AND/OR REPLACE THE CRUSHED STONE PAD, AS NECESSARY, TO MAINTAIN ITS EFFECTIVENESS.
6. KEEP THE LIMIT OF CLEARING, GRADING AND DISTURBANCES TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. PHASE THE SITE WORK IN A MANNER TO MINIMIZE AREAS OF EXPOSED SOIL. IF TREES ARE TO BE CUT ON THE ENTIRE SITE, CLEAR AND GRUB ONLY THOSE AREAS WHICH ARE ACTIVELY UNDER CONSTRUCTION. PROPERLY INSTALL THE SEDIMENTATION CONTROLS PRIOR TO BEGINNING ANY LAND CLEARING ACTIVITY AND/OR OTHER CONSTRUCTION RELATED WORK.
7. MONITOR LOCAL WEATHER REPORTS DURING CONSTRUCTION AND PRIOR TO SCHEDULING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES WHICH LEAVE LARGE DISTURBED AREAS UNSTABILIZED. IF INCLEMENT WEATHER IS PREDICTED, USE BEST PROFESSIONAL JUDGEMENT AND GOOD CONSTRUCTION PRACTICES WHEN SCHEDULING CONSTRUCTION ACTIVITIES AND ENSURE THE NECESSARY EROSION CONTROL DEVICES ARE INSTALLED AND FUNCTIONING PROPERLY TO MINIMIZE EROSION FROM ANY IMPENDING WEATHER EVENTS.
8. INSPECT EROSION AND SEDIMENT CONTROL DEVICES AND STABILIZED SLOPES ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT OF .25 INCH OR GREATER. REPAIR IDENTIFIED PROBLEMS WITHIN 24 HOURS TO ENSURE EROSION AND SEDIMENT CONTROLS ARE IN GOOD WORKING ORDER. RESET OR REPLACE MATERIALS AS REQUIRED.
9. SURROUND THE PERIMETER OF SOIL STOCKPILES WITH SILT SOCK, SILT FENCE, STRAWBALES, OR A COMBINATION OF SILT FENCE WITH STRAWBALE, AS DETERMINED NECESSARY.
10. DISTURBED AREAS AND SLOPES MUST NOT BE LEFT UNATTENDED OR EXPOSED FOR EXCESSIVE PERIODS OF TIME SUCH AS THE INACTIVE WINTER SEASON. PROVIDE APPROPRIATE STABILIZATION PRACTICES ON ALL DISTURBED AREAS AS SOON AS POSSIBLE BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY OR PERMANENTLY CEASED, REINFORCE TEMPORARY AREAS HAVING A SLOPE GREATER THAN 4:1 WITH EROSION BLANKETS OR APPROVED EQUAL UNTIL THE SITE IS PROPERLY STABILIZED. TEMPORARY SWALES MAY ALSO BE REQUIRED IF DETERMINED NECESSARY IN THE FIELD BY THE ENGINEER.
11. INSTALL A SILT SACK OR APPROVED EQUIVALENT IN EACH EXISTING CATCHBASIN RECEIVING RUNOFF FROM THE SITE. UPON THE INSTALLATION OF EACH CATCH BASIN, INSTALL A SILT SACK OR APPROVED EQUIVALENT. INSPECT SILT SACKS, AFTER EACH SIGNIFICANT STORM EVENT AND REMOVE AND EMPTY AS NEEDED FOR THE DURATION OF THE CONSTRUCTION PERIOD.
12. SMALL SEDIMENTATION BASINS MAY BE CONSTRUCTED ON AN AS-NEEDED BASIS DURING CONSTRUCTION TO AID IN THE CAPTURE OF SITE RUNOFF AND SEDIMENT. IT WILL BE THE RESPONSIBILITY OF THE SITE CONTRACTOR, IN CONSULTATION WITH THE ENGINEER, TO SIZE AND CREATE THESE BASINS IN APPROPRIATE LOCATIONS.
13. CONTAIN ALL SEDIMENT ONSITE. SWEEP ALL EXITS FROM THE SITE AS NECESSARY INCLUDING ANY SEDIMENT TRACKING. SWEEP PAVED AREAS AS NEEDED TO REMOVE SEDIMENT AND POTENTIAL POLLUTANTS ACCUMULATED DURING SITE CONSTRUCTION.
14. REMOVE ACCUMULATED SEDIMENT FROM ALL TEMPORARY PRACTICES AND DISPOSE OF IN A PRE-APPROVED LOCATION.
15. PROVIDE ON SITE OR MAKE READILY AVAILABLE THE NECESSARY EQUIPMENT AND SITE PERSONNEL DURING CONSTRUCTION HOURS FOR THE DURATION OF THE PROJECT TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER. IF SITE WORK IS SUSPENDED DURING THE WINTER MONTHS THE CONTRACTOR MUST CONTINUE TO PROVIDE PERSONNEL AND EQUIPMENT EITHER ON SITE OR READILY AVAILABLE TO PROPERLY MAINTAIN AND REPAIR ALL EROSION AND SEDIMENTATION CONTROL DEVICES IN A TIMELY AND RESPONSIBLE MANNER
16. PRIOR TO THE INSTALLATION OF FILTER FABRIC AND MEDIA WITHIN THE BIORETENTION AREAS, REMOVE AND PROPERLY DISPOSE OF SEDIMENT ACCUMULATED IN ANY PARTIALLY CONSTRUCTED OR TEMPORARY BIORETENTION/DRAINAGE AREA USED FOR SEDIMENT CONTROL DURING CONSTRUCTION. PROVIDE A SURFACE ELEVATION AT A MINIMUM 1-FOOT ABOVE THE BOTTOM OF MEDIA ELEVATION AS SHOWN IN THE BIORETENTION SCHEDULE FOR PARTIALLY CONSTRUCTED BIORETENTION AREAS. THIS ALLOWS FOR AN OVER-DIG OF THE COLLECTED SEDIMENT FROM WITHIN THE BIORETENTION AREA PRIOR TO MEDIA/FABRIC INSTALLATION.
17. CONTROL DUST BY WATERING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER.
18. THE CONTRACTOR IS RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE DURING CONSTRUCTION OF ALL STORMWATER FACILITIES INSTALLED OR AFFECTED BY THE PROJECT. REMOVE SEDIMENT OR DEBRIS COLLECTED WITHIN THESE FACILITIES FROM THE PROJECT WORK PRIOR TO THE OWNER'S ACCEPTANCE.

LEGEND:



COMMONWEALTH OF MASSACHUSETTS
RICHARD A. CLAYTOR
CIVIL
NO. 45116
REGISTERED PROFESSIONAL ENGINEER

5-21-19

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REVISION HISTORY:

Rev.	Date	By	Appr.	Description
1	00/00/00	##	##	Revisions Per

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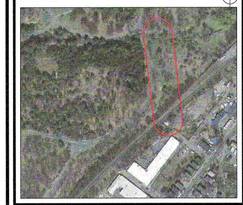
LOCUS MAP:



PROJECT NAME:

ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE

CONSTRUCTION NOTES & LEGEND

DATE	MAY 2019
CAD FILE NAME	16073 CN.dwg
DRAWING SCALE	---
PROJECT NO.	16073B
DRAWING NUMBER	C - 4
AREA	X
SHEET NUMBER	4 OF 14

PATH TO REMAIN OPEN DURING CONSTRUCTION

CONSTRUCTION ENTRANCE

MOVEABLE CONSTRUCTION FENCE WITH SIGNAGE LENGTH = 90 LF

EXISTING GATE, BOLLARDS AND GRANITE PIERS TO REMAIN

INSTALL INLET PROTECTION

WF MAHW1 WF MAHW1N WF MAHW2 WF MAHW2N WF MAHW3 WF MAHW3N WF MAHW4 WF MAHW5 WF MAHW101 WF MAHW101N WF MAHW102 WF MAHW102N WF MAHW103 WF MAHW103N

SILT SOCK LENGTH = 720 LF

CONSTRUCTION FENCE LENGTH = 690 LF

R&D EXISTING TREE

REMOVE & STOCKPILE EXISTING BOULDER & CONCRETE BLOCK

TREE PROTECTION (TYP.)

REMOVE & STOCKPILE EXISTING BOULDER & CONCRETE BLOCK

R&D EXISTING TREES

TREE PROTECTION (TYP.)

EDGE OF LAWN

R&D EXISTING TREE

REMOVE AND STOCKPILE EXISTING BOULDERS (6) AND GRANITE BLOCKS (2)

CONSTRUCTION FENCE WITH SIGNAGE LENGTH = 690 LF

SILT SOCK LENGTH = 90 LF

R&D EXISTING VEGETATION SEE SPECIFICATIONS

R&D EXISTING ASPHALT AREA = 1020 SF

R&D EXISTING VEGETATION SEE SPECIFICATIONS

R&R EXISTING GATE POSTS

R&D TRASH AND DEBRIS

R&D EXISTING CHAIN LINK FENCE LENGTH = 50LF

R&D EXISTING TREES

R&R EXISTING CATCH BASINS (2) OF ALL SEDIMENT AND INSTALL INLET PROTECTION (2)

NEATLY SAWCUT AND MATCH EXISTING GRADE LENGTH = 55LF

CONSTRUCTION FENCE WITH SIGNAGE LENGTH = 70LF

GRAPHIC SCALE

20 0 10 20 40 80

(in feet)

1 INCH = 20 FEET

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Rev.	Date	By	Appr.	Description

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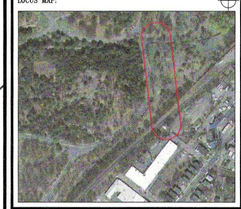
RICHARD J. GLAYTOR CIVIL NO. 45116 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS 5-21-19

LOCUS MAP:



PROJECT NAME:

ARBORETUM ROAD GREEN LINK ROSLINDALE, MASSACHUSETTS

DRAWING TITLE

SITE PREPARATION & DEMO PLAN

DATE	MAY 2019
CAD FILE NAME	16073 ESC.dwg
DRAWING SCALE	1"=20'
PROJECT NO.	16073B
DRAWING NUMBER	C - 5
AREA	X
SHEET NUMBER	5 OF 14

SEE PATH INTERSECTION DETAIL LAYOUT

MATCHLINE

10 FOOT WIDE STABILIZED SOIL PATH 6,200 SF ±

LIMIT OF WORK 35,000 SF ±

SAND FILTER AREA = 860 SF

PLANTABLE PAVER SPLASH PAD

TURF REINFORCEMENT 5' WIDE, 50' LONG

NEW CATCH BASINS BY OTHERS

NEW PIPE BY OTHERS

STEEL BOLLARDS (2) AND STEEL CHAIN

CAPE COD BERM 25 LF ±

GRAPHIC SCALE

20 0 10 20 40 80

(in feet)

1 INCH = 20 FEET

MATCHLINE

10 FOOT WIDE STABILIZED SOIL PATH

LIMIT OF WORK 35,000 SF

DIRECTIONAL SIGN

END OF PATH FUTURE CONNECTION TO BOARDWALK

SAND FILTER AREA = 860 SF

PLANTABLE PAVER SPLASH PAD

TURF REINFORCEMENT 5' WIDE, 50' LONG

NEW CATCH BASINS BY OTHERS

NEW PIPE BY OTHERS

STEEL BOLLARDS (2) AND STEEL CHAIN

CAPE COD BERM 25 LF ±

EDGE OF LAWN

SEE TUNNEL GATEWAY DETAIL LAYOUT

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Rev.	Date	By	Appr.	Description

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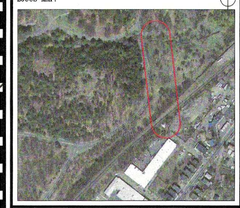
RICHARD H. CLAYTON CIVIL NO. 45196 REGISTERED PROFESSIONAL ENGINEER 5/21/19

