355 Bennington Street

East Boston, Massachusetts

Notice of Intent

November 24, 2021

submitted to
Boston Conservation Commission

submitted by **413-419 Bremen Street LLC**

prepared by **Fort Point Associates, Inc., A Tetra Tech Company**

in association with
Redgate
Goulston & Storrs
Arrowstreet
Copley Wolff Design Group
Petersen Engineering, Inc.
Howard Stein Hudson
Hancock Associates
McPhail Associates, LLC

Fort Point Associates, Inc.
Urban Planning Environmental Consulting Project Permitting
A TETRA TECH COMPANY

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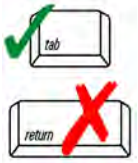
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

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

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
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):

355 Bennington Street — a. Street Address
East Boston — b. City/Town
02128 — c. Zip Code

Latitude and Longitude:
42° 22' 45" — d. Latitude
71° 1' 33" — e. Longitude

f. Assessors Map/Plat Number
0104196100 and 0104196010 — g. Parcel /Lot Number

2. Applicant:

Robert — a. First Name
Eichelroth — b. Last Name
413-419 Bremen Street LLC — c. Organization
20 Railroad Avenue — d. Street Address
Revere — e. City/Town
MA — f. State
02151 — g. Zip Code
508-243-9726 — h. Phone Number
i. Fax Number
reichelroth@gmail.com — j. Email Address

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

Joe — a. First Name
Ricupero — b. Last Name
413-419 Bremen Street LLC — c. Organization
1222 Bennington Street — d. Street Address
East Boston — e. City/Town
MA — f. State
02128 — g. Zip Code
617-569-1718 — h. Phone Number
i. Fax Number
joericupero@capitolws.com — j. Email address

4. Representative (if any):

Katie — a. First Name
Moniz — b. Last Name
Fort Point Associates, Inc. — c. Company
31 State Street, Floor 3 — d. Street Address
Boston — e. City/Town
MA — f. State
02109 — g. Zip Code
617-357-7044 x209 — h. Phone Number
i. Fax Number
kmoniz@fpa-inc.com — j. Email address

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

$2,562.50 — a. Total Fee Paid
$512.50 WPA Fee — b. State Fee Paid
$1,500 (Boston WPA Fee); $550 Wetlands Ordinance Fee)

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A. General Information (continued)

6. General Project Description:

The Project proposes to demolish existing structures on a 1.17-acre site and construct a 162,296 gross square foot (gsf) multi-family residential development with ground floor retail uses. The Project will create 10,300 sf of landscaped green space and will install a stormwater management system on a site that is currently covered by impervious area and void of stormwater infrastructure.

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 County	
c. Book	d. Page Number
51007	86

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

2. Width of Riverfront Area (check one):

   ☐ 25 ft. - Designated Densely Developed Areas only

   ☐ 100 ft. - New agricultural projects only

   ☐ 200 ft. - All other projects

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

4. Proposed alteration of the Riverfront Area:

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

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

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

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

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

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

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

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

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

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	11,300 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

   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 https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

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

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

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

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

(d) ☐ Vegetation cover type map of site

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

(f) OR Check One of the Following

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

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

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

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

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

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

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

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

North Shore - Hull to New Hampshire border:

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

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

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

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

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

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

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

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

   b. ACEC

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

   a. ☐ Yes ☒ No

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

   a. ☐ Yes ☒ No

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

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

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

      2. ☐ A portion of the site constitutes redevelopment

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

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

      1. ☐ Single-family house

      2. ☐ Emergency road repair

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

D. Additional Information

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

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

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

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

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

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D. Additional Information (cont'd)

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

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

See Attachment A: Supplemental Information, Section 1.8: NOI Plan List
a. Plan Title

b. Prepared By

c. Signed and Stamped by

d. Final Revision Date

e. Scale

f. Additional Plan or Document Title

g. Date

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

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

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

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

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

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

1002 2. Municipal Check Number	November 15, 2021 3. Check date
1001 4. State Check Number	November 15, 2021 5. Check date
New Urban Fund II LLC 6. Payor name on check: First Name	New Urban Fund II LLC 7. Payor name on check: Last Name

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F. Signatures and Submittal Requirements

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

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

Signature of Applicant (413-419 Bremen Street LLC)

11/16/21
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.

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Signature of Property Owner (413-419 Bremen Street LLC)

11/16/2024
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.

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Signature of Property Owner (Friends of Excel Academy Charter Schools)

November 17, 2022
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:
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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.

Katie T. Moniz

Signature of Representative (Katie Moniz, Fort Point Associates, Inc.)

November 17, 2021

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.

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Other:
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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.

Additional Ownership

Friends of Excel Academy Charter Schools, Inc.
58 Moore Street
East Boston, MA 02128

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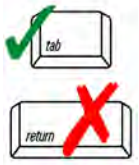


A. Applicant Information

1. Location of Project:

355 Bennington Street	East Boston
a. Street Address	b. City/Town
c. Check number	$512.50 (State WPA), $1,500 (Boston WPA), $550 (Boston Wetlands Ordinance)

2. Applicant Mailing Address:

Robert		Eichelroth
a. First Name		b. Last Name
413-419 Bremen Street LLC		
c. Organization		
20 Railroad Avenue		
d. Mailing Address		
Revere	MA	02151
e. City/Town	f. State	g. Zip Code
508-243-9726		reichelroth@gmail.com
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

Joe		Ricupero
a. First Name		b. Last Name
413-419 Bremen Street LLC		
c. Organization		
1222 Bennington Street		
d. Mailing Address		
East Boston	MA	02128
e. City/Town	f. State	g. Zip Code
617-569-1718		joericupero@capitolws.com
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
Category 3b: Building (for development) including site	1	$1,050	$1,050

Step 5/Total Project Fee:

Step 6/Fee Payments:

Total Project Fee:	$1,050 a. Total Fee from Step 5
State share of filing Fee:	$512.50 b. 1/2 Total Fee **less $**12.50
City/Town share of filling Fee:	$1,500 (Boston WPA), $550(Boston Wetlands)

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.)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wetlands & Waterways

BRP WPA Form 3 - Notice of Intent Instructions and Supporting Materials

Category Activities and Fees

Category 1 (Fee for each activity is **$110**):
a.) work on single family lot; addition, pool, etc.;
b.) site work without a house;
c.) control vegetation;
d.) resource improvement;
e.) work on septic system separate from house;
f.) monitoring well activities minus roadway;
g.) new agricultural or aquaculture projects.

Category 2 (Fee for each activity is **$500**)
a.) construction of single family house;
b.) parking lot;
c.) beach nourishment;
d.) coastal limited projects;
e.) inland limited projects minus road crossings and agriculture;
f.) each crossing for driveway to single family house;
g.) each project source (storm drain) discharge;
h.) control vegetation in development;
i.) water level variations;
j.) any other activity not in Category 1, 3, 4, 5 or 6;
k.) water supply exploration.

Category 3 (Fee for each activity is **$1,050**)
a.) site preparation (for development) beyond Notice of Intent scope;
b.) each building (for development) including site;
c.) road construction not crossing or driveway;
d.) hazardous cleanup;
e.) water supply development.

Category 4 (Fee for each activity is **$1,450**):
a.) each crossing for development or commercial road;
b.) dam, sluiceway, tidegate (safety) work;
c.) landfills operation/closures;
d.) sand and gravel operations;
e.) railroad line construction;
f.) bridge;
g.) hazardous waste alterations to resource areas;
h.) dredging;
i.) package treatment plant and discharge;
j.) airport tree clearing;
k.) oil and/or hazardous material release response actions.

Category 5 (Fee is **$4 per linear foot**; total fee not less than $100 or more than $2,000):
a.) work on docks, piers, revetments, dikes, etc. (coastal or inland).

Category 6 (Fee is **$2 per linear foot for each resource area): For each resource area delineation, the fee shall not** exceed $200 for activities associated with a single family house or $2,000 for all other activities).

Boston Application Form

City of Boston Environment

NOTICE OF INTENT APPLICATION FORM
Boston Wetlands Ordinance
City of Boston Code, Ordinances, Chapter 7-1.4

Boston File Number

MassDEP File Number

A. GENERAL INFORMATION

1. Project Location

a. Street Address	b. City/Town	c. Zip Code
355 Bennington Street	East Boston	02128

f. Assessors Map/Plat Number	g. Parcel /Lot Number
	0104196100 and 0104196010

2. Applicant

a. First Name	b. Last Name	c. Company
Robert	Eichelroth	413-419 Bremen Street LLC

d. Mailing Address: 20 Railroad Avenue

e. City/Town	f. State	g. Zip Code
Revere	MA	02151

h. Phone Number	i. Fax Number	j. Email address
508-243-9726		reichelroth@gmail.com

3. Property Owner

a. First Name	b. Last Name	c. Company
Joe	Ricupero	413-419 Bremen Street LLC

d. Mailing Address: 1222 Bennington Street

e. City/Town	f. State	g. Zip Code
East Boston	MA	02128

h. Phone Number	i. Fax Number	j. Email address
617-569-1718		joericupero@capitolws.com

☒ Check if more than one owner

(If there is more than one property owner, please attach a list of these property owners to this form.)

4. Representative (if any)

a. First Name	b. Last Name	c. Company
Katie	Moniz	Fort Point Associates, Inc.

d. Mailing Address: 31 State Street, Floor 3

e. City/Town	f. State	g. Zip Code
Boston	MA	02109

h. Phone Number	i. Fax Number	j. Email address
617-357-7044 x209		kmoniz@fpa-inc.com

5. Is any portion of the proposed project jurisdictional under the Massachusetts Wetlands Protection Act M.G.L. c. 131 §40?

☒ Yes ☐ No

If yes, please file the WPA Form 3 - Notice of Intent with this form

6. General Information

The Project proposes to demolish existing structures on a 1.17-acre site and construct a 162,296 gross square foot (gsf) multi-family residential development with ground floor retail uses. The Project will create 10,300 sf of landscaped green space and will install a stormwater management system on a site that is currently covered by impervious area and void of stormwater infrastructure.

7. Project Type Checklist

a. ☐ Single Family Home
b. ☐ Residential Subdivision
c. ☐ Limited Project Driveway Crossing
d. ☐ Commercial/Industrial
e. ☐ Dock/Pier
f. ☐ Utilities
g. ☐ Coastal Engineering Structure
h. ☐ Agriculture – cranberries, forestry
i. ☐ Transportation
j. ☒ Other

8. Property recorded at the Registry of Deeds

Suffolk County	86
a. County	b. Page Number
51007	
c. Book	d. Certificate # (if registered land)

9. Total Fee Paid

$2,562.50	$512.50 WPA Fee	$1,500 WPA Fee; $550 Wetlands Ordinance Fee
a. Total Fee Paid	b. State Fee Paid	c. City Fee Paid

B. BUFFER ZONE & RESOURCE AREA IMPACTS

Buffer Zone Only - Is the project located only in the Buffer Zone of a resource area protected by the Boston Wetlands Ordinance?

☐ Yes ☒ No

1. Coastal Resource Areas

Resource Area	**Resource Area Size**	**Proposed Alteration***	**Proposed Migitation**
❑ *Coastal Flood Resilience Zone*	*Square feet*	*Square feet*	*Square feet*
❑ *25-foot Waterfront Area*	*Square feet*	*Square feet*	*Square feet*
❑ *100-foot Salt Marsh Area*	*Square feet*	*Square feet*	*Square feet*
❑ *Riverfront Area*	*Square feet*	*Square feet*	*Square feet*

2. Inland Resource Areas

Resource Area	**Resource Area Size**	**Proposed Alteration***	**Proposed Migitation**
❑ *Inland Flood Resilience Zone*	*Square feet*	*Square feet*	*Square feet*
❑ *Isolated Wetlands*	*Square feet*	*Square feet*	*Square feet*
❑ *Vernal Pool*	*Square feet*	*Square feet*	*Square feet*
❑ *Vernal Pool Habitat (vernal pool + 100 ft. upland area)*	*Square feet*	*Square feet*	*Square feet*
❑ *25-foot Waterfront Area*	*Square feet*	*Square feet*	*Square feet*
❑ *Riverfront Area*	*Square feet*	*Square feet*	*Square feet*

C. OTHER APPLICABLE STANDARDS & REQUIREMENTS

1. What other permits, variances, or approvals are required for the proposed activity described herein and what is the status of such permits, variances, or approvals?