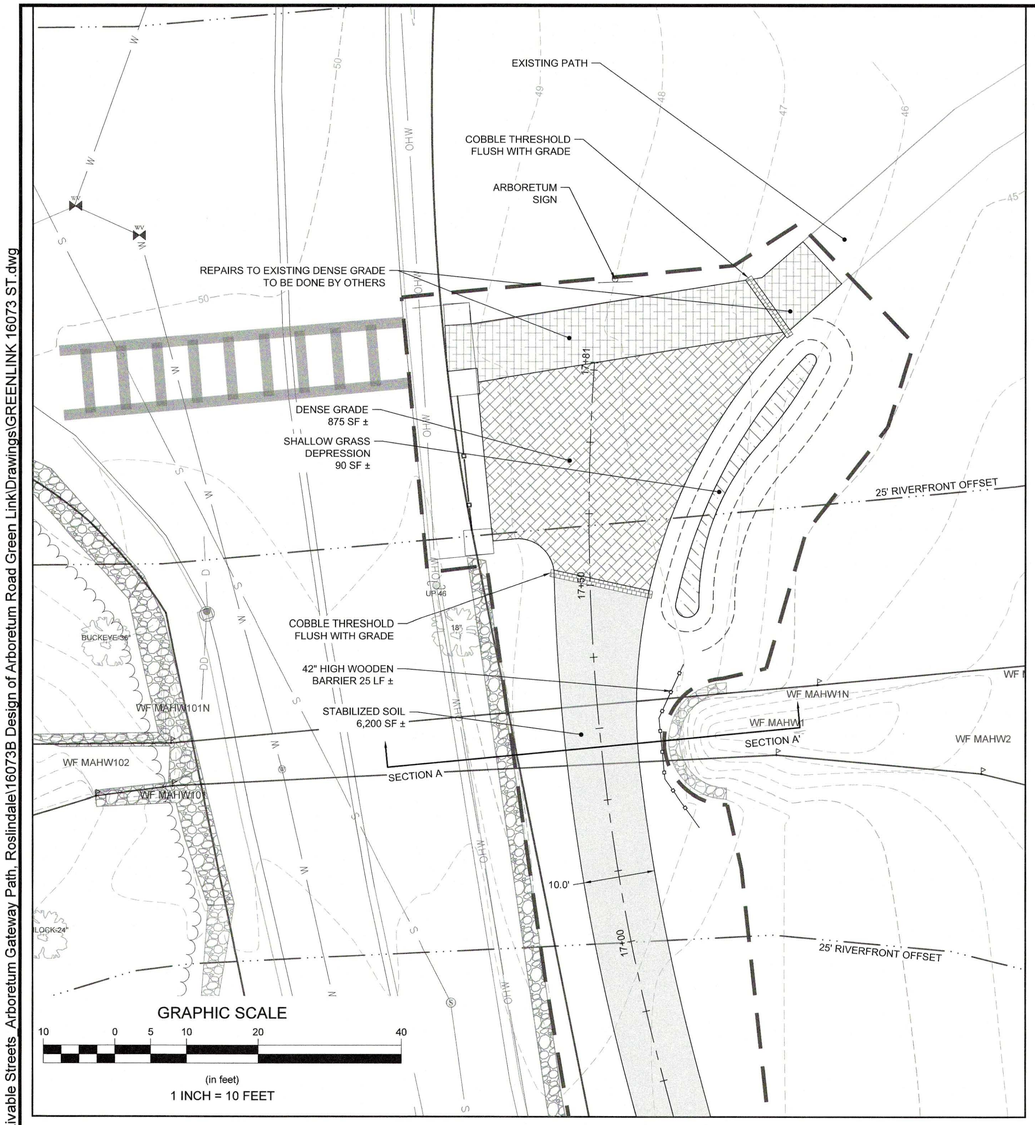
LOCUS MAP:



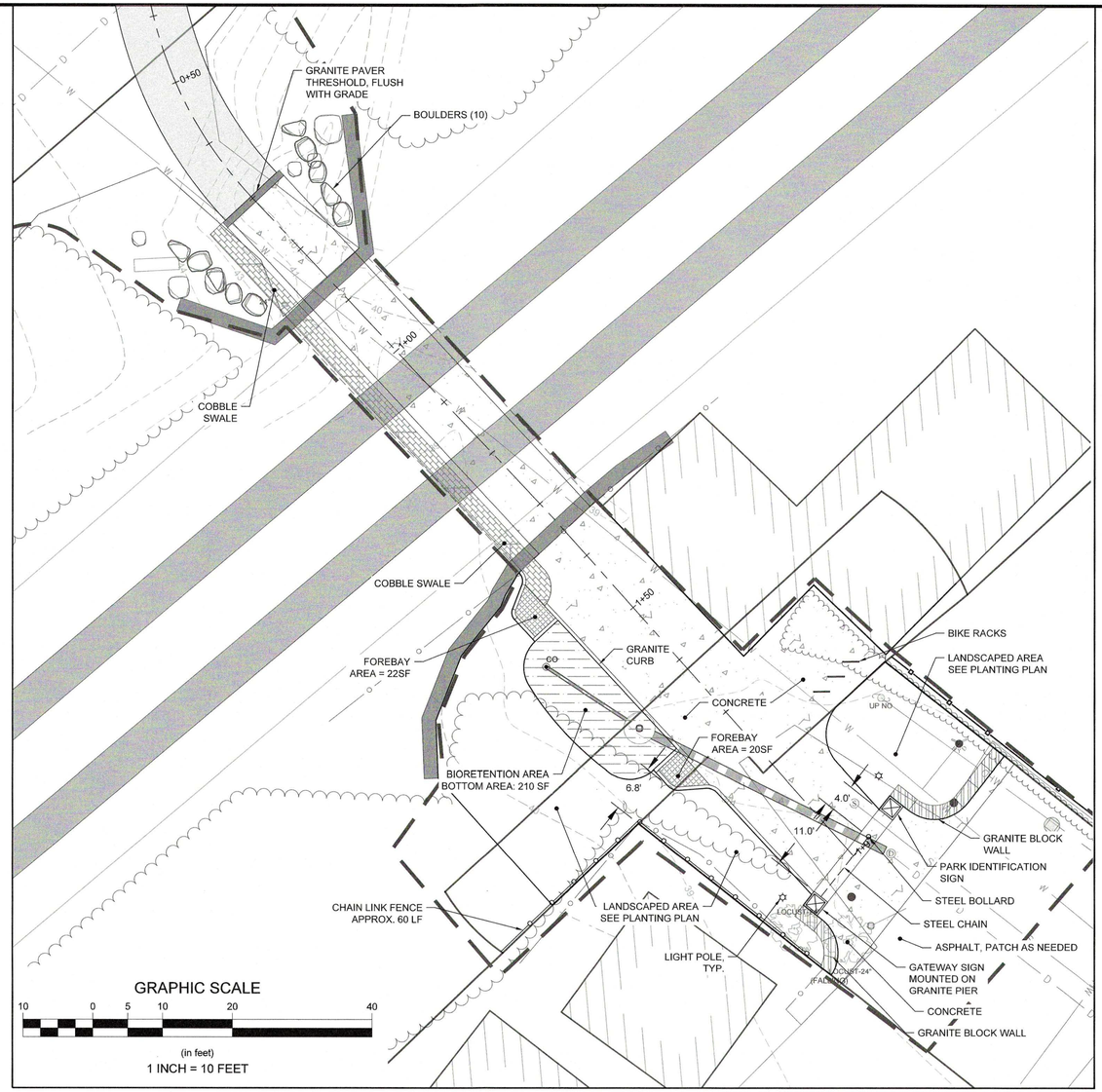
PROJECT NAME:
ARBORETUM ROAD GREEN LINK ROSLINDALE, MASSACHUSETTS

DRAWING TITLE
SITE PLAN

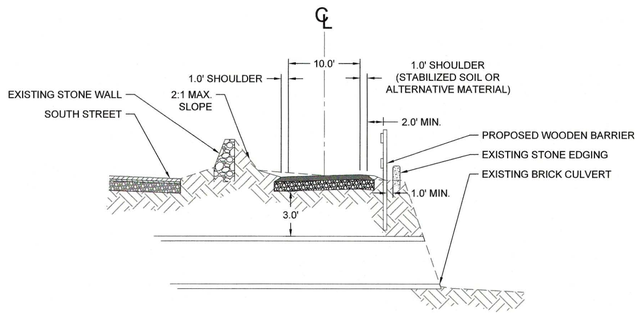
DATE	MAY 2019
CAD FILE NAME	16073 ST.dwg
DRAWING SCALE	1"=20'
PROJECT NO.	16073B
DRAWING NUMBER	C - 6
AREA	X
SHEET NUMBER	60F14



INTERSECTION OF BLACKWELL PATH AND GREEN LINK PATH DETAIL LAYOUT



TUNNEL GATEWAY DETAIL LAYOUT



CULVERT CROSSING SECTION A-A'
HORIZONTAL SCALE 1" = 10'
VERTICAL SCALE 1" = 5'

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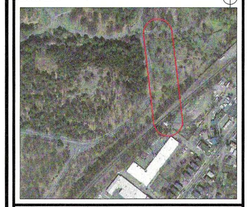
RICHARD A. CLAYTOR CIVIL NO. 46196 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

LOCUS MAP:

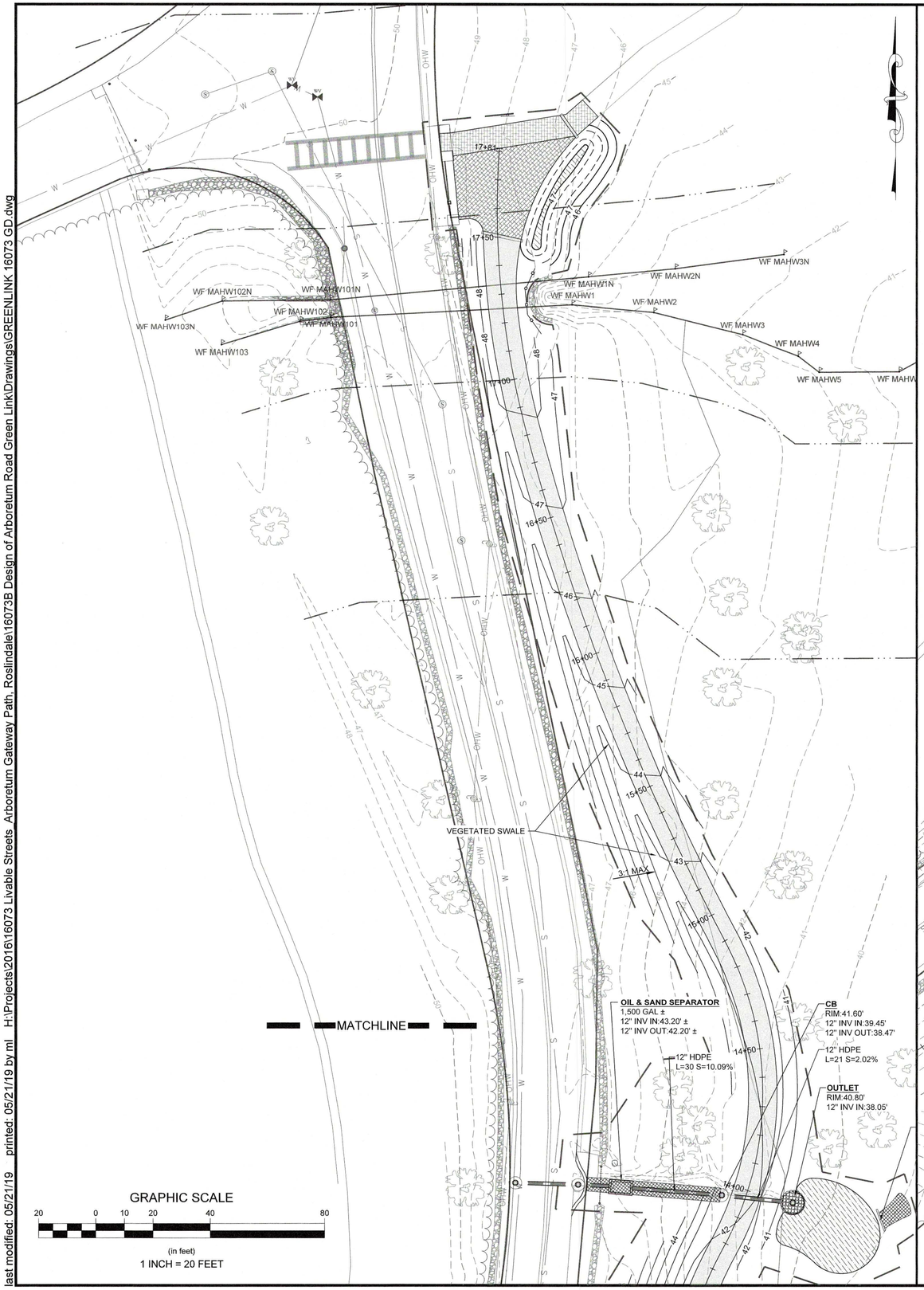


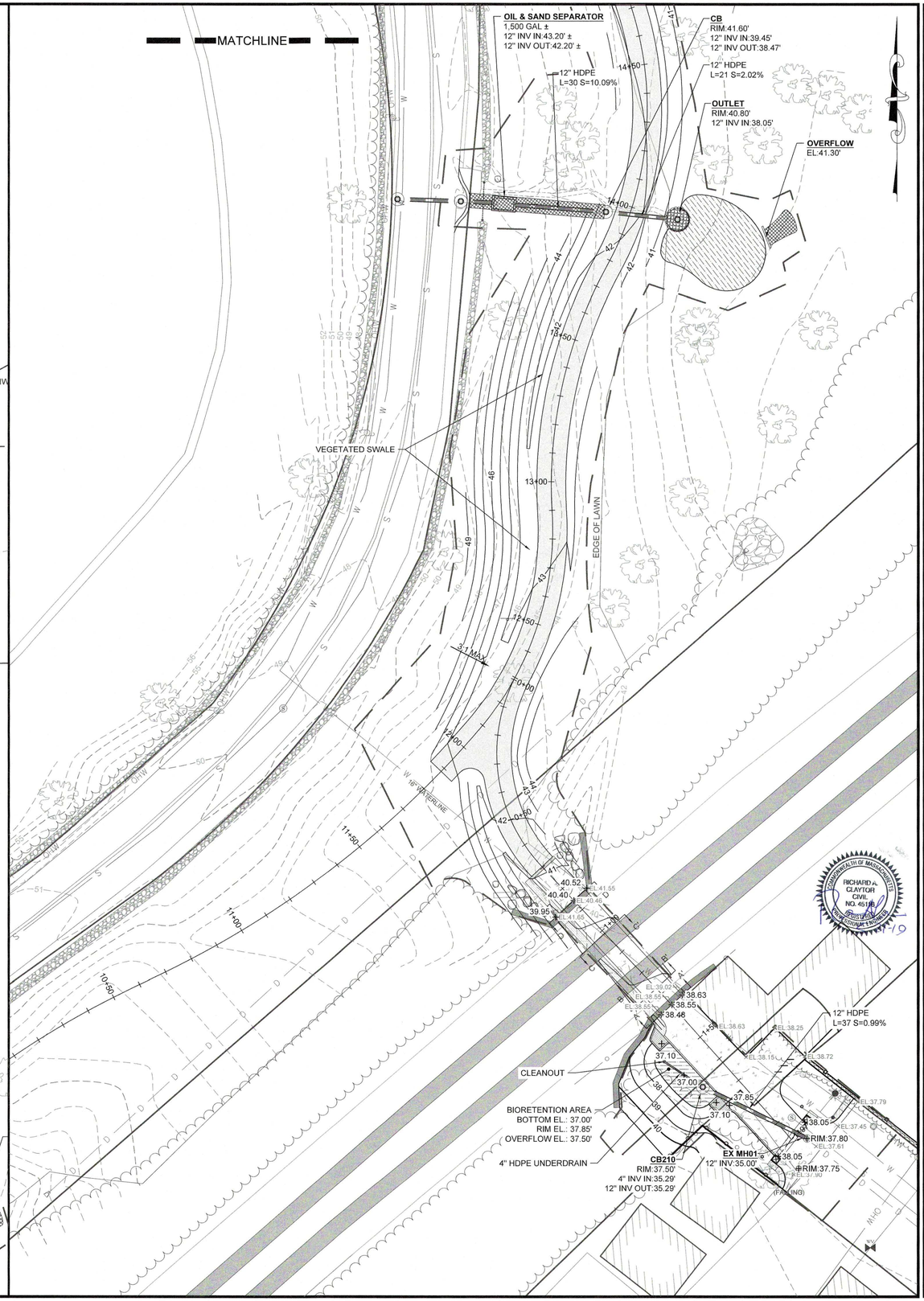
PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
SITE PLAN INSETS

DATE: MAY 2019		
CAD FILE NAME: 16073 ST.dwg		
DRAWING SCALE: 1"=10'		PROJECT NO: 16073B
DRAWING NUMBER: C - 7	AREA: X	SHEET NUMBER: 7 OF 14

last modified: 05/21/19 printed: 05/21/19 by ml H:\Projects\2016\16073 Livable Streets_Arboretum Gateway Path, Roslindale\16073B Design of Arboretum Road Green Link\Drawings\GREENLINK 16073 ST.dwg





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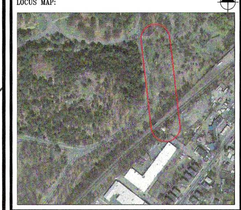
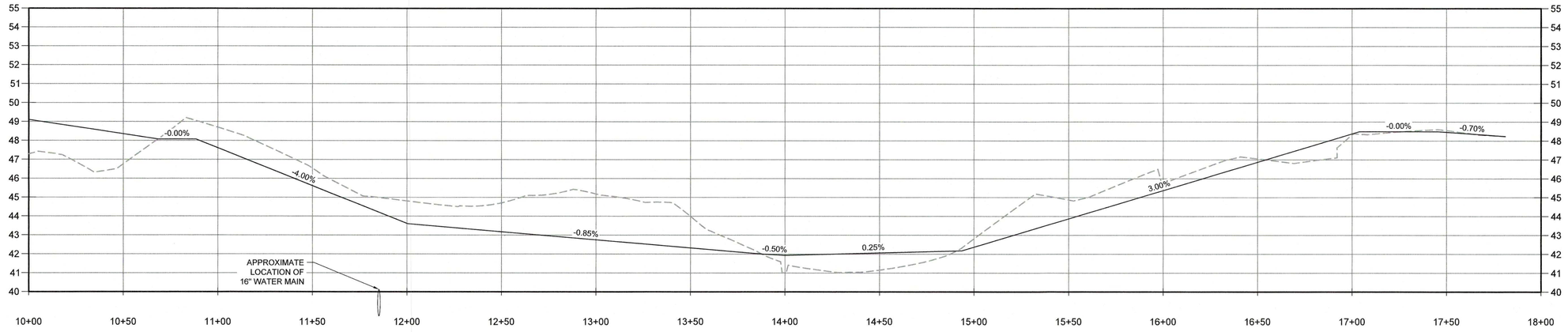


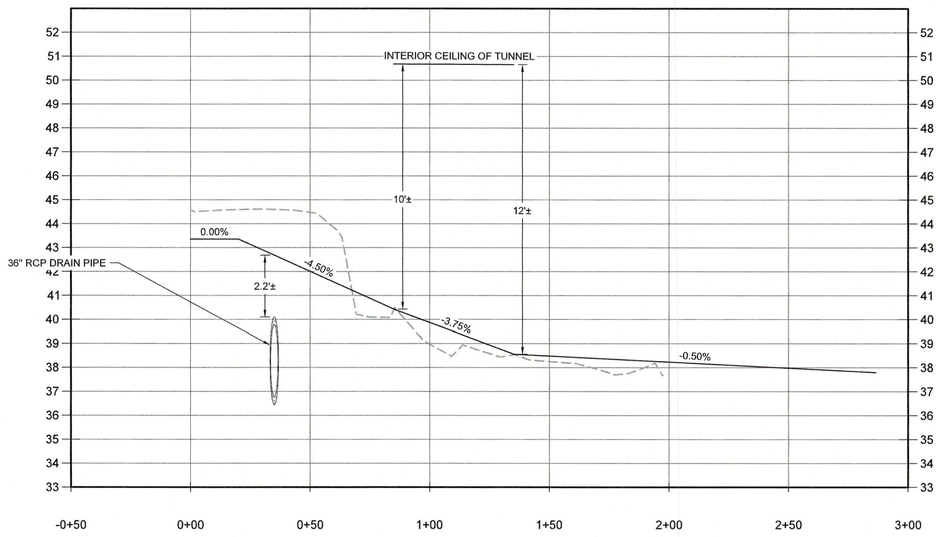
PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
GRADING & DRAINAGE PLAN

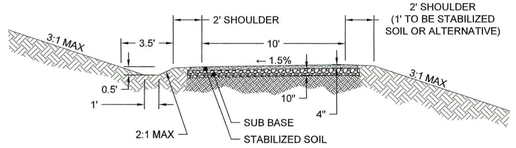
DATE		
MAY 2019		
CAD FILE NAME 16073 GD.dwg		
DRAWING SCALE 1"=20'	PROJECT NO. 16073B	
DRAWING NUMBER C - 8	AREA X	SHEET NUMBER 8 OF 14



BLACKWELL PATH PROFILE
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 1'



BIKE SPUR PROFILE
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 1'



PATHWAY AND SWALE TYPICAL SECTION
NOT TO SCALE

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SUB-CONTRACTOR:
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www.halvorsondesign.com/
25 Kingston Street, 5th Floor,
Boston, MA, 02111, United
States (617) 536-0380

REVISION HISTORY:

Rev.	Date	By	Appr.	Description

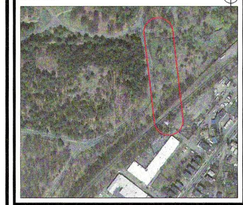
USE DISCLAIMER:

PERMITTING ONLY
NOT FOR CONSTRUCTION

ARCHITECT'S STAMP:

COMMONWEALTH OF MASSACHUSETTS
RICHARD A. CLAYTOR
CIVIL
NO. 49118
REGISTERED PROFESSIONAL ENGINEER

LOCUS MAP:



PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
PROFILES

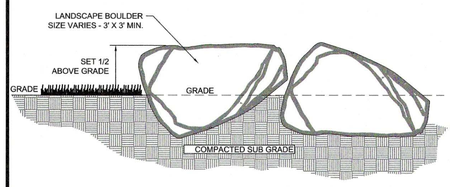
DATE
MAY 2019

CAD FILE NAME 16073 GD.dwg

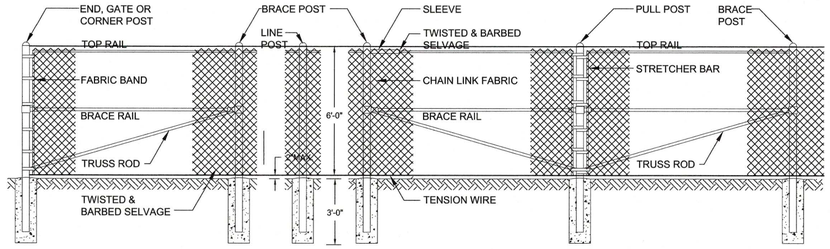
DRAWING SCALE ---

PROJECT NO. 16073B

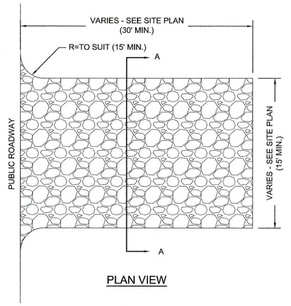
DRAWING NUMBER	AREA	SHEET NUMBER
C - 9	X	9 OF 14