See following insert page

Review Entity	Approval/Permit	Status
Local		
Boston Planning & Development Agency	• Article 80B Large Project Review • Article 80C Planned Development Area Development Plan	• Ongoing • Pending Article 80B
Boston Civic Design Commission	• Design Review Recommendation	• Final vote anticipated 12/2021
Boston Zoning Commission	• Planned Development Area Development Plan	• Pending Article 80B
Boston Transportation Department	• Transportation Access Plan Agreement • Construction Management Plan	• Pending Article 80B • Pending Article 80B
Boston Water and Sewer Commission	• Site Plan Approval • Water and Sewer Connection Permits	• Submission 10/29/2021 • Pre-submission
Boston Public Improvement Commission	• Specific Repairs	• Pending Article 80B
Inspectional Services Department	• Demolition Permit • Building Permit • Certificate of Occupancy	• Pending Article 80B • Pending Article 80B • Pending Article 80B
State		
Massachusetts Department of Environmental Protection	• Notification Prior to Construction or Demolition	• Prior to construction
Federal		
Environmental Protection Agency	• National Pollutant Discharge Elimination System Permit	• Prior to construction
Federal Aviation Administration	• Notice of Construction – Building & Crane	• Massport pre-submission review complete

2. 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 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://www.mass.gov/dfwele/dfw/nhesp/nhregmap.htm.

❑ Yes ☒ No

If *yes*, the project is subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18).

A. Submit Supplemental Information for Endangered Species Review

☐ Percentage/acreage of property to be altered:

(1) within wetland Resource Area _____ percentage/acreage

(2) outside Resource Area _____ percentage/acreage

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

3. Is any portion of the proposed project within an Area of Critical Environmental Concern?

❑ Yes ☒ No

If yes, provide the name of the ACEC: _____

4. Is the proposed project subject to provisions of the Massachusetts Stormwater Management Standards?

☒ *Yes. Attach a copy of the Stormwater Checklist & Stormwater Report as required.*
- ❑ *Applying for a Low Impact Development (LID) site design credits*
- ❑ *A portion of the site constitutes redevelopment*
- ☒ *Proprietary BMPs are included in the Stormwater Management System*

❑ *No. Check below & include a narrative as to why the project is exempt*
- ❑ *Single-family house*
- ❑ *Emergency road repair*
- ❑ *Small Residential Subdivision (less than or equal to 4 single family houses or less than or equal to 4 units in a multifamily housing projects) with no discharge to Critical Areas*

5. Is the proposed project subject to Boston Water and Sewer Commission Review?

☒ Yes ❑ No

4. Is the proposed project subject to provisions of the Massachusetts Stormwater Management Standards?

   - ■ *Yes. Attach a copy of the Stormwater Checklist & Stormwater Report as required.*
     - ❑ *Applying for a Low Impact Development (LID) site design credits*
     - ■ *A portion of the site constitutes redevelopment*
     - ❑ *Proprietary BMPs are included in the Stormwater Management System*
   - ❑ *No. Check below & include a narrative as to why the project is exempt*
     - ❑ *Single-family house*
     - ❑ *Emergency road repair*
     - ❑ *Small Residential Subdivision (less than or equal to 4 single family houses or less than or equal to 4 units in a multifamily housing projects) with no discharge to Critical Areas*

5. Is the proposed project subject to Boston Water and Sewer Commission Review?

   ■ Yes ❑ No

D. 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 Protection Ordinance.

Signature of Applicant (413-419 Bremen Street LLC)

11/16/21
Date

4. Is the proposed project subject to provisions of the Massachusetts Stormwater Management Standards?

   - ■ *Yes. Attach a copy of the Stormwater Checklist & Stormwater Report as required.*
     - ❑ *Applying for a Low Impact Development (LID) site design credits*
     - ■ *A portion of the site constitutes redevelopment*
     - ❑ *Proprietary BMPs are included in the Stormwater Management System*
   - ❑ *No. Check below & include a narrative as to why the project is exempt*
     - ❑ *Single-family house*
     - ❑ *Emergency road repair*
     - ❑ *Small Residential Subdivision (less than or equal to 4 single family houses or less than or equal to 4 units in a multifamily housing projects) with no discharge to Critical Areas*

5. Is the proposed project subject to Boston Water and Sewer Commission Review?

   ■ Yes ❑ No

D. 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 Protection Ordinance.

Signature of Property Owner (413-419 Bremen Street LLC)

11/16/2024
Date

4. Is the proposed project subject to provisions of the Massachusetts Stormwater Management Standards?

   ☒ *Yes. Attach a copy of the Stormwater Checklist & Stormwater Report as required.*
   - ❑ *Applying for a Low Impact Development (LID) site design credits*
   - ☒ *A portion of the site constitutes redevelopment*
   - ❑ *Proprietary BMPs are included in the Stormwater Management System*

   ❑ *No. Check below & include a narrative as to why the project is exempt*
   - ❑ *Single-family house*
   - ❑ *Emergency road repair*
   - ❑ *Small Residential Subdivision (less than or equal to 4 single family houses or less than or equal to 4 units in a multifamily housing projects) with no discharge to Critical Areas*

5. Is the proposed project subject to Boston Water and Sewer Commission Review?

   ☒ Yes ❑ No

D. 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 Protection Ordinance.

Signature of Property Owner (Friends of Excel Academy Charter Schools)

November 17, 2022
Date

4. Is the proposed project subject to provisions of the Massachusetts Stormwater Management Standards?

   ☒ *Yes. Attach a copy of the Stormwater Checklist & Stormwater Report as required.*
   - ❑ *Applying for a Low Impact Development (LID) site design credits*
   - ☒ *A portion of the site constitutes redevelopment*
   - ❑ *Proprietary BMPs are included in the Stormwater Management System*

   ❑ *No. Check below & include a narrative as to why the project is exempt*
   - ❑ *Single-family house*
   - ❑ *Emergency road repair*
   - ❑ *Small Residential Subdivision (less than or equal to 4 single family houses or less than or equal to 4 units in a multifamily housing projects) with no discharge to Critical Areas*

5. Is the proposed project subject to Boston Water and Sewer Commission Review?

   ☒ Yes ❑ No

D. 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 Protection Ordinance.

Katie T. Moniz

Signature of Representative (Katie Moniz, Fort Point Associates, Inc.)

November 17, 2021

Date

Additional Ownership

Friends of Excel Academy Charter Schools, Inc.
58 Moore Street
East Boston, MA 02128

ATTACHMENT A

SUPPLEMENTAL INFORMATION

ATTACHMENT A: SUPPLEMENTAL INFORMATION

1.1 OVERVIEW

413-419 Bremen Street LLC (the "Applicant") is proposing the redevelopment of 355 Bennington Street in East Boston (the "Project Site"). The Applicant proposes to demolish the existing structure(s) and construct an approximately 162,296-square-foot (sf) multi-family residential development with ground-floor retail use (the "Project"). The Applicant is submitting a Notice of Intent (NOI) to the City of Boston Conservation Commission for work within the Land Subject to Coastal Storm Flowage (LSCSF) wetland resource area, which is protected under the Massachusetts Wetlands Protection Act (WPA). Property abutters have been notified per the WPA Regulations (see Attachment B: Notification).

1.2 EXISTING CONDITIONS

The Project Site is composed of one parcel totaling approximately 50,807 square feet (sf), or 1.17 acres, on the eastern edge of East Boston's Day Square. Fronting on Bennington Street, it is bordered by the intersection of Bennington and Bremen Streets to the west, the Martin A. Coughlin Bypass Road (EB Bypass Road) to the south and east, and the Excel Academy Charter School at 401 Bremen Street to the south. See Figure 1: Locus Map and Figure 2: Aerial View of the Project Site.

The unique Project Site slopes considerably between its frontage on Bremen and Bennington Streets and the back side of the lot on the EB Bypass Road. Existing grades range from a low point of 11.84 Boston City Base (BCB) (5.38 NAVD88) in the parcel's southern corner to 29.49 BCB (23.03 NAVD88) in the northeastern tip within the Massport easement. See Figure 3: Existing Conditions Survey. The lowest portions of the Project Site, along its southeastern edge, are located within the Federal Emergency Management Agency (FEMA) Flood Zone AE, Elevation (El.) 10 NAVD88 (16.5 BCB), as reflected in the current version of the FEMA Federal Insurance Rate Map (FIRM) Community Panel 25025C0082J (effective March 16, 2016). See Figure 4: FEMA Flood Insurance Rate Map.

The adjacent Day Square neighborhood surrounds the intersection of Chelsea Street and Bremen Street and is characterized by a mix of commercial and residential uses. Two local East Boston restaurant favorites, Spinelli's Banquet Hall and Pasta & Pastry Shop and Jeveli's, bookend the neighborhood on the west and east.

To the east of the Project Site, beyond the Massachusetts Turnpike I-90 right-of-way, are Massachusetts Port Authority (Massport) land holdings that support Boston Logan International Airport. Airport-related uses nearest the Project Site include airport food service vendors, jet fuel storage, and airport parking areas, as well as the barracks of

Massachusetts State Police Troop F. The Mary Ellen Welch (East Boston) Greenway and the highway separate the Project Site from these uses.

The Project Site is presently occupied by surface-level parking and vacant, boarded one-story structure(s) previously used for office space(s), warehousing with more than half a dozen loading docks/doors, auto repair garage space, and other commercial uses. Temporary uses currently dominate the property, including a construction staging area and construction vehicle parking area to support area projects. An access easement on the adjacent property at 401 Bremen Street extends approximately 25 feet off the southern edge of the Project Site and is used by the Excel Academy Charter High School for parking for key staff members. See Figures 5-8: Existing Conditions Photographs.

There is no evidence (record drawings and site observations) of an existing stormwater management system or drain connection to the Boston Water and Sewer Commission (BWSC) system for the Project Site. Runoff from the front portions of the site sheet flows into Bennington Street and Bremen Street. Runoff from the south side of the site and from the building's gutter downspouts flows overland to the gravel area at the rear of the building.

1.3 PROJECT DESCRIPTION

The Project proposes to redevelop the underutilized lot into approximately 162,296 square feet of gross floor area of transit-oriented residential development, creating 170 new rental housing units, 6,985 gsf of retail space, 81 structured parking spaces, and significant improvements to the public realm. See Figure 9: Project Site Plan. The Project will demolish the existing surface parking area and one-story structure(s) on the Project Site.

The Project has been carefully designed to provide a more appropriate buffer between Day Square, Excel Academy Charter High School, and the existing elevated roadway infrastructure and industrial properties to the east. Ground floor uses include a mix of residential units, lobby space, amenities, and retail.

Approximately 30% of the Project Site will consist of open space (including an elevated residential courtyard), with 20% of the Project Site available for public use. The existing access easement area will also be improved to include a pedestrian and bicycle connection from the Day Square neighborhood to the Mary Ellen Welch (East Boston) Greenway and nearby Bremen Street park.

The building massing takes advantage of the grade change of the site, which is higher in elevation along Bremen and Bennington Streets and lower in elevation along the Mary Ellen Welch Greenway, to provide approximately 81 parking spaces in an enclosed garage on the lower level, which is accessed through an improved easement space adjacent to Excel Academy Charter High School. The entry into the parking garage is located at approximately 18.0’ BCB (Elevation 11.6 NAVD88), and the parking garage level is

located at or above 9.5' BCB (Elevation 3.0 NAVD88). See Figures 10-14 for Project sections and elevations.

The Project will incorporate multiple green building measures and will be Leadership in Energy and Environmental Design (LEED) certifiable as required by Article 37 of the City of Boston Zoning Code. The Applicant is exploring opportunities to make the Project LEED Gold certifiable.

As previously noted, there is no evidence of an existing stormwater management system or drain connection to the BWSC system. The Project incorporates on-site stormwater collection, treatment, and infiltration systems to the maximum extent practicable in compliance with BWSC stormwater management requirements, Boston Planning and Development Agency's (BPDA's) Smart Utilities Policy, and Massachusetts Department of Environmental Protection's (MassDEP's) Stormwater Management Regulations. The proposed stormwater management systems will improve water quality and reduce runoff from the site compared with current uncontrolled/unmitigated conditions. In addition, street trees and permeable paver strips are proposed along the Project frontages of Bennington and Bremen Streets providing additional off-site public realm stormwater management improvements.

1.4 WETLAND RESOURCES

Based on the definitions provided in the WPA (310 CMR 10.21 through 10.37) Land Subject to Coastal Storm Flowage (LSCSF) is the only wetland resource area present within the Project Site. In addition, the Project Site is more than 100 feet from any wetland resource area to have a buffer zone.