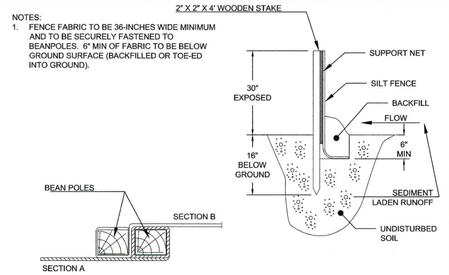
LANDSCAPE BOULDER
NOT TO SCALE



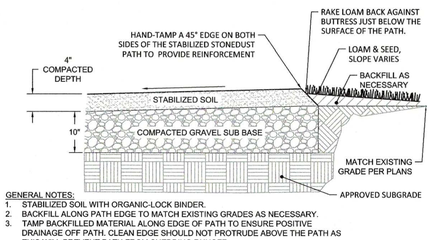
CHAIN LINK FENCE DETAIL
NOT TO SCALE



PLAN VIEW

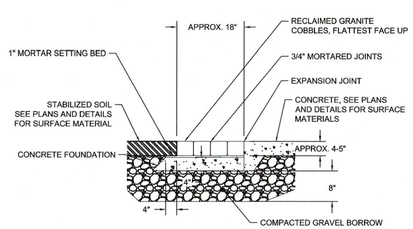


TOP VIEW



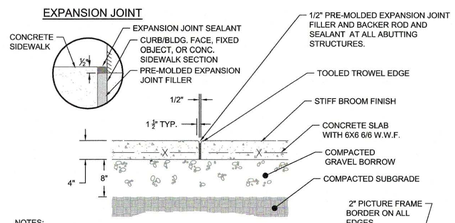
GENERAL NOTES:
1. STABILIZED SOIL WITH ORGANIC-LOCK BINDER.
2. BACKFILL ALONG PATH EDGE TO MATCH EXISTING GRADES AS NECESSARY.
3. TAMP BACKFILLED MATERIAL ALONG EDGE OF PATH TO ENSURE POSITIVE DRAINAGE OFF PATH. CLEAN EDGE SHOULD NOT PROTRUDE ABOVE THE PATH AS THIS WILL PREVENT PATH FROM SHEDDING RUNOFF.
4. SEE PLANS FOR PATH WIDTH.
5. COMPACT BASE COURSE IN TWO LIFTS, EACH TO 95% MODIFIED PROCTOR DENSITY. SEE SPECIFICATIONS FOR INSTALLATION DETAILS.

STABILIZED SOIL PATH
NOT TO SCALE



NOTES:
INTERFACE BETWEEN SURFACES AND THE EXPOSED CURB FACE SHOULD BE LEVEL WITHIN ¼".

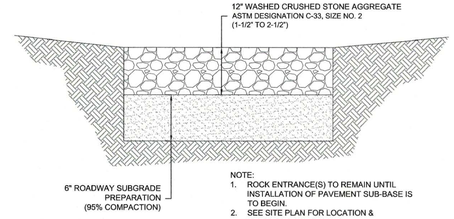
GRANITE COBBLE THRESHOLD
NOT TO SCALE



NOTES:
1. TOOLED JOINTS EVERY 5'. EXPANSION JOINTS EVERY 30'.
2. BROOM FINISH WILL BE PERPENDICULAR TO THE ROAD AND DIRECTION OF CIRCULATION.
3. SLOPE AS SHOWN ON PLANS.
4. CEMENT CONCRETE: 4,000 PSI-TYPE II
5. SUBBASE: COMPACTED TO 95%.

BROOM FINISH CONCRETE
NOT TO SCALE

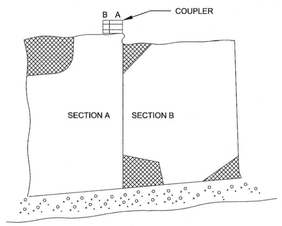
PLAN



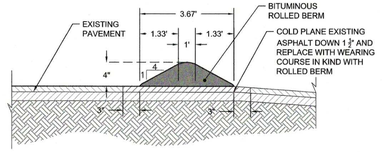
NOTE:
1. ROCK ENTRANCE(S) TO REMAIN UNTIL INSTALLATION OF PAVEMENT SUB-BASE IS TO BEGIN.
2. SEE SITE PLAN FOR LOCATION & ACTUALLY DIMENSIONS

SECTION A-A

STONE CONSTRUCTION ENTRANCE
NOT TO SCALE

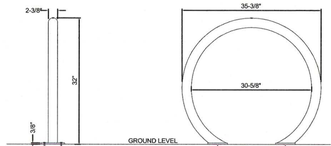


JOINING SECTIONS OF FENCE



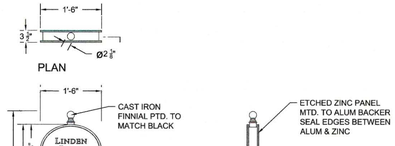
NOTES:
1. BERM TO BE CONSTRUCTED OF BITUMINOUS WEARING SURFACE COURSE AS SHOWN.
2. BERM TO BE CONSTRUCTED INTEGRAL WITH BITUMINOUS WEARING SURFACE.
3. BERM TO BE FOUNDED ENTIRELY ON THE BASE COURSE.

CAPE COD BERM DETAIL
NOT TO SCALE



NOTES:
1. MOUNTING: SURFACE MOUNT WITH SQUARE FLANGE.
2. COLOR OPTION: GALVANIZED.
3. PRODUCT MUST BE PERMANENTLY AFFIXED TO THE GROUND. CONSULT YOUR LOCAL CODES FOR REGULATIONS.
4. CONTACT MANUFACTURER FOR DETAILS.

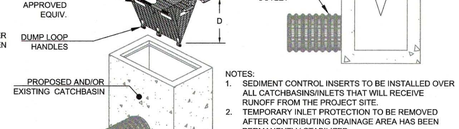
BIKE RACK
NOT TO SCALE



ELEVATION

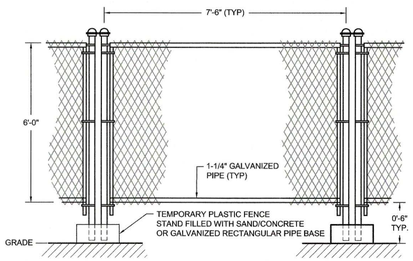
SIDE

DIRECTIONAL SIGN
NOT TO SCALE

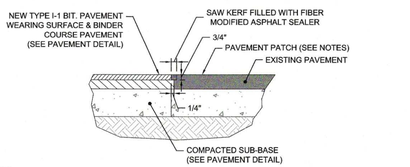


NOTES:
1. SEDIMENT CONTROL INSERTS TO BE INSTALLED OVER ALL CATCHBASINS/INLETS THAT WILL RECEIVE RUNOFF FROM THE PROJECT SITE.
2. TEMPORARY INLET PROTECTION TO BE REMOVED AFTER CONTRIBUTING DRAINAGE AREA HAS BEEN PERMANENTLY STABILIZED.
3. DEPTH (D) TO BE A MINIMUM OF 16-INCHES.
4. MANUFACTURER TO BE SILT SACK OR APPROVED EQUIVALENT.

TEMPORARY CATCHBASIN INSERT WITH INLET PROTECTION
NOT TO SCALE

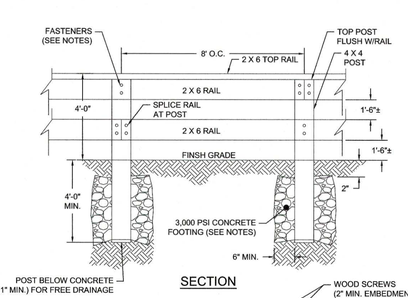


EROSION/SILTATION CONTROL FENCE
NOT TO SCALE

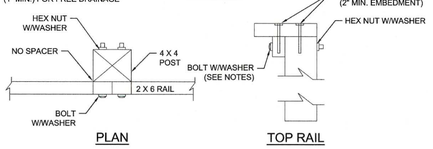


NOTES:
1. EXISTING BITUMINOUS PAVEMENT SHALL BE REMOVED TO A CLEAN STRAIGHT EDGE VIA SAW CUTTING. THE SAW CUT SHALL BE COMPLETED PERPENDICULAR TO THE ROADWAY/SIDEWALK.
2. PRIOR TO INSTALLING THE WEARING COURSE THE EXISTING VERTICAL PAVEMENT SURFACE SHALL BE SWEPT COMPLETELY CLEAN.
3. AFTER PROPER COMPACTION (SEE PAVEMENT DETAIL) SAW CUT NEW PAVEMENT ABUTMENT 3/4" DEEP AND FILL WITH FIBER MODIFIED ASPHALT SEALER AS SHOWN.

PAVEMENT PATCH
NOT TO SCALE



SECTION

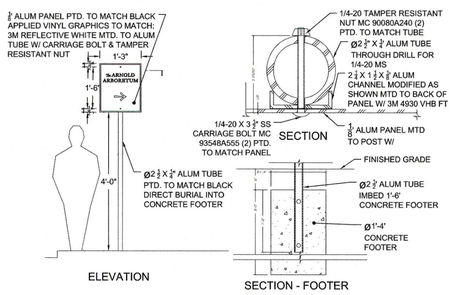


PLAN

TOP RAIL

NOTES:
1. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. POST AND RAILS TO BE PRESSURE TREATED LUMBER GROUND CONTACT LUMBER, NO. 2 GRADE MIN.
3. ALL SPLICES ARE TO BE MADE AT POSTS. ALTERNATE SPLICE CONNECTIONS.
4. FASTENERS TO BE HOT DIPPED GALVANIZED OR STAINLESS STEEL MATCHING ASTM A153 AND ASTM A653.
5. THE CONTRACTOR SHALL INSTALL EITHER TWO 1/2"Ø BOLTS OR ONE 1"Ø BOLT AT EACH RAIL TO POST CONNECTION. ALTERNATIVE OPTION: THRU-LOCKING BOLT (FASTENMASTER THRU LOCK OR EQUAL).
6. CONCRETE FOOTING NOT NECESSARY FOR HYDRAULIC POST INSTALLATION. FOOTING MATERIAL TO EXTEND AROUND THE ENTIRE POST.
7. WOOD POSTS SHALL BE NOTCHED AS NECESSARY TO FACILITATE CURVES AND CHANGES IN DIRECTION. RAIL SHALL BE CUT TO CREATE A RAIL TO RAIL FLUSH FACE JOINT AS NECESSARY.
8. BEGINNING & END SECTIONS SHALL BE ANCHORED INTO THE GROUND A MINIMUM 1-FOOT BELOW FINISH GRADE WHERE PARALLEL TO TRAFFIC.

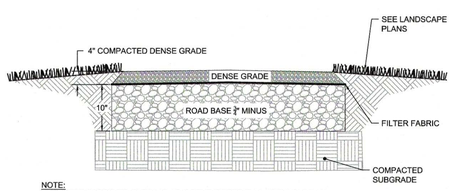
WOODEN BARRIER
NOT TO SCALE



ELEVATION

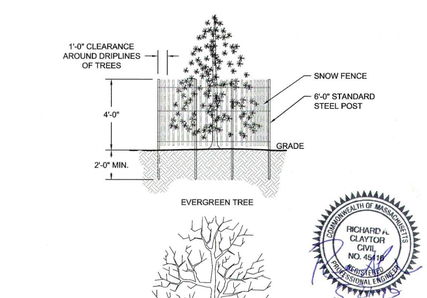
SECTION - FOOTER

ARBORETUM SIGN
NOT TO SCALE

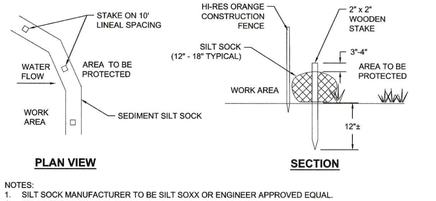


NOTE:
1. FILTER FABRIC TO OVERLAP ADJACENT PIECES BY A MINIMUM OF 12".
2. COMPACT SUBGRADE TO 95% MODIFIED PROCTOR DENSITY.
3. BACKFILL ALONG PATH EDGE TO MATCH EXISTING GRADES AS NECESSARY.
4. ENSURE POSITIVE DRAINAGE OFF PATH.
5. SEE PLANS FOR PATH WIDTH.

DENSE GRADE PATH
NOT TO SCALE



TREE TRUNK PROTECTION DETAIL
NOT TO SCALE

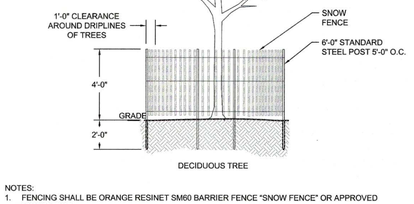


PLAN VIEW

SECTION

NOTES:
1. SILT SOCK MANUFACTURER TO BE SILT SOXX OR ENGINEER APPROVED EQUAL.
2. ALL MATERIAL TO MEET MANUFACTURER'S SPECIFICATIONS.
3. SEDIMENT SILT SOCK TO BE FILLED WITH LEAF COMPOST AND/OR WOODY MULCH PER MANUFACTURER'S REQUIREMENTS.
4. FOLLOWING CONSTRUCTION AND SITE STABILIZATION, COMPOST MATERIAL TO BE REMOVED OR DISPERSED ON SITE, AS APPROVED BY THE ENGINEER.

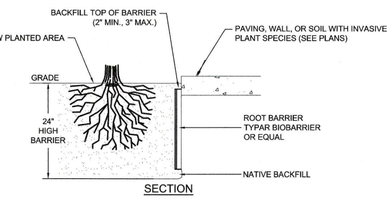
SEDIMENT SILT SOCK DETAIL
NOT TO SCALE



NOTES:
1. FENCING SHALL BE ORANGE RESINET SM60 BARRIER FENCE "SNOW FENCE" OR APPROVED EQUIVALENT.
2. POST SHALL BE HOT ROLLED RAIL STEEL AND FORMED INTO A "T". DIMENSIONS OF "T" POST SECTION, APPROXIMATELY 1 7/16" X 1 5/16" X 1/8" X 6' (SIX FEET) LONG. THE POST SHALL BE PAINTED GREEN OR GALVANIZED.
3. THE FENCING SHALL REMAIN IN PLACE UNTIL ALL EXCAVATION HAS BEEN COMPLETED AND THE SURFACE HAS BEEN RE-ESTABLISHED

TREE PROTECTION DETAIL
NOT TO SCALE

TYPICAL LINEAR ROOT BARRIER
NOT TO SCALE



SECTION

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LEAD ENGINEER:
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REVISION HISTORY:

Rev.	Date	By	Appr.	Description

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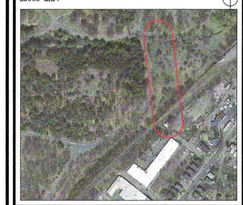
NOT FOR CONSTRUCTION

ARCHITECT'S STAMP:

COMMONWEALTH OF MASSACHUSETTS
RICHARD L. CLAYTOR
CIVIL
NO. 45418
REGISTERED PROFESSIONAL ENGINEER

LOCUS MAP:



PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
DETAILS (1)

DATE
MAY 2019

CAD FILE NAME 16073 DE.dwg

DRAWING SCALE ---

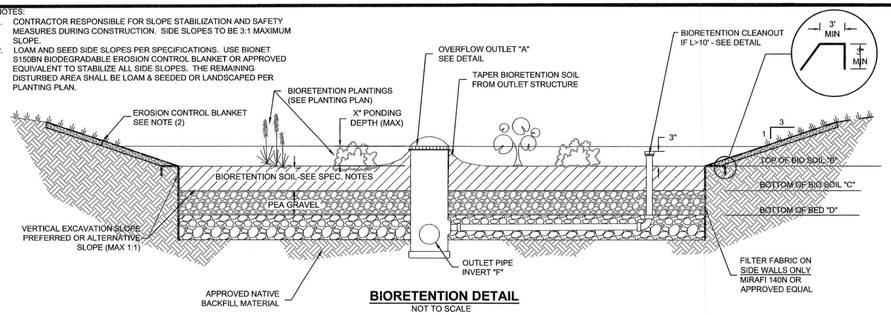
PROJECT NO. 16073B

DRAWING NUMBER C - 10

AREA X

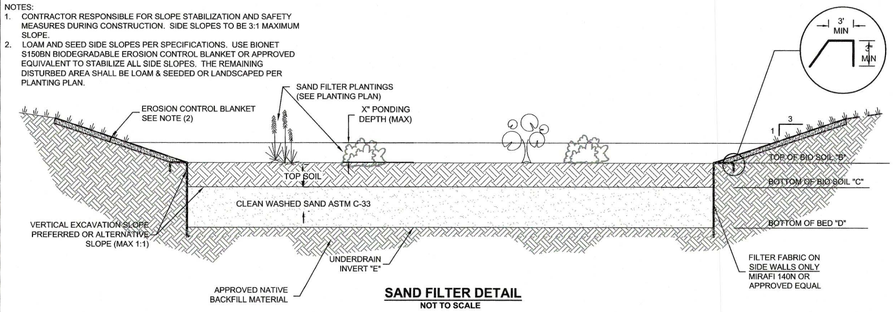
SHEET NUMBER 10 OF 14

NOTES:
1. CONTRACTOR RESPONSIBLE FOR SLOPE STABILIZATION AND SAFETY MEASURES DURING CONSTRUCTION. SIDE SLOPES TO BE 3:1 MAXIMUM SLOPE.
2. LOAM AND SEED SIDE SLOPES PER SPECIFICATIONS. USE BIONET S150BN BIODEGRADABLE EROSION CONTROL BLANKET OR APPROVED EQUIVALENT TO STABILIZE ALL SIDE SLOPES. THE REMAINING DISTURBED AREA SHALL BE LOAM & SEEDED OR LANDSCAPED PER PLANTING PLAN.

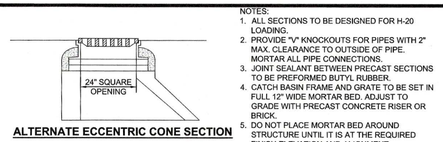


BIORETENTION DETAIL
NOT TO SCALE

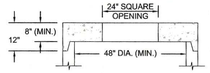
NOTES:
1. CONTRACTOR RESPONSIBLE FOR SLOPE STABILIZATION AND SAFETY MEASURES DURING CONSTRUCTION. SIDE SLOPES TO BE 3:1 MAXIMUM SLOPE.
2. LOAM AND SEED SIDE SLOPES PER SPECIFICATIONS. USE BIONET S150BN BIODEGRADABLE EROSION CONTROL BLANKET OR APPROVED EQUIVALENT TO STABILIZE ALL SIDE SLOPES. THE REMAINING DISTURBED AREA SHALL BE LOAM & SEEDED OR LANDSCAPED PER PLANTING PLAN.



SAND FILTER DETAIL
NOT TO SCALE

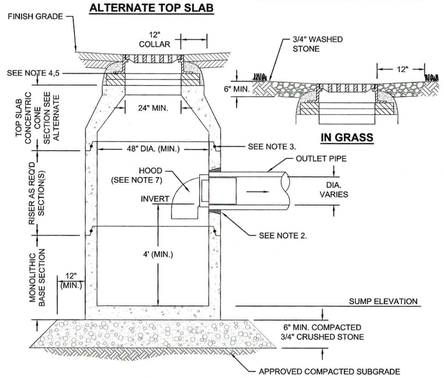


ALTERNATE ECCENTRIC CONE SECTION

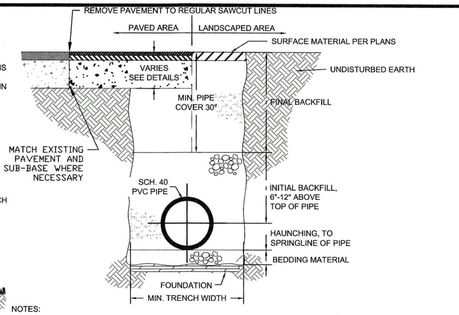


ALTERNATE TOP SLAB

NOTES:
1. ALL SECTIONS TO BE DESIGNED FOR H-20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS TO BE PREFORMED BUTYL RUBBER.
4. CATCH BASIN FRAME AND GRATE TO BE SET IN FULL 12" WIDE MORTAR BED. ADJUST TO GRADE WITH PRECAST CONCRETE RISER OR BRICK.
5. DO NOT PLACE MORTAR BED AROUND STRUCTURE UNTIL IT IS AT THE REQUIRED FINISH ELEVATION AND ALIGNMENT.
6. FRAME AND COVER TO CONFORM TO MASSACHUSETTS STANDARDS HEAVY DUTY (EAST JORDAN, NEENAH, OR APPROVED EQUIVALENT).
7. HDPE PIPE HOOD TO BE 90° BEND FASTENED TO PIPE WITH SEALANT. BEND TO HAVE 1 INCH PURGE HOLE DRILLED INTO TOP OF ELBOW.



PRECAST CONCRETE CATCH BASIN (CB) WITH HOOD
NOT TO SCALE



NOTES:
1. INSTALL PVC PIPE AND FITTINGS IN STRICT ACCORDANCE WITH THE INSTALLATION RECOMMENDATIONS OF THE PIPE FITTING MANUFACTURER. SUCH INSTRUCTIONS INCLUDE BUT ARE NOT LIMITED TO CUTTING, SOLVENT CEMENTING AND PRIMING, JOINTS, CONNECTIONS, TRANSITIONS AND ALLOWANCE FOR THERMAL EXPANSION.
2. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH A SUITABLE COMPACTED GRAVEL MATERIAL OR AS AN ALTERNATIVE AND AT THE DISCRETION OF THE ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A WOVEN GEOTEXTILE FABRIC.
3. BEDDING, HAUNCHING AND INITIAL BACKFILL: SUITABLE MATERIAL SHALL CONSIST OF CLEAN, HARD, PARTICLES OF GRAVEL MEETING THE FOLLOWING:

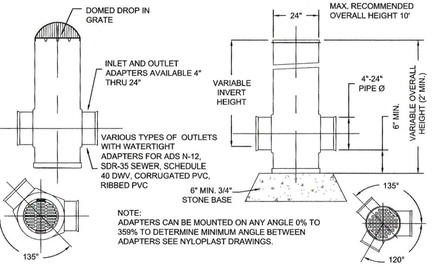
SIEVE SIZE	PERCENT PASSING
3/4"	85-95
#4	5-15
#8	0-2

UNLESS OTHERWISE APPROVED BY ENGINEER

MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION. UNLESS OTHERWISE SPECIFIED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" PIPE (100-600mm)
4. FINAL BACKFILL: COMPACTED NATIVE GRAVEL OR FLOWABLE FILL.
5. GENERAL BACKFILLING: (INCLUDING DISTURBED AREAS SURROUNDING TRENCHES) SHALL BE PLACED AND COMPACTED IN 12" (MAX.) VERTICAL LIFTS. CONTRACTOR SHALL ACHIEVE 95% COMPACTION FOR THE BEDDING UNLESS OTHERWISE APPROVED BY THE ENGINEER.
6. TRENCH WIDTH: UNLESS OTHERWISE SPECIFIED BY THE ENGINEER, MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:

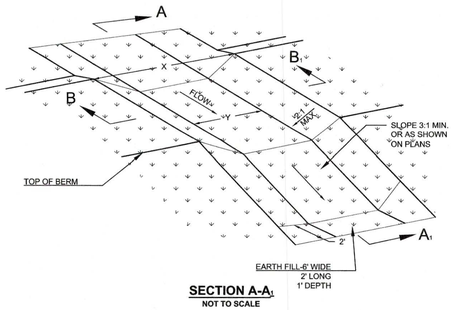
NOMINAL Ø in (mm)	TRENCH WIDTH, in (mm) MIN. RECOMMENDED
8 (200)	36 (915)
10 (250)	36 (915)
12 (300)	36 (915)
15 (375)	42 (1070)
18 (450) >	60 (1520)

PIPE TRENCH DETAIL
NOT TO SCALE

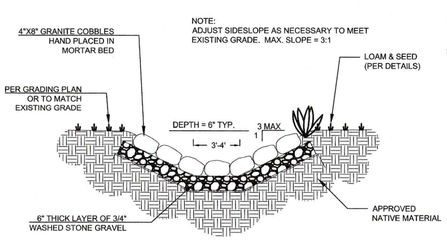


NOTE:
ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0% TO 359% TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE NYLOPLAST DRAWINGS.