1.4.1 LAND SUBJECT TO COASTAL STORM FLOWAGE

LSCSF is defined in 310 CMR 10.04 as:

Land subject to an inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record, or storm of record, whichever is greater.

The LSCSF resource area was determined based on 100-year flood information provided by the FEMA FIRM (Panel 25025C0019J, effective March 16, 2016) and measured based on actual elevation. Approximately 11,300 sf of the Project Site is within the FEMA 100-year flood elevation, which is 16.5 feet BCB (10.0 NAVD88) for the Project Site.

1.5 COMPLIANCE WITH PERFORMANCE AND STORMWATER MANAGEMENT STANDARDS

The Wetland Regulations at 310 CMR 10.00 do not include performance standards for LSCSF. The City of Boston is currently developing regulations and performance standards for LSCSF. This section addresses how the Project complies with the currently drafted regulations for LSCSF. In addition, resiliency measures and stormwater management are reviewed to contribute to the interests in storm damage prevention and prevention of pollution functions.

1.5.1 BOSTON DRAFT PERFORMANCE STANDARDS FOR LSCSF

The draft provisions and associated performance standards specifically being drafted for redevelopment projects is as follows (as issued May 2021):

Redevelopment Within Previously Developed LSCSF

1. For purposes of this section, Redevelopment shall mean work or activity that constitutes previously developed or degraded areas prior to December 19, 2019.

2. Notwithstanding the provisions of Section XVII(E), the Commission may permit work or activity that constitutes a Redevelopment, provided that the work or activity shall conform to the following criteria:

i. At a minimum, proposed work or activity shall result in an improvement over existing conditions of the capacity of LSCSF to protect the interests described in Section XVII(A) and/or adaptations to or mitigation against the impacts of SLR on the project and the area of the proposed work or activity;

ii. Stormwater management is provided according to the performance standards established in 310 Code Mass. Regs.10.05(6)(k), including such performance standards as are applicable to proposed Redevelopment.

iii. The proposed work or activity shall not inhibit any planned flood resilience, adaptation, or mitigation solutions and shall not inhibit the ability to enact such solutions in a timely and practical manner as referenced by Climate Ready Boston or any successor initiative of the City.

Although the Project is not subject to these draft provisions and associated performance standards, the Applicant has been proactive in participating in the public process for development of these regulations and has incorporated the intent into the Project's design.

The Project will comply with the draft provisions pertaining to LSCSF. The existing site is highly degraded from previous commercial and industrial use and is completed covered by impervious surface. The Proposed Project will significantly improve these conditions by increasing the capacity of the Site to adapt to extreme flooding and storm surge events. The Project will result in approximately 10,300 sf of open space, comprising 35% of the Project Site. A total of 41 new canopy trees will line the Bennington/Bremen Street sidewalk frontage and the Excel Academy easement leading to the Mary Ellen Welch Greenway. These green infrastructure improvements will help to mitigate flood events that may impact the Site while reducing the urban heat island effect. In addition to the proposed green stormwater infrastructure, the Project will incorporate permeable pavers, deep sump catch basins, hooded outlet pipes, and subsurface infiltration systems. The Project will meet MassDEP Stormwater Management Standards, as discussed in the following section. The Proponent continues to be in direct communication and collaboration with Climate Ready East Boston to complement their neighborhood-scale flood resilience interventions through sustainable and resilient design of the Project Site.

1.5.2 MASSDEP STORMWATER MANAGEMENT STANDARDS

The Project will comply with the MassDEP Stormwater Management Standards (the "Standards") to the maximum extent practicable. See Attachment C, Stormwater Report, for full description of the Project's compliance with the Standards.

1.6 CLIMATE RESILIENCY

The Project advances the goals of climate resiliency and environmental justice by complying with the City of Boston's Article 37 Green Buildings zoning code requirements and the City's Climate Resiliency Policy. The Proponent is currently targeting LEED v4.1 Multifamily rating system at the Gold level.

Several low-impact green design strategies will reduce the urban heat island effect and mitigate stormwater runoff on a site that is currently void of green space and stormwater infrastructure. The Project will create approximately 10,300 sf of landscaped green space, plant 41 new street trees and understory shrubbery, and install permeable paver strips along the sidewalks. All of the street tree locations will integrate details to ensure the urban trees are able to grow and provide the intended shade and air filtration within the public realm as well as capturing surface water run-off. These green infrastructure components will support the infiltration capacity of deep sump catch basins, hooded outlet pipes, and

subsurface infiltration systems. The stormwater system is designed to capture and retain the first 1.25 inches of runoff over the site's post-development impervious site area before being discharged to the closed drainage system. This represents a significant improvement from the existing uncontrolled stormwater runoff from the Site and responds to expected future increases in the frequency and intensity of precipitation events.

The urban heat island effect will also be addressed through the combined use of roof and non-roof reflective surface materials. The paving and roofing materials will be selected to provide initial solar reflectance values of 0.33 and 82, respectively. In addition to the landscaped components of the Proposed Project, these hardscape elements will further reduce the harmful effects of heat waves and will contribute to a more energy efficient building system.

The building's energy system contributes to the Project's environmentally resilient performance standards. Highly efficient utilities will significantly reduce the Project's energy use and consumption. All energy systems will be designed to reduce energy consumption, including low-flow water fixtures and energy-efficient appliances in all residential units and in non-residential spaces. Furthermore, at least 75% of the Project's landscaped vegetation will be able to withstand prolonged periods of drought, requiring little to no irrigation.

The Proponent is assessing the potential to build a Zero Net Carbon (ZNC) building through the purchase of renewable energy credits in the short term and securing energy through a 100% renewable grid in the future. The building will be serviced by all-electric utilities, which are far more efficient and safer than natural gas systems. The use of air source heat pump heating and cooling systems are aligned with the all-electric building systems. The result of the Project's energy-efficient, all-electric building design is an 18% improvement in reduction in greenhouse gas (GHG) emissions compared to the ASHRAE baseline.

The Project responds to an increased risk of precipitation, flooding, and storm surges with raised first floor elevations and resilient design measures. The Project will consider the effects of sea level rise in the design of the building and its mechanical systems. The Sea Level Rise – Base Flood Elevation (SLR-BFE) is Elevation 19.5 BCB (Elevation 13 NAVD88). The proposed building has been designed with First Floor Elevations (FFEs) of El. 15 NAVD88 for the residential portion and El. 14 NAVD88 for the retail portion, which comply with the BPDA's Sea Level Rise – Design Flood Elevation (SLR-DFE) policy.

Additionally, the Proponent has elevated all entrance/egress points to the building above the FIRM Zone AE Elevation (El.) 10 NAVD88 (16.5 BCB) plus the maximum additional freeboard (between one to two feet of freeboard from west to east along the access easement) while maintaining a connection to the public realm. Two of these entrance/egress points along the access easement provide connection the elevated main level of the building only and will be constructed of flood resilient materials to the maximum extent feasible.

The entry into the parking garage is located at approximately 18.0' BCB (Elevation 11.6 NAVD88), and the parking garage level is located at or above 9.5' BCB (Elevation 3.0 NAVD88). The parking level is a built-in condition that responds to the site topography, which is higher in elevation along Bremen and Bennington Streets and lower in elevation along the Mary Ellen Welch Greenway. The Proponent anticipates incorporating engineered flood vents into the design of the parking level per National Flood Insurance Program (NFIP) standards.

As previously noted, the Proponent continues to be in direct communication and collaboration with Climate Ready East Boston to complement their neighborhood-scale flood resilience interventions through sustainable and resilient design of the Project Site.

1.7 CONSTRUCTION MEANS AND METHODS

The contractor, once selected, will determine the means and methods of construction. Their approach to means and methods and bids is often influenced by permits and the Order of Conditions. The important construction phase information for the Commission is included in the Stormwater Management Plan in terms of site containment with erosion controls for protection of off-site resource areas. The contractor will follow SWPPP procedures, and any additional requirements detailed in the Order of Conditions.

Potential onsite construction equipment include:

- Pile drivers
- Excavators
- Backhoes
- Graders
- Concrete Pumps
- Mobile cranes and stationery 180-foot Lift Crane
- Lulls
- Bobcats

Construction set up is likely to include:

- Erosion control barriers will be installed/maintained on the entire site perimeter prior to commencement of construction activities.
- Entrances to the site will be stabilized with 2 1/2" + crushed stone. Each entrance will be equipped with means for wheel washing and a laborer to wash wheels as required.
- Inlet protection will be provided at all existing drainage grates within the site as well as outside of the immediate site perimeter.
- Use of both street sweepers and hand sweeping will be implemented daily around the site perimeter.
- A combination of both a water truck and hoses will be used for dust control during all phases of the project.
- The existing asphalt parking area will be maintained to the greatest extent possible to mitigate exposure time on subgrade below.

- After the demolition phase, construction of the new foundations and slab on grade will be completed in an expeditious manner to reduce exposure time for subgrade materials below.
- Sediment control measures (filtration system/frac tank) will be implemented for all required site dewatering activities.
- A spill containment kit will be stored at a central location on site during all heavy equipment activities.

Demolition of structure(s) may be accomplished through various methods, i.e., wrecking ball, heavy equipment, and handheld cutters and percussion instruments, depending upon what portion of the existing structures are being demolished. Demolition will remove and dispose:

- Asphalt pavement
- Bollard
- Concrete
- Propane Tank
- Trench Drain
- Concrete Ramp
- Catch Basin
- Gas Service and Meter
- Mulch
- Utility Pole
- Signage
- Dumpster and pad
- Sump pump
- Transformer and pad
- Sewer Manhole
- Concrete pads
- Brick
- Drainage Structure
- Jersey Barriers

Construction Materials will include fungibles such as fill, concrete, bituminous concrete, and raw steel and aluminum sheeting. Manufactured materials may include, PVC pipes and conduits, steel Quonset, granite curbing, catch basins, cast iron pipes, copper wire, and glazing.

Materials will be specified to identify 20 products with Environmental Product Declarations (EPDs) and 20 with Health Product Declarations (HPDs). In addition, recycled materials will be specified, with a Project goal of 20 percent recycled content with a focus on architectural, structural, and site components. The Project team is also planning on construction waste recycling including an 80 percent diversion goal and at least four diversion streams, which will be identified in a Construction Waste Management Plan. The preliminary assumed water fixtures (1.28 gpf toilet; 0.35 gpm lavs; 1.0 gpm sink; 0.125 gpf urinals; 1.0-gallon showers) will result in 40 percent water savings. Advanced water

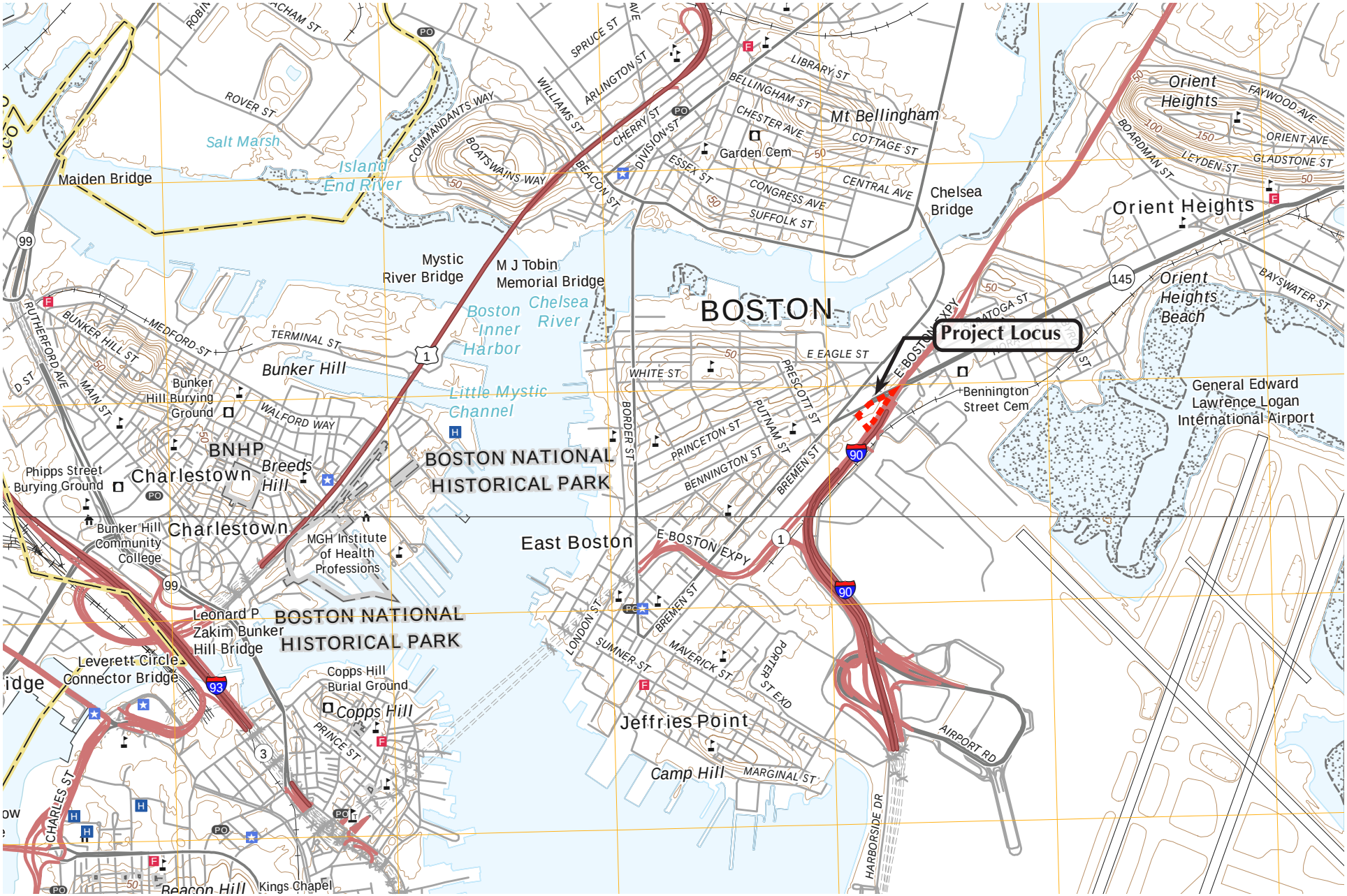
metering is also planned with domestic hot water, irrigation, and cooling tower water use planned for metering.