OVERFLOW OUTLET DETAIL
NOT TO SCALE
BY "NYLOPLAST" OR APPROVED EQUIVALENT

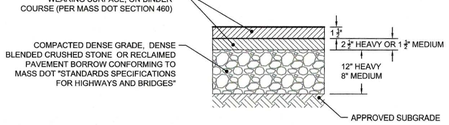


SECTION A-A$_1$
NOT TO SCALE



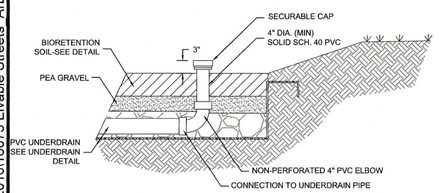
NOTE:
ADJUST SIDESLOPE AS NECESSARY TO MEET EXISTING GRADE. MAX. SLOPE = 3:1

TYPICAL COBBLE SWALE DETAIL
NOT TO SCALE

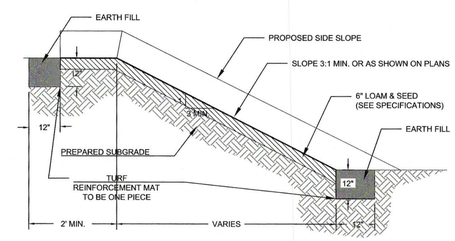


GENERAL NOTES:
1. SUB-GRADE (EXISTING MATERIAL) SHALL CONSIST OF INERT MATERIAL THAT IS HARD, DURABLE STONE AND/OR COARSE SAND, FREE FROM LOAM AND CLAY TO A DEPTH NOT LESS THAN 4-FT BELOW THE FINISH PAVEMENT SURFACE. EXCAVATE SANDY-LOAM AND/OR LOAMY-SAND TOPSOIL MATERIAL FROM ALL PAVED AREAS PRIOR TO SUB-BASE INSTALLATION.
2. PLACE SUB-BASE IN MAXIMUM 6" LIFTS (COMPACTED TO 95%).
3. COMPACT SUB-GRADE FILL TO 95% COMPACTION.
4. SEE SITE LAYOUT PLAN FOR PAVEMENT WIDTH AND LOCATION.
5. SEE GRADING PLANS FOR PAVEMENT SLOPE AND CROSS SLOPE.
6. SWEEP CLEAN THE EXISTING BINDER COURSE SURFACE PRIOR TO INSTALLING THE WEARING COURSE BY A STREET SWEEPING MACHINE.
7. APPLY A TACK COAT PER SPECIFICATIONS.

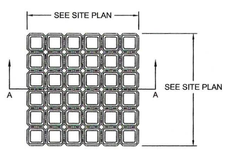
BITUMINOUS PAVEMENT
NOT TO SCALE



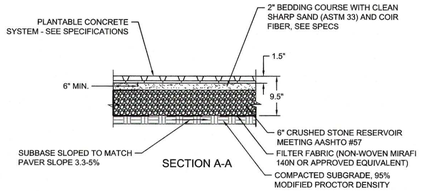
TYPICAL BIORETENTION CLEANOUT DETAIL
NOT TO SCALE



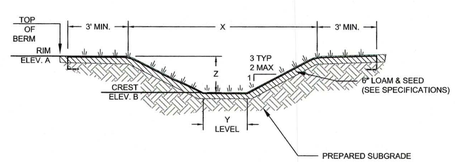
SECTION B-B
NOT TO SCALE



PLAN VIEW

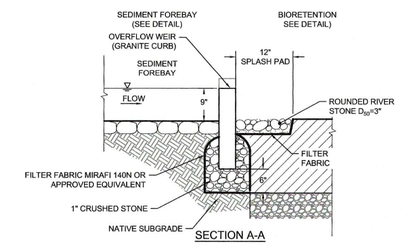


SECTION A-A



NOTES:
1. SUBGRADE TO BE UNIFORM AND SMOOTH. REMOVE ALL ROCKS, CLODS, VEGETATION OR OTHER OBJECTS.
2. LOAM & HAND SEED PRIOR TO MAT INSTALLATION.
3. APPLY HYDROSEED WITH BONDED FIBER MATRIX PER THE PLANS & SPECIFICATIONS.

VEGETATED EMERGENCY SPILLWAY DETAIL
NOT TO SCALE



SECTION A-A

SEDIMENT FOREBAY OVERFLOW WEIR
NOT TO SCALE

NOTES:
1. FILTER FABRIC AROUND PERIMETER AND BOTTOM OF STONE BASE. KEY IN MINIMUM 6".
2. MATERIALS SHALL PASS THE FOLLOWING SIEVE ANALYSES:

SEDIMENT FOREBAY DETAIL
NOT TO SCALE

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Sustainable Environmental Solutions
www.horsleywitten.com
90 Route 6A Sandwich, MA 02563
508-833-6600

SUB-CONTRACTOR:
Halvorson Design Partnership
www.halvorsondesign.com/
25 Kingston Street, 5th Floor,
Boston, MA, 02111, United States (617) 536-0380

REVISION HISTORY:

Rev.	Date	By	Appr.	Description

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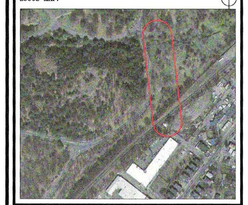
ARCHITECT'S STAMP:

COMMONWEALTH OF MASSACHUSETTS
RICHARD A. CLAYTOR
CIVIL
NO. 45158
REGISTERED PROFESSIONAL ENGINEER

5-20-19

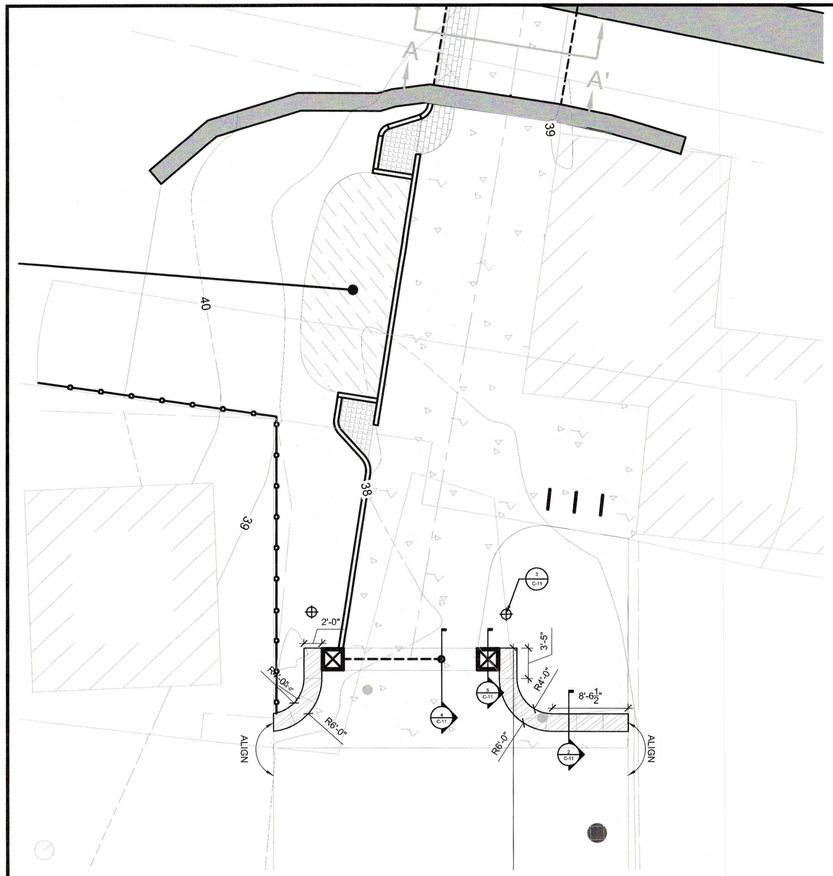
LOCUS MAP:



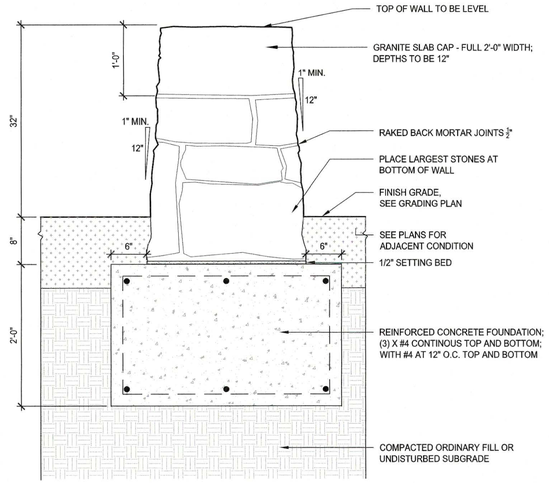
PROJECT NAME:
ARBORETUM ROAD GREEN LINK ROSLINDALE, MASSACHUSETTS

DRAWING TITLE
DETAILS (2)

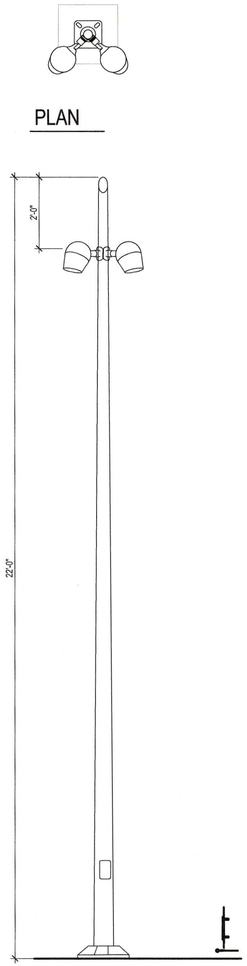
DATE: MAY 2019
CAD FILE NAME: 16073 DE.dwg
DRAWING SCALE: ---
PROJECT NO.: 16073B
DRAWING NUMBER: C - 11
AREA: X
SHEET NUMBER: 11 OF 14



1 PLAN ENLARGEMENT
SCALE: 1/8" = 1'-0"

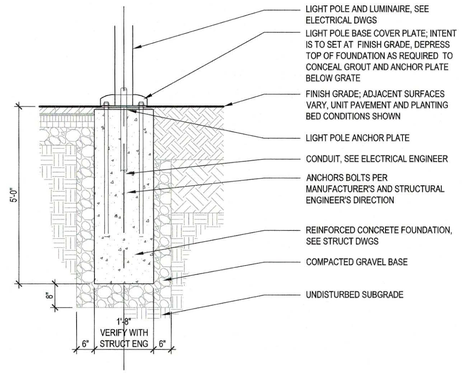


2 SALVAGED STONE WALL SECTION
SCALE: 1"=1'-0"

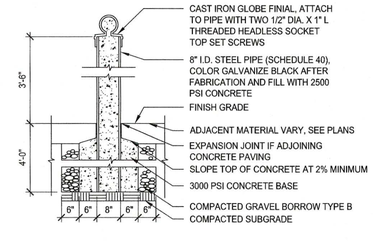


3 LIGHT POLE
SCALE: 1/2" = 1'-0"

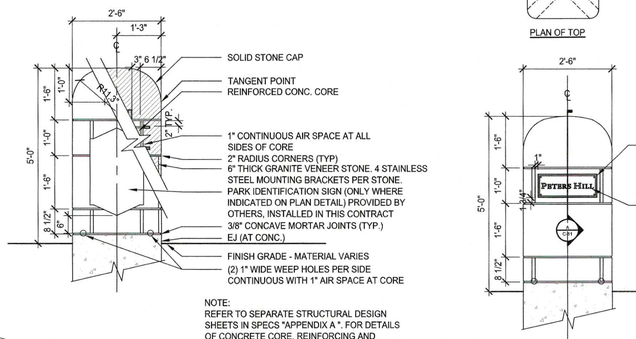
NOTES
1. CONTRACTOR SHALL VERIFY FOUNDATION CONDITION IN FIELD BASED ON EXTENT AND DEPTH OF EXISTING CONCRETE SLAB
2. PROVIDE FULL CUT OFF FIXTURES
3. PROVIDE SYMMETRICAL OR ASYMMETRICAL LIGHT DISTRIBUTION PER ELECTRICAL ENGINEER
4. PROVIDE COLOR SAMPLES FOR COLOR SELECTION BY LANDSCAPE ARCHITECT



TYPICAL FOUNDATION



4 STEEL BOLLARD
SCALE: 1/2" = 1'-0"



NOTE:
REFER TO SEPARATE STRUCTURAL DESIGN SHEETS IN SPECS "APPENDIX A ", FOR DETAILS OF CONCRETE CORE, REINFORCING AND FOOTING.