1.8 NOI PLAN LIST

Table 1: Plan List

Sheet Number	Plan Title	Prepared by	Date	Scale
C-0	Title Sheet	Hancock Associates	11/10/2021	N.T.S
V-1	Existing Conditions Plan of Land in East Boston, MA	Hancock Associates	12/11/2019	1”=20’
C-1	Site Preparation & Erosion Control Plan	Hancock Associates	11/10/2021	1”=20’
C-2	Layout & Materials Plan	Hancock Associates	11/10/2021	1”=20’
C-3	Site Utility Plan	Hancock Associates	11/10/2021	1”=20’
C-4	Grading & Drainage Plan	Hancock Associates	11/10/2021	1”=20’
C-5	Site Details	Hancock Associates	11/10/2021	Varies
C-6	Site Details	Hancock Associates	11/10/2021	Varies

FIGURES

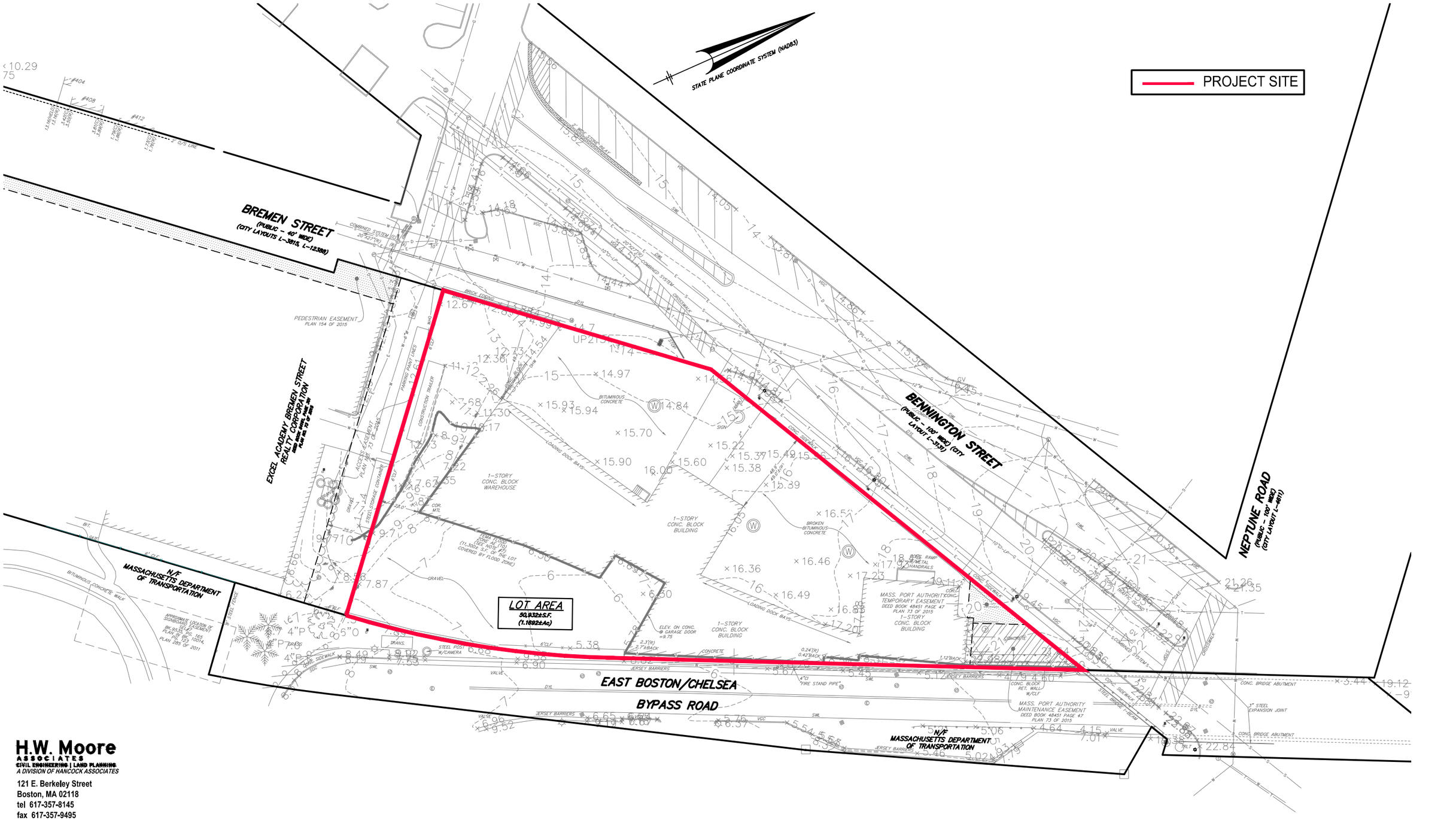


East Boston, Massachusetts

Figure 1
Locus Map
Source: USGS, 2018

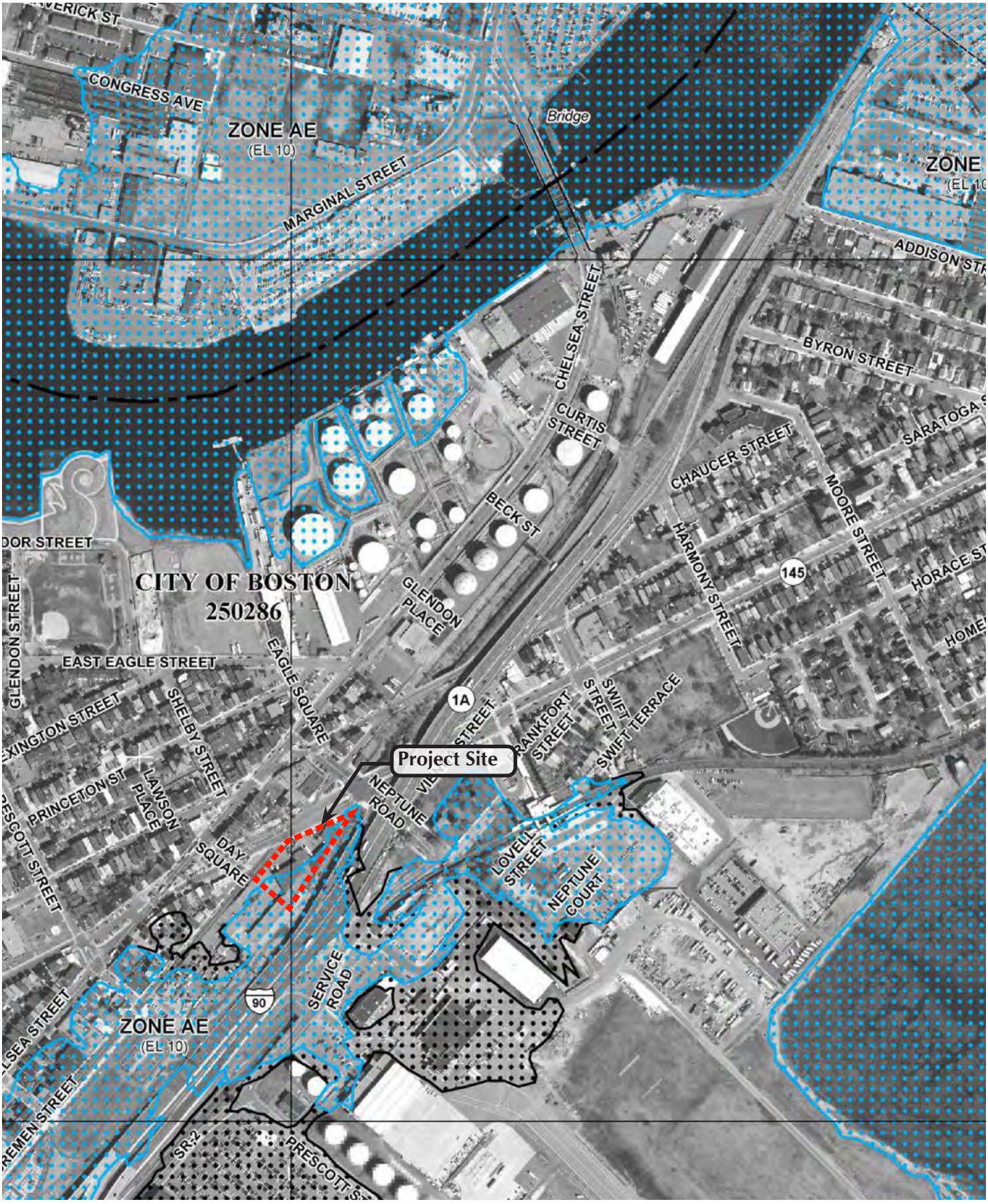
East Boston, Massachusetts

Figure 2
Aerial View of Project Site
Source: Google Maps, 2020



H.W. Moore
ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK ASSOCIATES
121 E. Berkeley Street
Boston, MA 02118
tel 617-357-8145
fax 617-357-9495

Figure 3
Existing Conditions Survey
Source: Hancock Associates, 2020



East Boston, Massachusetts

Figure 4
FEMA Flood Insurance Rate Map
Source: FEMA, 2016

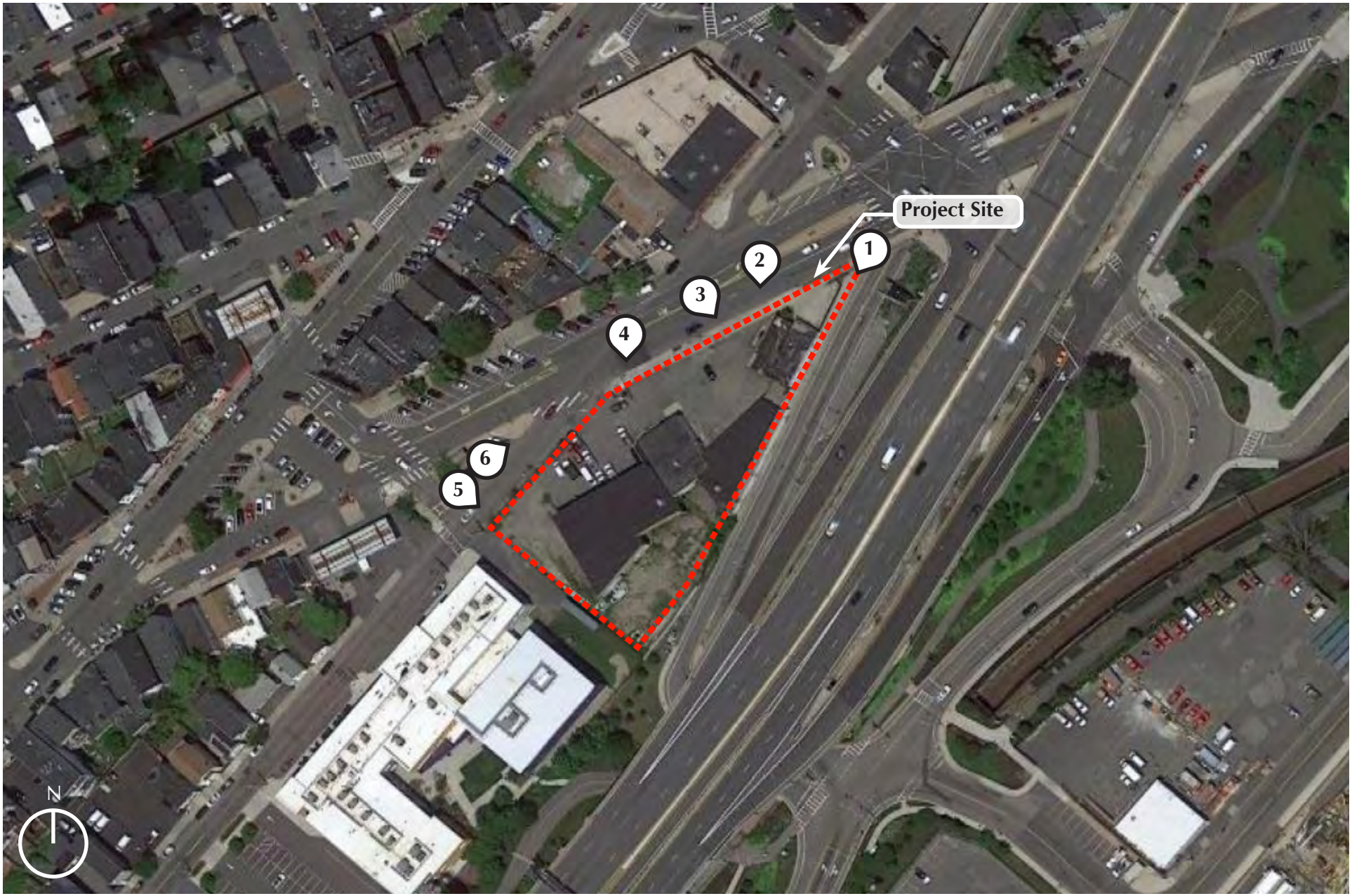
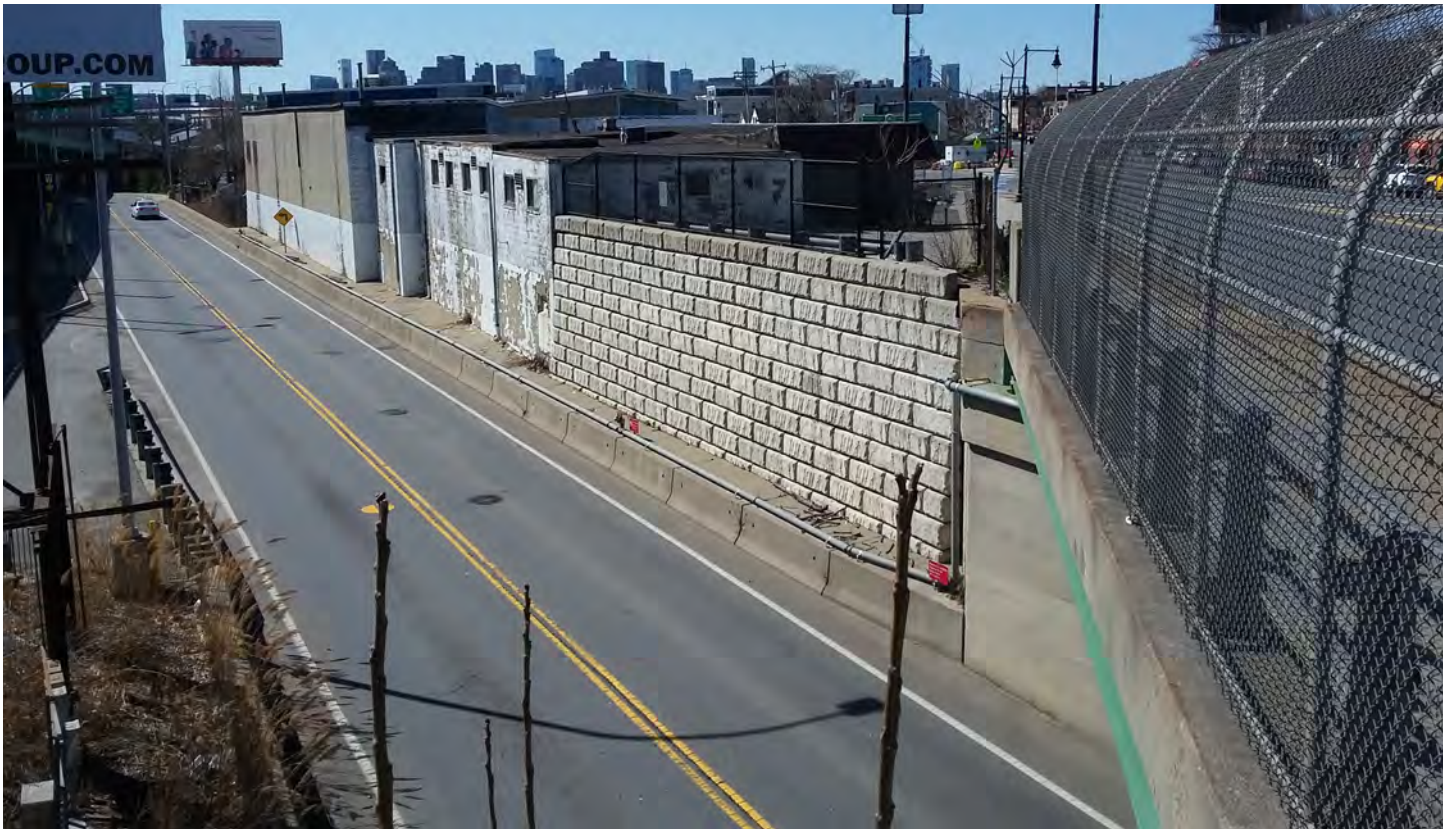


Figure 5
Existing Conditions Photographs Key
Source: Google Maps, 2020



Existing Photograph 1: Looking Southeast along Eastern Edge of Project Site

Existing Photograph 2: Looking South toward Project Site across Bennington Street

Figure 6
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2020

Existing Photograph 3: Looking Southeast toward Project Site across Bennington Street

Existing Photograph 4: Looking South toward Project Site across Bennington Street