5 PIER ELEVATIONS
SCALE: 1/2" = 1'-0"

A ALUMINUM PLAQUE ATTACHMENT
SCALE: 1"=1'-0"

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SUB-CONTRACTOR:
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25 Kingston Street, 5th Floor,
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REVISION HISTORY:

Rev.	Date	By	Appr.	Description

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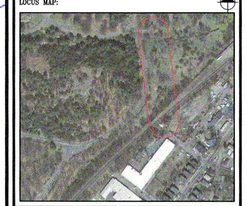
ARCHITECT'S STAMP:

COMMONWEALTH OF MASSACHUSETTS
RICHARD A. CLAYTOR
CIVIL
NO. 45116
REGISTERED PROFESSIONAL ENGINEER
5-21-19

LOCUS MAP:



PROJECT NAME:
ARBORETUM ROAD
GREEN LINK
ROSLINDALE,
MASSACHUSETTS

DRAWING TITLE
DETAILS (3)

DATE
MAY 2019

CAD FILE NAME 16073 DE.dwg

DRAWING SCALE ---

PROJECT NO. 16073B

DRAWING NUMBER	AREA	SHEET NUMBER
C - 12	X	12 OF 14

LOAM AND SEED WITH SEED MIX 1 APPROX. AREA: 150 SF

WF MAHW3N
WF MAHW2N
WF MAHW1N
WF MAHW1
WF MAHW2
WF MAHW3
WF MAHW4
WF MAHW5
WF MAHW6
WF MAHW102N
WF MAHW101N
WF MAHW102
WF MAHW101
WF MAHW103N
WF MAHW103

BUCKEYE-36"
HEMLOCK-24"
HEMLOCK-30"
HEMLOCK-36"
DOGWOOD-12"
WALNUT-24"
SYC-24"
LOCUST-12"
LOCUST-12"
OAK-18"
MAPLE-36"
OAK-48"
HONEYLOCUST-12"
SYC-24"
LOCUST-12"
LOCUST-12"
LOCUST-24"
LOCUST-24"
(FASTIGIATA)

UP-46
UP-62
UP-49
UP-46
UP-51
UP-50
UP-49
UP-NO

OHW
WHO
W
S

LIMIT OF WORK
35,000 SF ±

MATCHLINE

SAND FILTER (SEE DETAIL) SEED MIX 3
APPROX. AREA: 860 SF
AND SAND FILTER PLUGS (SEE LIST OF PLUGS FOR INSTALLATION AND SUGGESTED SAND FILTER PLANTS LIST FOR FUTURE PLANTING)

MATCHLINE

LIMIT OF WORK
35,000 SF

EDGE OF LAWN

LOAM AND SEED WITH SEED MIX 1
APPROX. AREA: 21,300 SF

LOAM AND SEED WITH SEED MIX 1
APPROX. AREA: 1,500 SF

GRAPHIC SCALE
20 0 10 20 40 80
(in feet)
1 INCH = 20 FEET

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REVISION HISTORY:

Rev.	Date	By	Appr.	Description

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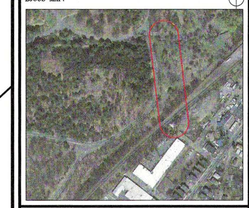
COMMONWEALTH OF MASSACHUSETTS
ALAN R. KUNZ
NO. 1529
REGISTERED LANDSCAPE ARCHITECT

LOCUS MAP:



PROJECT NAME:
ARBORETUM ROAD GREEN LINK ROSLINDALE, MASSACHUSETTS

DRAWING TITLE
PLANTING PLAN

DATE	MAY 2019
CAD FILE NAME	16073 LA.dwg
DRAWING SCALE	1"=20'
PROJECT NO.	16073B
DRAWING NUMBER	C - 13
AREA	X
SHEET NUMBER	13 OF 14

GENERAL PLANTING NOTES:

1. THE FOLLOWING NOTES ARE PROVIDED AS GENERAL PLANTING GUIDELINES ONLY. THOROUGHLY REVIEW THE PROJECT SPECIFICATIONS FOR ALL LANDSCAPE REQUIREMENTS PRIOR TO THE COMMENCEMENT OF ANY LANDSCAPE WORK. SUBMIT IN WRITING TO THE LANDSCAPE ARCHITECT ANY QUESTIONS OR CLARIFICATIONS REQUIRED AT A MINIMUM OF 30 DAYS PRIOR TO ORDERING ANY MATERIALS OR BEGINNING ANY LANDSCAPE CONSTRUCTION.
2. SUBMIT TO THE LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL ALL REQUIRED LANDSCAPE SUBMITTALS AS DESCRIBED IN THE SPECIFICATIONS INCLUDING A PLANT LIST WITH PLANT SIZE AND QUANTITIES TO BE ORDERED PRIOR TO DELIVERY TO THE PROJECT SITE.
3. FURNISH AND INSTALL ALL PLANTS AS SHOWN ON THE DRAWINGS AND IN THE SIZE AND QUANTITIES SPECIFIED ON THE PLANTING SCHEDULE. PLANT SUBSTITUTION SELECTION MUST BE APPROVED BY BIOLOGIST OR LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
4. ALL PLANTS TO COMPLY WITH APPLICABLE REQUIREMENTS OF ANSI Z60.1 "AMERICAN STANDARD FOR NURSERY STOCK." LATEST EDITION, PUBLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION INC.
5. PLANTS TO BE GROWN UNDER CLIMATIC CONDITIONS SIMILAR TO THOSE IN THE LOCALITY OF THE PROJECT FOR AT LEAST TWO (2) YEARS. USE HEALTHY NURSERY GROWN PLANTS, FREE OF DISEASE, INSECTS, AND PESTS. EGGS OR LARVAE, AND HAVE A WELL DEVELOPED ROOT SYSTEM.
6. INSTALL PLANTS WITHIN ONE (1) WEEK OF PURCHASE. IF PLANTS ARE TO BE STORED AT THE SITE PRIOR TO PLANTING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THEY ARE PROPERLY MAINTAINED, WATERED, AND REMAIN HEALTHY.
7. PROCEED WITH PLANTING ONLY WHEN EXISTING AND FORECASTED WEATHER CONDITIONS PERMIT. SUBMIT TO THE LANDSCAPE ARCHITECT IN WRITING THE PROPOSED PLANTING SCHEDULE. OBTAIN APPROVAL OF PLANTING SCHEDULE FROM THE LANDSCAPE ARCHITECT PRIOR TO PERFORMING ANY WORK.
8. SEASONS FOR PLANTING:

SPRING:	DECIDUOUS:	APRIL 1 TO JUNE 15
	EVERGREEN:	APRIL 1 TO JUNE 15
	PERENNIALS:	APRIL 15 TO JUNE 1
	GROUNDCOVERS:	APRIL 15 TO JUNE 1
FALL:	DECIDUOUS:	SEPTEMBER 15 TO NOVEMBER 15
	EVERGREEN:	SEPTEMBER 15 TO NOVEMBER 15
	PERENNIALS:	SEPTEMBER 15 TO NOVEMBER 15
	GROUNDCOVERS:	SEPTEMBER 15 TO NOVEMBER 15

9. PLANTING UNDER FROZEN CONDITIONS IN EITHER THE SPRING OR FALL WILL NOT BE PERMITTED. PLANTING BEFORE OR AFTER THE ABOVE REFERENCED PLANTING DATES WILL INCREASE THE LIKELIHOOD OF PLANT OR GRASS SEED ESTABLISHMENT FAILURE. ANY DEVIATION FROM THE ABOVE REFERENCED PLANTING DATES IS UNDERTAKEN AT SOLE RISK OF THE CONTRACTOR AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ANY ADDITIONAL MAINTENANCE AND WATERING WHICH MAY BE REQUIRED TO ENSURE SATISFACTORY PLANT AND SEED ESTABLISHMENT.
10. FURNISH ONE YEAR MANUFACTURER WARRANTY FOR TREES, PLANTS, AND GROUND COVER AGAINST DEFECTS INCLUDING DEATH AND UNSATISFACTORY GROWTH, EXCEPT FOR DEFECTS RESULTING FROM LACK OF ADEQUATE MAINTENANCE, NEGLECT, OR ABUSE BY OWNER, OR ABNORMAL WEATHER CONDITIONS UNUSUAL FOR WARRANTY PERIOD. THE DATE OF FINAL ACCEPTANCE OF ALL COMPLETED PLANTING WORK ESTABLISHES THE END OF INSTALLATION AND INITIAL MAINTENANCE PERIOD AND THE COMMENCEMENT OF THE GUARANTEE PERIOD.
11. INSPECT ALL AREAS TO BE PLANTED OR SEEDED PRIOR TO STARTING ANY LANDSCAPE WORK. REPORT ANY DEFECTS SUCH AS INCORRECT GRADING, INCORRECT SUBGRADE ELEVATIONS OR DRAINAGE PROBLEMS, ETC. TO THE LANDSCAPE ARCHITECT AND ENGINEER PRIOR TO BEGINNING WORK. COMMENCEMENT OF WORK INDICATES ACCEPTANCE OF SUBGRADE AREAS TO BE PLANTED, AND THE LANDSCAPE CONTRACTOR ASSUMES RESPONSIBILITY FOR ALL LANDSCAPE WORK.
12. PROVIDE PROPER PREPARATION OF ALL PROPOSED PLANTED AND SEEDED AREAS PER THE NOTES AND SPECIFICATIONS.
13. ALL PLANT LAYOUT AND ACTUAL PLANTING LOCATIONS ARE TO BE FIELD VERIFIED BY LANDSCAPE ARCHITECT PRIOR TO PLANTING. NOTIFY THE LANDSCAPE ARCHITECT AT A MINIMUM OF 48 HOURS IN ADVANCE PRIOR TO SCHEDULING ANY FIELD INSPECTIONS.
14. POTTED PLANTS: REMOVE THE PLANT FROM THE POT AND LOOSEN OR SCORE THE ROOTS BEFORE PLANTING TO PROMOTE OUTWARDS ROOT GROWTH INTO THE SOIL.
15. PLUGS: PLANT UPRIGHT AND NOT AT AN ANGLE. DIG PLANTING HOLES LARGE ENOUGH AND DEEP ENOUGH TO ACCOMMODATE THE ENTIRE ROOT MASS. PLANT PLUGS WITH NO TWISTED OR BALLED ROOTS AND WITH NO ROOTS EXPOSED ABOVE THE GRADE LINE. HAND PACK THE SOIL AROUND THE ENTIRE PLUG ROOT MASS.
16. REMOVE ALL PLANT TAGS AND FLAGS FROM THE PLANTS.