Figure 7
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2020

Existing Photograph 5: Looking Southeast along Southern Edge of Project Site

Existing Photograph 6: Looking Northeast along Western Edge of Project Site

Figure 8
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2020

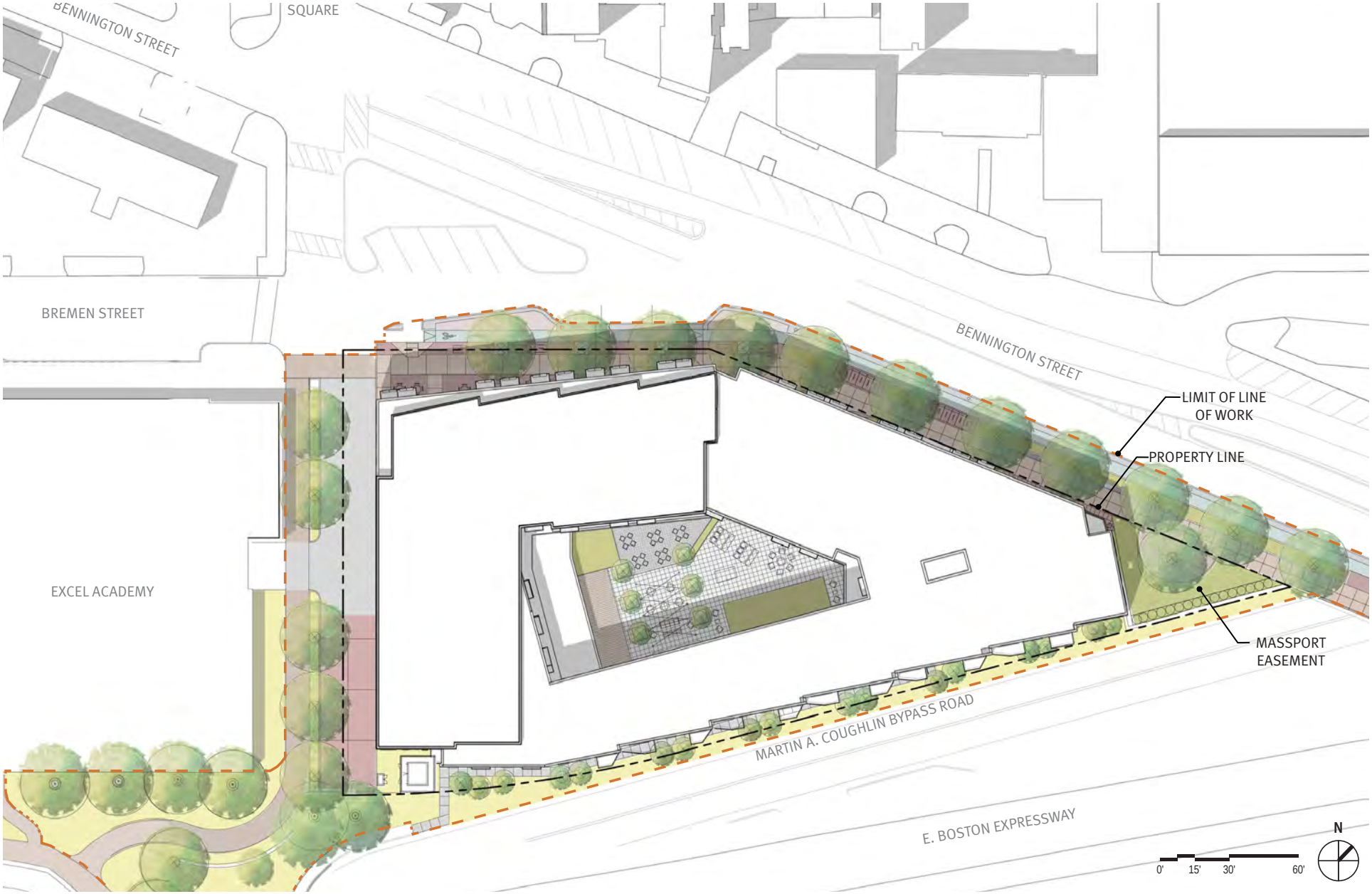


Figure 9
Project Site Plan
Source: Arrowstreet, 2021

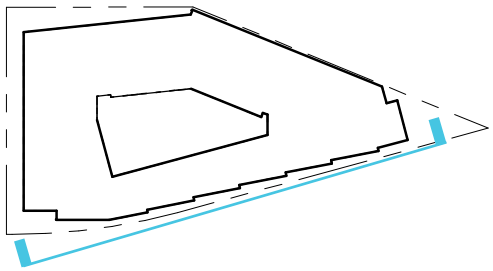


Figure 10
South Elevation
Source: Arrowstreet, 2021

Figure 11
North/West Building Section
Source: Arrowstreet, 2021

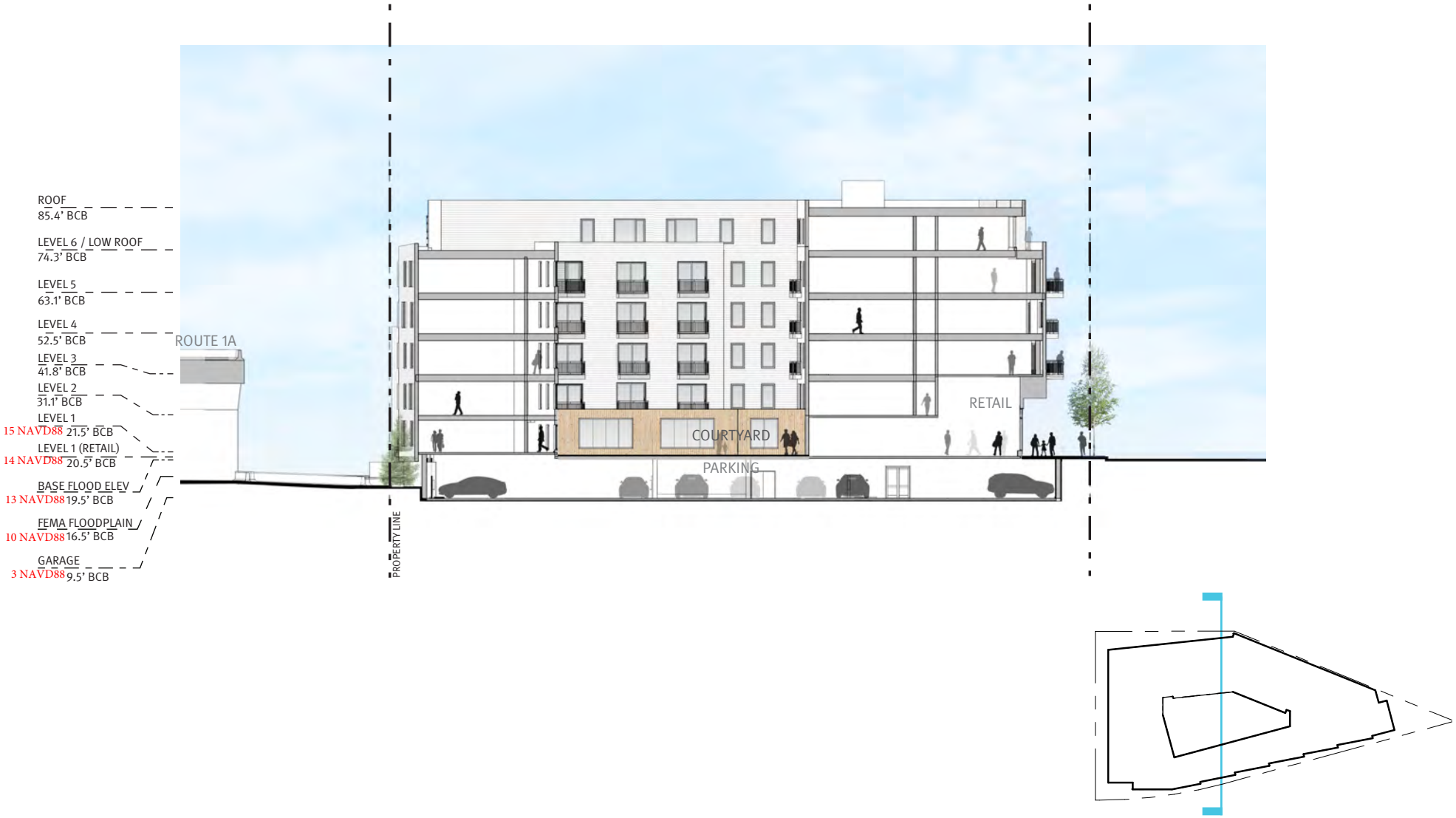


Figure 12
North/South Building Section
Source: Arrowstreet, 2021

Figure 13
Northwest and Northeast Elevations
Source: Arrowstreet, 2021

Figure 14
West Elevation
Source: Arrowstreet, 2021

ATTACHMENT B

NOTIFICATIONS

ATTACHMENT B – NOTIFICATIONS

The following table lists abutters of the Project within 300 feet of the property line, as gathered from the City of Boston Assessing Department.

Parcel Number	Property Address	Owner	Owner's Mailing Address
100508000	Bennington Street, East Boston, MA 02128	Bernard S Costello Jr	15 Broad, Boston, MA 02109
100476000	411 Chelsea Street, East Boston, MA 02128	Hugo J Arango	c/o Hugo Arango, 411 Chelsea Street, East Boston, MA 02128
100352000	Neptune Road, East Boston, MA 02128	Commonwealth of Massachusetts	Neptune Road, East Boston, MA 02128
104203000	23 Neptune Road, East Boston, MA 02128	Massachusetts Port Authority	1 Harborside Drive #200S, East Boston, MA 02128
100479000	Chelsea Street, East Boston, MA 02128	CJE Realty LLC	20 Carpenter Road, Lynnfield, MA 01940
100471000	401 A401 Chelsea Street, East Boston, MA 02128	Lady M Development LLC	387 Chelsea Street, East Boston, MA 02128
100463000	452 Bremen Street, East Boston, MA 02128	CJE Realty LLC	20 Carpenter Road, Lynnfield, MA 01940
100333000	319 A319 Bennington Street, East Boston, MA 02128	Kevin Slattery	319 Bennington Street, East Boston, MA 02128
100470000	399 Chelsea Street, East Boston, MA 02128	EWJ Properties LLC	387 Chelsea Street, East Boston, MA 02128
104197050	Massport Bypass Road, East Boston, MA 02128	Massachusetts Department of Transportation	Massport Bypass Road, East Boston, MA 02128
100338000	404 Bremen Street, East Boston, MA 02128	Binh Ngo	404 Bremen Street, East Boston, MA 02128
100485010	Wm F McClellan Highway, East Boston, MA 02128	Massachusetts Port Authority	Wm F McClellan Highway, East Boston, MA 02128
100473000	405 Chelsea Street, East Boston, MA 02128	William Puma	405 Chelsea Street, East Boston, MA 02128
104198000	Neptune Road, East Boston, MA 02128	Commonwealth of Massachusetts	Neptune Road, East Boston, MA 02128

Parcel Number	Property Address	Owner	Owner's Mailing Address
100339000	400 Bremen Street, East Boston, MA 02128	PACO Properties LLC	143 Border Street, East Boston, MA 02128
100334000	325 329 Bennington Street, East Boston, MA 02128	Henry J Gavegnano	PO Box 385, Allentown, PA 18105
100329000	303 305 Bennington Street, East Boston, MA 02128	Oakwood Ave Realty LLC	c/o Steven Stoico, PO Box 504, Revere, MA 02151
100331000	309 Bennington Street, East Boston, MA 02128	Stella 2017 Trust	c/o, James J Stella, 10 Richardson Circle, Saugus, MA 01906
104126000	Maverick Street, East Boston, MA 02128	Massachusetts Port Authority	1 Harborside Drive #200S, East Boston, MA 02128
100082000	380 Chelsea Street, East Boston, MA 02128	Sum Wun Ng	42 Fairview Terrace, Malden, MA 02148
100399000	16 Neptune Road, East Boston, MA 02128	Massachusetts Port Authority	1 Harborside Drive #200S, East Boston, MA 02128
100504000	Bennington Street, East Boston, MA 02128	Hector Ordonez	394 Bennington Street, East Boston, MA 02128
100507000	Bennington Street, East Boston, MA 02128	Joseph C Scarafone etal	394 Bennington Street, East Boston, MA 02128
100081000	382 386 Chelsea Street, East Boston, MA 02128	Teodoro Tarantino	382 Chelsea Street, East Boston, MA 02128
100503000	394 Bennington Street, East Boston, MA 02128	Hector Ordonez	394 Bennington Street, East Boston, MA 02128
100336000	412 Bremen Street, East Boston, MA 02128	Jose Velasquez	412 Bremen Street, East Boston, MA 02128
100465000	356 354 Bennington Street, East Boston, MA 02128	Mcbenjc Family Limited Partnership	23 Bayswater Street, East Boston, MA 02128
100469000	397 A397 Chelsea Street, East Boston, MA 02128	EWJ Properties LLC	387 Chelsea Street, East Boston, MA 02128
100337000	408 Bremen Street, East Boston, MA 02128	Eileen Fairchild White	408 Bremen Street, East Boston, MA 02128
104190000	Prescott Street, East Boston, MA 02128	Massachusetts Department of Transportation	Prescott Street, East Boston, MA 02128

Parcel Number	Property Address	Owner	Owner's Mailing Address
104196100	355 Bennington Street, East Boston, MA 02128	413-419 Bremen Street LLC	222 Everett Street, East Boston, MA 02128
104197150	Wm F McClellan Highway, East Boston, MA 02128	Massachusetts Department of Transportation	Wm F McClellan Highway, East Boston, MA 02128
100400000	14 Neptune Road, East Boston, MA 02128	Massachusetts Port Authority	1 Harborside Drive #200S, East Boston, MA 02128
100335000	Bremen Street, East Boston, MA 02128	Henry J Gavegnano	PO Box 385, Allentown, PA 18105
100464000	360 Bennington Street, East Boston, MA 02128	Jesus A Maldonado	360 Bennington Street, East Boston, MA 02128
100079000	392 398 Chelsea Street, East Boston, MA 02128	Fazio Enterprises	c/o Michael Fazio, 4 Seasons Place #1101, Boston, MA 02116
104201000	19 Neptune Road, East Boston, MA 02128	Massachusetts Port Authority	1 Harborside Drive #200S, East Boston, MA 02128
100468000	336 344 Bennington Street, East Boston, MA 02128	EWJ Properties LLC	387 Chelsea Street, East Boston, MA 02128
100401000	Vienna Street, East Boston, MA 02128	Massachusetts Port Authority	1 Harborside Drive #200S, East Boston, MA 02128
100474000	407 Chelsea Street, East Boston, MA 02128	Andres Giraldo, Trustee	409 Chelsea Street, East Boston, MA 02128
100483000	2:00 AM Neptune Road, East Boston, MA 02128	4 Neptune Road Realty Trust	50 Acorn Street, Malden, MA 02148
100330000	307 Bennington Street, East Boston, MA 02128	Stella 2017 Trust	c/o, James J Stella, 10 Richardson Circle, Saugus, MA 01906
100481000	491 493 Saratoga Street, East Boston, MA 02128	Nicola R Dilibero, Trustee	464 Bremen Street Suite B-4, Boston, MA 02128
104196010	401 Bremen Street, East Boston, MA 02128	Friends of Excel Academy Charter Schools Inc.	58 Moore Street, East Boston, MA 02128
100482010	511 515 Saratoga Street, East Boston, MA 02128	Neptune Courier Rest LLC	3 Neptune Street, East Boston, MA 02128

Parcel Number	Property Address	Owner	Owner's Mailing Address
100332000	313 315 Bennington Street, East Boston, MA 02128	Long Kim Nguyen	313- 315 Bennington Street, East Boston, MA 02128
100506000	Bennington Street, East Boston, MA 02128	Joseph C Scarafone	394 Bennington Street, East Boston, MA 02128
100478000	415 Chelsea Street, East Boston, MA 02128	CJE Realty LLC	20 Carpenter Road, Lynnfield, MA 01940
100467000	Bennington Street, East Boston, MA 02128	Josseph E Young etal	135 Summit Avenue, Chelsea, MA 02150
100477000	413 Chelsea Street, East Boston, MA 02128	CJE Realty LLC	20 Carpenter Road, Lynnfield, MA 01940
100475000	409 Chelsea Street, East Boston, MA 02128	Andres Giraldo, Trustee	409 Chelsea Street, East Boston, MA 02128
100080000	390 A390 Chelsea Street, East Boston, MA 02128	Day Square Associates LLC Mass LLC	38 Turning Mill Lane, Quincy, MA 02169
100472000	403 Chelsea Street, East Boston, MA 02128	Joseph E Young etal	135 Summit Avenue, Chelsea, MA 02150

AFFIDAVIT OF SERVICE
FOR ABUTTER NOTIFICATION

Under the Massachusetts Wetlands Protection Act
and Boston Wetlands Ordinance

I, Eileen Michaud, hereby certify under pains and penalties of perjury that that at least one week prior to the public hearing, I gave notice to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, section 40, and the DEP Guide to Abutter Notification dated April 8, 1994, in connection with the following matter:

A Notice of Intent was filed under the Massachusetts Wetlands Protection Act and/or the Boston Wetlands Ordinance by 413-419 Bremen Street LLC for the project located at 355 Bennington Street, East Boston, Massachusetts 02128.

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

Eileen B. Michaud November 17, 2021

Name Date

CERTIFICATE OF INTERPRETATION

I, Susana Carella, hereby certify that I am competent in both the Spanish and English languages, and that I translated the required information and read the attached document, Notification to Abutters Boston Conservation Commission into Spanish. And that is true and accurate to the best of my abilities.

Date: November 16, 2021

Susana Carella

27 Prescott Ave #1

Chelsea, MA 02150

+1(617) 851-3180

Notification to Abutters
Boston Conservation Commission

In accordance with the Massachusetts Wetlands Protection Act, Massachusetts General Laws Chapter 131, Section 40, and the Boston Wetlands Ordinance, you are hereby notified as an abutter to a project filed with the Boston Conservation Commission.

A. **413-419 Bremen Street LLC** has filed a Notice of Intent with the Boston Conservation Commission seeking permission to alter an Area Subject to Protection under the Wetlands Protection Act (General Laws Chapter 131, section 40) and Boston Wetlands Ordinance.

B. The address of the lot where the activity is proposed is **355 Bennington, East Boston, Massachusetts 02128**.

C. The project involves **demolition of existing structures and construction a multi-family residential building with ground floor retail. The Project will create landscaped green space and install a stormwater management system.**

D. Copies of the Notice of Intent may be obtained by contacting the Boston Conservation Commission at **CC@boston.gov**.

E. Copies of the Notice of Intent may be obtained from the **Applicant's Representative** at **(617) 357-7044 x 209** between the hours of **9 AM and 5 PM, Monday through Friday**.

F. In accordance with the Commonwealth of Massachusetts Executive Order Suspending Certain Provisions of the Open Meeting Law, the public hearing will take place virtually at https://zoom.us/j/6864582044. If you are unable to access the internet, you can call 1-929-205-6099, enter Meeting ID 686 458 2044 # and use # as your participant ID.

G. Information regarding the date and time of the public hearing may be obtained from the **Boston Conservation Commission** by emailing **CC@boston.gov** or calling **(617) 635-3850** between the hours of **9 AM to 5 PM, Monday through Friday**.

NOTE: Notice of the public hearing, including its date, time, and place, will be published at least five (5) days in advance in the **Boston Herald**.

NOTE: Notice of the public hearing, including its date, time, and place, will be posted on www.boston.gov/public-notices and in Boston City Hall not less than forty-eight (48) hours in advance.

NOTE: If you would like to provide comments, you may attend the public hearing or send written comments to CC@boston.gov or Boston City Hall, Environment Department, Room 709, 1 City Hall Square, Boston, MA 02201

NOTE: You also may contact the Boston Conservation Commission or the Department of Environmental Protection Northeast Regional Office for more information about this application or the Wetlands Protection Act. To contact DEP, call: the Northeast Region: (978) 694-3200.

Notificación a los Colindantes
Comisión de Conservación de Boston

En conformidad con la Ley de Protección de los Humedales de Massachusetts, Capítulo 131 de las Leyes Generales de Massachusetts, Sección 40, y con la Ordenanza de los Humedales de Boston, por la presente se le notifica a usted, en su calidad de colindante con un proyecto presentado ante la Comisión de Conservación de Boston.

A. **413-419 Bremen Street LLC** ha presentado una Notificación de Intención ante la Comisión de Conservación de Boston solicitando permiso para alterar una zona sujeta a protección en virtud de la Ley de Protección de los Humedales (Leyes Generales, Capítulo 131, Sección 40) y la Ordenanza de Humedales de Boston.

B. La dirección del terreno donde se propone la actividad es **355 Bennington, East Boston, Massachusetts 02128**.

C. El proyecto **implica la demolición de las estructuras existentes y la construcción de un edificio residencial multifamiliar con una planta baja comercial. El proyecto creará un espacio verde ajardinado e instalará un sistema de gestión de aguas pluviales.**

D. Pueden obtenerse copias de la Notificación de Intención poniéndose en contacto con la Comisión de Conservación de Boston en **CC@boston.gov**.

E. Pueden obtenerse copias de la Notificación de Intención llamando al **representante del solicitante** al **(617) 357-7044 x 209** de **lunes a viernes de 9 a 17 horas**.

F. De acuerdo a la Orden Ejecutiva del Estado de Massachusetts de Suspensión de Ciertas Disposiciones de la Ley de Reuniones Abiertas, la audiencia pública tendrá lugar virtualmente en https://zoom.us/j/6864582044. Si no puede acceder al internet, puede llamar al 1-929-205-6099, introducir el número de identificación de la reunión 686 458 2044 # y utilizar # como identificación de participante.

G. **La Comisión de Conservación de Boston** puede facilitarle información sobre la fecha y la hora de la audiencia pública enviando un correo electrónico a **CC@boston.gov** o llamando al (617) 635-3850 de **lunes a viernes de 9 a 17 horas**.

NOTA: Aviso de la audiencia pública, incluyendo su fecha, hora y lugar, se publicará con al menos cinco (5) días de antelación en el **Boston Herald**.

NOTA: El aviso de la audiencia pública, incluyendo su fecha, hora y lugar, se publicará en www.boston.gov/public-notices y en Boston City Hall con no menos de cuarenta y ocho (48) horas de antelación.

NOTA: Si desea aportar comentarios, puede asistir a la audiencia pública o enviarlos por escrito a CC@boston.gov o al Boston City Hall, Departamento de Medio Ambiente, Sala 709, 1 City Hall Square, Boston, MA 02201

BABEL NOTICE

English:

IMPORTANT! This document or application contains **important information** about your rights, responsibilities and/or benefits. It is crucial that you understand the information in this document and/or application, and we will provide the information in your preferred language at no cost to you. If you need them, please contact us at cc@boston.gov or 617-635-3850.

Spanish:

¡IMPORTANTE! Este documento o solicitud contiene **información importante** sobre sus derechos, responsabilidades y/o beneficios. Es fundamental que usted entienda la información contenida en este documento y/o solicitud, y le proporcionaremos la información en su idioma preferido sin costo alguno para usted. Si los necesita, póngase en contacto con nosotros en el correo electrónico cc@boston.gov o llamando al 617-635-3850.

Haitian Creole:

AVI ENPÒTAN! Dokiman oubyen aplikasyon sa genyen **enfòmasyon ki enpòtan** konsènan dwa, responsablite, ak/oswa benefis ou yo. Li enpòtan ke ou konprann enfòmasyon ki nan dokiman ak/oubyen aplikasyon sa, e n ap bay enfòmasyon an nan lang ou prefere a, san ou pa peye anyen. Si w bezwen yo, tanpri kontakte nou nan cc@boston.gov oswa 617-635-3850.

Traditional Chinese:

非常重要！這份文件或是申請表格包含關於您的權利，責任，和／或福利的重要信息。請您務必完全理解這份文件或申請表格的全部信息，這對我們來說十分重要。我們會免費給您提供翻譯服務。如果您有需要請聯系我們的郵箱 cc@boston.gov 電話# 617-635-3850..

Vietnamese:

QUAN TRỌNG! Tài liệu hoặc đơn yêu cầu này chứa **thông tin quan trọng** về các quyền, trách nhiệm và/hoặc lợi ích của bạn. Việc bạn hiểu rõ thông tin trong tài liệu và/hoặc đơn yêu cầu này rất quan trọng, và chúng tôi sẽ cung cấp thông tin bằng ngôn ngữ bạn muốn mà không tính phí. Nếu quý vị cần những dịch vụ này, vui lòng liên lạc với chúng tôi theo địa chỉ cc@boston.gov hoặc số điện thoại 617-635-3850.

Simplified Chinese:

非常重要！这份文件或是申请表格包含关于您的权利，责任，和／或福利的重要信息。请您务必完全理解这份文件或申请表格的全部信息，这对我们来说十分重要。我们会免费给您提供翻译服务。如果您有需要请联系我们的邮箱 cc@boston.gov 电话# 617-635-3850.

CITY of BOSTON

Cape Verdean Creole:

INPURTANTI! Es dukumentu ó aplikason ten **informason inpurtanti** sobri bu direitus, rasponsabilidadis i/ó benefísius. Ê krusial ki bu intendi informason na es dukumentu i/ó aplikason ó nu ta da informason na língua di bu preferênsia sen ninhun kustu pa bó. Si bu prisiza del, kontata-nu na cc@boston.gov ó 617-635-3850.

Arabic:

مهم! يحتوي هذا المستند أو التطبيق على معلومات مهمة حول حقوقك ومسؤولياتك أو فوائدك. من الأهمية أن تفهم المعلومات الواردة في هذا المستند أو التطبيق. سوف نقدم المعلومات بلغتك المفضلة دون أي تكلفة عليك. إذا كنت في حاجة إليها، يرجى الاتصال بنا على cc@boston.gov أو 617-635-3850.

Russian:

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CITY of BOSTON

ATTACHMENT C

STORMWATER REPORT

HANCOCK ASSOCIATES

Stormwater Report

In Support of

Notice of Intent Filing with Boston Conservation Commission
Site Plan Filing with Boston Water and Sewer Commission

for

413 – 419 Bremen, LLC
c/o Gate Residential Properties, LLC
355 Bennington Street
(Parcel ID: 0104196100)
East Boston, MA

Prepared By:
Hancock Associates
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Prepared For:
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November 2021

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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.

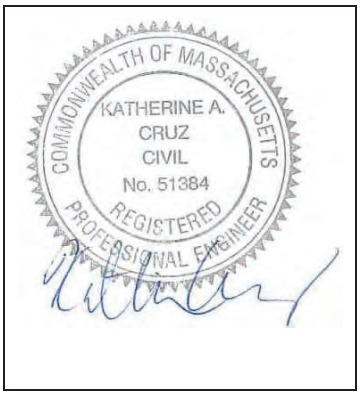
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



11/10/21
Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

☒ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

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

☐ An Illicit Discharge Compliance Statement is attached;

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

STORM RUNOFF ANALYSIS
355 BENNINGTON STREET
EAST BOSTON, MA

1.0 PROJECT DESCRIPTION

Gate Residential Properties, LLC proposes to construct a 170-unit apartment building with 6,985 square feet of retail space at 355 Bennington Street in East Boston, MA. Site improvements associated with construction of the new building will include paved vehicular and pedestrian access, landscaped areas, public realm sidewalk improvements including notched curb planters with canopy trees and street trees in 5'x5' tree pits, connections to municipal utility services, and a stormwater management system. The project site exceeds 1-acre in area and therefore requires a stormwater report demonstrating compliance with MassDEP Stormwater Standards.

1.1 Existing Site Description

A trapezoidal parcel, the 1.17± acre site is bounded by Bennington Street to the north, Bremen Street to the west, Excel Academy Charter High School and the Mary Ellen Welch Greenway to the southwest, and Martin A. Coughlin Bypass Road to the east.

Presently, the project site is occupied by an irregularly shaped building with a paved parking areas along Bremen and Bennington Streets, and a gravel drive and parking along the southern side of the site. The onsite building on the northeast side of the site abuts the property line and sits on a ~15-ft retaining wall above the Coughlin Bypass Road. The high point onsite is at the northern corner along Bennington Street at elevation 23.00± (NAVD88), and the site follows the natural grade along Bennington Street and Bremen Street down to elevation 12.8± in the southwestern property corner. From there the site slopes down the existing drive between the property and the Excel Academy toward the Coughlin Bypass Road, and then slopes down in a northerly direction to a low area/depression at the rear of the property at elevation 5.69±.

Under existing conditions, there are no stormwater management structures or controls. Stormwater flows overland offsite to Bennington or Bremen Streets or ponds onsite in the low area at the rear of the property. A portion of the site is located within the 100-yr coastal flood plain according to current FEMA Flood mapping, with a 100-year floodplain elevation of 10.0± (NAVD88) or 16.46± (BCB). There are no habitats of Endangered Species on or near the project site.

1.2 Proposed Conditions

The proposed building will occupy approximately 76% of the project site. Entry to the proposed under-building parking garage this located on the southwest side of the building and access to the garage entrance is from Bremen Street and an existing access easement at the western corner of the property.

The underground site sewer electric, water, communication utilities servicing the project will also run under Bremen Street. Onsite stormwater mitigation is located along the perimeter edges of the site and under the ramp to the parking garage. The proposed stormwater management system will comply with all DEP Stormwater Management Regulations and will include five subsurface infiltration systems.

1.3 Soil Conditions

A review of the Web Soil Survey operated by the Natural Resource Conservation Service (NRCS) indicates Urban Land (Map Unit 603) and Udorthents (Map Unit 655) are the primary Soils onsite. Both Urban land

and Udorthents are soils that have been previously altered by grading and filling operations. Due to the variable nature of fill soils, Urban Land and Udorthents are not given a soil classification.

McPhail Associates performed seven soil borings onsite from November 16 to 20, 2019. Soils were found to be asphalt and concrete over feet of sandy gravel fill material that extended down to elevation 0.9 to 7.5. The fill material is underlain by a blue grey marine clay deposit. Two borings encountered a grey blue glacial till deposit at elevation -3.0 and 8.5. Groundwater was found ranging from elevation 8.5± in the northwest side of the site to a low elevation of -1.8 feet on the east side of the site.

Surficial fill soils in the Boston area are generally classified into Hydrologic Soil Group (HSG) "C," indicative of slow infiltration when thoroughly wet. The underlying clay layer is classified into HSG "D," indicative of very slow infiltration when thoroughly wet. For the calculations, land cover is classified as HSG "C" and the soils below the infiltration systems is classified as HSG "D."