GENERAL SEEDING NOTES:

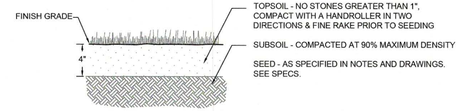
1. SEND A REPRESENTATIVE SAMPLE OF THE TOPSOIL TO A TESTING LABORATORY FOR STANDARD SOIL ANALYSIS AS DESCRIBED IN THE SPECIFICATIONS. SUBMIT TO THE LANDSCAPE ARCHITECT AND ENGINEER TEST RESULTS WITH RECOMMENDED SOIL TREATMENTS TO PROMOTE PLANT AND GRASS GROWTH. CORRECT DEFICIENCIES IN THE LOAM AND STOCKPILED TOPSOIL AS DIRECTED BY THE TESTING AGENCY.
2. ALL AREAS THAT ARE DISTURBED AND/OR GRADED DURING CONSTRUCTION ARE TO BE BROUGHT TO FINISHED GRADE WITH AT LEAST 4" MINIMUM DEPTH OF GOOD QUALITY LOAM AND SEEDED WITH A QUICK GERMINATING GRASS SEED AS SPECIFIED ON THE PLANS.
3. PRIOR TO THE PLACEMENT OF TOP SOIL, LOOSEN THE SUBGRADE OF ALL PROPOSED SEEDED AREAS TO A DEPTH OF 6" AND RAKE TO REMOVE STONES LARGER THAN 1 INCH, STICKS, ROOTS, RUBBISH AND OTHER EXTRANEOUS MATTER AND LEGALLY DISPOSE TO AN OFF SITE LOCATION.
4. DO NOT SPREAD TOPSOIL IF THE SUBGRADE IS FROZEN, EXCESSIVELY WET, COMPACTED OR NOT PROPERLY PREPARED PER THE NOTES AND SPECIFICATIONS.

WATERING NOTES:

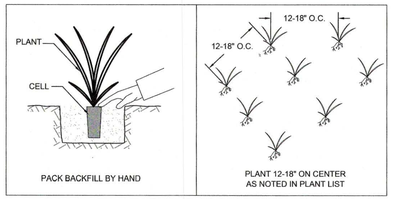
1. PROVIDE PROPER PLANT CARE, MAINTENANCE AND WATERING ON SITE UNTIL SUCH TIME AS THE LANDSCAPING IS ACCEPTED BY THE PROPERTY OWNER AS SATISFACTORY PER THE SPECIFICATIONS OR AS DETERMINED BY ANY WRITTEN AGREEMENTS BETWEEN THE CONTRACTOR AND PROPERTY OWNER.
2. ESTABLISH AN APPROPRIATE WATERING SCHEDULE FOR ALL PLANT MATERIAL BASED UPON PLANT SPECIES REQUIREMENTS AND PROVIDE IN WRITING TO THE LANDSCAPE ARCHITECT AND OWNER FOR REVIEW AND APPROVAL. ADHERE TO THE APPROVED SCHEDULE UNTIL PLANTS ARE FULLY ESTABLISHED.
3. SPECIAL CARE SHOULD BE TAKEN TO ENSURE THAT THE LAWN IS NOT SATURATED DURING WATERING. A TEMPORARY IRRIGATION SYSTEM OR HANDHELD GARDEN HOSE SHALL BE USED FOR WATERING SEEDED AREAS. THE AREA MUST BE MAINTAINED CONSISTENTLY MOIST FOR THE BEST GERMINATION RESULTS. ADDITIONAL WATERING WILL BE REQUIRED IF PLANTING AND SEEDING OCCUR OUTSIDE OF THE RECOMMENDED PLANTING SEASONS.

PLANTING LAYOUT NOTES

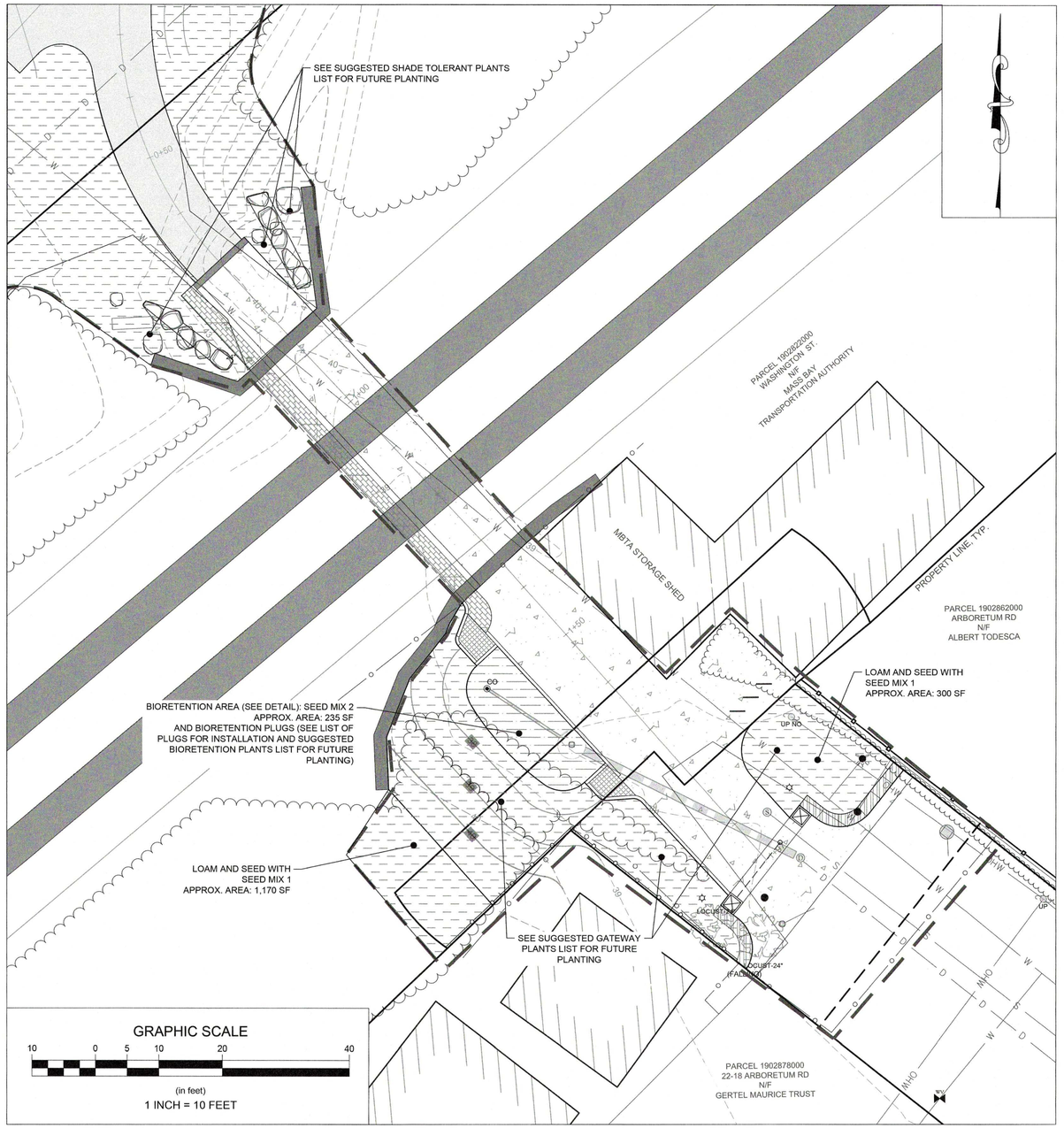
1. HATCHED AREAS - DO NOT PLANT LARGE AREAS OF THE SAME SPECIES. RANDOMLY PLANT AS INDICATED ON THE PLANTING PLANS INTO SMALL GROUPINGS OF THE SAME SPECIES TO CREATE A MORE NATURALISTIC APPEARANCE. PLANT THE SAME PLANT SPECIES IN GROUPS OF 3-7 AND NOT LARGER THAN 7, DEPENDING ON THE OVERALL NUMBER OF PLANTINGS.



LOAM AND SEED DETAIL
NOT TO SCALE



PLUG PLANTING DETAIL
NOT TO SCALE



TUNNEL GATEWAY DETAIL PLANTING

SEED MIXES:

SEED MIX 1: SOLAR FARM MIX FROM ERNST SEED
Festuca rubra
Festuca brevipila, 'Beacon'
Festuca brevipila, 'Harpoon'
Festuca rubra ssp. commutata
Poa pratensis, 'Volt'
Poa pratensis, 'Shamrock'
Trifolium repens, Dutch

SEED MIX 2: BIORETENTION, A MIX OF SEED MIX 1 AND:
Cover crop (See specifications for species)
Juncus tenuis
Deschampsia cespitosa

SEED MIX 3: SAND FILTER, A MIX OF SEED MIX 1 AND:
Cover crop (See specifications for species)
Schizachyrium scoparium

SPECIES OF PLUGS FOR INSTALLATION PRIOR TO SEEDING:

BIORETENTION AREA:
Carex appalachia
Deschampsia flexuosa
Juncus tenuis

SAND FILTER:
Schizachyrium scoparium

SUGGESTED PLANT LISTS FOR FUTURE PLANTING:

SHADE TOLERANT:
Aquilegia canadensis
Carex amphiloba
Carex pensylvanica
Deschampsia flexuosa
Dryopteris marginalis
Geranium maculatum

BIORETENTION AREA:
Carex amphiloba
Carex appalachia
Geranium maculatum
Iris versicolor
Juncus effusus
Penstemon digitalis
Schizachyrium scoparium

GATEWAY:
Symphyotrichum species
Carex amphiloba
Carex appalachia
Carex pensylvanica
Deschampsia cespitosa
Deschampsia flexuosa
Eragrostis spectabilis
Eupatorium species
Sporobolus heterolepis
Schizachyrium scoparium
Sisyrinchium angustifolium
Veronicastrum virginicum

Bulb: Erythronium americanum

SAND FILTER:
Schizachyrium scoparium
Symphyotrichum species

NOTES:
1. SEE SPECS FOR MORE INFORMATION ON SEED MIXES AND PLUGS.
2. SEE SITE PREP AND DEMO PLAN, AND INVASIVES SPECIES REMOVAL AND MANAGEMENT SPECIFICATIONS TO ENSURE THE SITE IS PROPERLY PREPARED PRIOR TO ADDING LOAM, PLANTS AND SEED.

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Sustainable Environmental Solutions
www.horsleywitten.com
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508-833-6600

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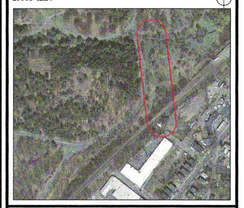
REVISION HISTORY:

Rev.	Date	By	Appr.	Description

USE DISCLAIMER:
PERMITTING ONLY
NOT FOR CONSTRUCTION

ARCHITECT'S STAMP:
COMMONWEALTH OF MASSACHUSETTS
REGISTERED LANDSCAPE ARCHITECT
5/21/19

LOCUS MAP:



PROJECT NAME:
ARBORETUM ROAD GREEN LINK ROSLINDALE, MASSACHUSETTS

DRAWING TITLE
LANDSCAPE DETAILS

DATE	MAY 2019
CAD FILE NAME	16073 LA.dwg
DRAWING SCALE	1"=10'
PROJECT NO.	16073B
DRAWING NUMBER	C - 14
AREA	X
SHEET NUMBER	14 OF 14