2.0 STORMWATER MANAGEMENT STANDARDS

The proposed development has been designed in compliance with the Stormwater Management Regulations issued by the Massachusetts Department of Environmental Protection (MassDEP). The Stormwater Management Regulations includes ten standards for stormwater management compliance. The following is a description of each standard, and how the proposed project will comply with each of the ten Stormwater Management Standards.

Standard 1: No New Untreated Discharges
No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

There will be no new untreated stormwater conveyances to wetlands or waters of the Commonwealth associated with this project.

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

The project site is within the 100-year costal floodplain and therefore not required to meet the Stormwater Standard #2 mitigation requirement. However, the development will provide mitigation for the 2 and 10 year storm events over existing conditions. Stormwater runoff from the proposed site flows to the five onsite stormwater infiltration systems. The subsurface infiltrations provide more than 1.25 inches of storage over the impervious area as required by the City of Boston.

Stormwater runoff calculations contained herein for site related runoff have been computed in accordance with methods developed by the NRCS, as described in the "NRCS National Engineering Handbook, Section 5, and Hydrology for Small Watersheds." Storm hydrographs were generated and routed using the NRCS TR-20/TR-55 methodologies (incorporated into the hydraulic modeling software HydroCAD) with a Type III Storm Distribution.

The methodologies provide for hydraulic analyses of a watershed under various combinations of land cover/use. Surface runoff hydrographs were developed from storm rainfall data using a dimensionless unit hydrograph, drainage areas, times of concentration (Tc), and NRCS runoff curve numbers. These computer simulated hydrographs have been flood-routed, when appropriate, to account for effects of surface storage and hydraulic constraints provided by the designed mitigative measures.

For this analysis, hydrographs were developed to simulate peak storm runoff flows under existing and proposed conditions for the 2, 10, and 100-year storm events. Twenty-four (24) hour values of 3.2, 4.7, and 7.0 inches of rainfall were utilized for the respective storm events. The calculations indicate the order-of-magnitude of existing and proposed peak runoff rates anticipated from the project site. The following section provides a brief description of the existing and proposed watershed areas and associated downstream facilities.

2.1 Existing Watersheds

Existing Watershed E1 – includes a portion of the roof and parking areas that drain overland to Bremen and Bennington Street. Stormwater sheet flows overland unmitigated.
AREA = 0.65 ac

Existing Watershed E2 – contains the gravel areas to the southwest and south of the existing building, the remaining roof areas, and the access easement area to the west of the site. Stormwater runoff sheet flows around the building to the low at the rear of the property. Stormwater ponds in this area and infiltrates into the ground or evaporates without any offsite flow.
AREA = 0.63 ac

2.2 Proposed Watersheds

Proposed Watershed P1, P2, P3, P4, and P5 – contain the areas that discharge to the five proposed subsurface Stormtank infiltration systems located around the building. Stormtank chambers are stackable HDPE chambers that store stormwater at a 96% storage capacity per chamber. The access easement area, entire building roof, and perimeter areas to the southeast and eastern side of the building flow to these systems. Overflow from these infiltration systems is discharged to the existing 18-inch combined storm sewer in Bennington Street.
AREA = 1.14 ac

Proposed Watershed P6 and P7 – includes the sidewalk areas on the northwest and southwest sides of the site. Stormwater flows overland offsite to Bennington Street and Bremen Street via overland flow.
AREA = 0.14 ac

2.3 Stormwater Mitigation Measures

Under existing conditions, stormwater from about 0.63 ac. of the site flows to a gravel depression in the rear of the site. This depression completely mitigates stormwater flowing into it through the 100-year storm event. The project site is within the 100-year coastal flood plain, therefore stormwater mitigation is not required. Also, the onsite underlying clay soils are considered hydraulic soil group "D" which impede infiltration of stormwater. Stormwater runoff is mitigated under the 2 and 10-year storm events. The site is maximized for stormwater retention though the five infiltration systems to meet this standard to the maximum extent practicable.

2.4 Stormwater Calculations

The stormwater calculations indicate the "order-of magnitude" of peak runoff rates under existing and proposed conditions for the 2, 10 and 100-year storm event recurrence intervals. Refer to **Table 1** for a summary of the peak runoff rates. As shown in the Table, there is no increase in the peak rate of runoff for the 2 and 10-year storm events.

A summary of the existing and proposed discharge rates follows. Please see the attached "Existing Drainage Areas" and "Proposed Drainage Areas" figures (Appendix E) and HydroCAD output (Appendix F) for more information.

Table 1 – Peak Runoff Table

	2-Year 24 Hour Storm Event	10-Year 24 Hour Storm Event	100-Year 24 Hour Storm Event
	cfs	cfs	cfs
Existing	2.01	2.91	4.44
Proposed	1.28	2.57	8.65

- *Flood-routing effect and offset times of concentration results in a combined peak runoff rate that can be less than the sum of the peak rates for the individual watersheds*

Standard #3

Loss of annual recharge to groundwater should 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 the 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.

There will be no loss of annual recharge to groundwater as a result of the proposed project. Large projects in the City of Boston require 1.25 inches of recharge over the proposed impervious area. Stormwater recharge is provided by the five proposed subsurface infiltration systems around the proposed building. The infiltration systems are composed of Stormtank Module 25 Series Chambers. The required recharge volume is 4,844 cubic feet (cf) and the provided recharge is 5,315 cf.

MassDEP requires 0.25 inches of recharge over the impervious area for projects with Type “C” soils. The proposed onsite recharge will exceed 1.25 inches of inches of recharge over the impervious area due to City of Boston regulations, accordingly this standard is met under MassDEP requirements as well. Note that the municipal recharge volume requirement is over four times the state requirement for the site. The drawdown requirement could not be met for the site due do the higher required recharge volume, poor soils, and high onsite groundwater

Table 2 summarizes the on-site recharge requirements and the proposed recharge volumes provided by the proposed stormwater infiltration system. The “Static” Method was used to calculate the volume required for the project.

Table 2 – Recharge Compliance Summary

Impervious Area		Recharge Required	Recharge Vol. Required	BMP	Recharge Vol. Provided
	(ac)	(in/acre)	(CF)		(CF)
				Infiltration System S1	779.0
Exist. Imp Area	0.86			Infiltration System S2	459.9
Prop. Imp Area	1.07			Infiltration System S3	922.8
Increase Imp Area	0.21			Infiltration System S4	430.0
				Infiltration System S5	2,723.2
TOTAL	**1.07**	**0.25 (DEP Req.)**	**968.8**		**5,314.9**
TOTAL	**1.07**	**1.25 (BPDA Req.)**	**4,843.75**		**5,314.9**

As indicated above, the recharge volume requirement is met for the project though the proposed infiltration systems.

The Massachusetts Stormwater Handbook states that the recharge volume must drain within 72 hours. Again, due to the city's 1.25-inch recharge volume requirement, poor soils, and limited space onsite due to high groundwater, none of the systems meet the drawdown requirement.

The following "drawdown" calculation assumes a Rawls' Rate of 0.09 inches per hour, corresponding to texture class "D". HSG "D" soils have very slow infiltration rates (0.09 in/hr) which is inversely proportional to drawdown time. This very slow infiltration rate, coupled with the comparatively large municipal recharge volume requirement results in long drawdown times, preventing compliance with the MassDEP 72-hour drawdown requirement.

The calculation used to determine drawdown time is as follows. See **Table 3** for a summary of the drawdown times for the proposed infiltration BMP.

*Drawdown Time = Storage Volume / (Rawls Rate * Bottom Area)*

Table 3 – Drawdown Compliance Summary

BMP	Recharge Volume (CF)	Bottom Area (SF)	Rawls Rate (in/hr)	Drawdown Time (hrs)	Drawdown Time Required (hrs)
Infiltration System S1	779.0	196	0.09	**529.9**	**72**
Infiltration System S2	459.9	238	0.09	**257.6**	**72**
Infiltration System S3	922.8	576	0.09	**213.6**	**72**
Infiltration System S4	430.0	603	0.09	**94.9**	**72**
Infiltration System S5	2,723.2	1,850	0.09	**196.3**	**72**

Also, the Massachusetts Stormwater Handbook requires groundwater mounding calculations for stormwater mitigation facilities that mitigate the 10-year storm event and are within 4-feet of groundwater. Groundwater mounding was calculated using the provided MassDEP spreadsheet which utilizes the "Hantush Method" to establish the groundwater mound. See **Table 4** for a summary of the groundwater mounding in relation the bottom elevations of the infiltration systems.

Table 4 – Groundwater Mounding Compliance Summary

BMP	Bottom of System (elev)	Ground-water (elev)	GW Mound (ft)	Final GW (elev)
Infiltration System S1	**7.50**	5.3	0.29	**5.59**
Infiltration System S2	**3.50**	0.9	0.39	**1.29**
Infiltration System S3	**3.00**	0.9	0.63	**1.53**
Infiltration System S4	**9.00**	6.9	0.46	**7.36**
Infiltration System S5	**3.00**	0.9	1.48	**2.38**

As shown in Table 4, each of the proposed subsurface recharge systems remain above groundwater when accounting for groundwater mounding underneath.

All stormwater flowing to the infiltration systems is either roof water or will undergo 80% TSS removal prior to discharge to the systems. Therefore, only "clean" water will be infiltrated.

See Appendix G: Recharge calculations for the detailed recharge and mounding calculations.

Standard #4

For new developments, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when:

- ***a. Suitable nonstructural practices for source control and pollution prevention are implemented.***
- ***b. Stormwater management BMPs are sized to capture the prescribed runoff volume.***
- ***c. Stormwater management BMPs are maintained as designed.***

This project incorporates five subsurface infiltration systems, deep sump catch basins, and a Stormceptor Water Quality Unit to provide 80% TSS removal for the site. The discharge is not directed to a critical area, the land use is not a Land Use with a Higher Potential Pollutant Load ("LUHPPL"), and the soil does not have a rapid infiltration rate. Therefore, a 0.5-inch water quality depth is required for the site, and 44% stormwater pretreatment is not required prior to discharge to infiltration structures from non-roof areas.

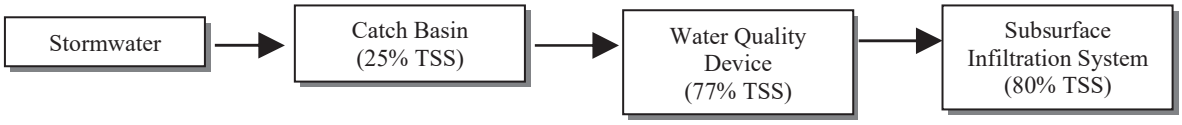
The stormwater infiltration systems are designed to retain 1.25 inches of stormwater over the impervious area onsite, well above the 0.5-inch water quality depth requirement. Additionally, roof runoff is considered "clean" so the only areas onsite that require treatment are the impervious areas around the perimeter of the building. Two deep sump and hooded catch basins and a stormceptor water quality device will be installed in the driveway between the site and the Excel Academy to collect and pretreat this runoff before it is infiltrated in Infiltration System S5.

Table 5 summarizes how the proposed BMPs will exceed the 80% TSS removal standard based on Mass DEP's presumptive criteria. The Stormwater Management Regulations provide design average annual TSS removal rates for correctly sized BMPs. These values can then be used to estimate the overall average annual TSS removal efficiency for the proposed BMP system.

Table 5 – TSS Removal Rates

BMP	TSS Removal Rate	TSS Load Removed by BMP	TSS Load Remaining	Overall Removal Rate
Deep Sump and Hooded Catch Basin	25%	25%	75%	
Water Quality Device	77%	57%	18%	
Surface Infiltration System	80%	14%	4%	
			Total	**96%**

The following diagram illustrates the proposed BMP treatment train:



As shown above, stormwater runoff from the access drive area will undergo 90% TSS removal prior to discharge offsite. See Appendix H: Water Quality Calculations for the detailed water quality calculations, the TSS Removal Worksheet, and the MaSTEP technology review for Stormceptor water quality devices.

Standard #5

Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs. The use of infiltration practices without pretreatment is prohibited.

There will be less than 1000 vehicle trips per day generated by the proposed development. Therefore, the project is not considered a Land Use with Higher Potential Pollutant Loads. All stormwater runoff from the project site will undergo 80% TSS removal.

Standard #6

Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for "critical areas". Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold-water fisheries and recharge areas for public water supplies.

Stormwater from the proposed development eventually discharges to the municipal combined sewer system as under existing conditions. Therefore, the project site does not discharge to a "critical area."

Standard #7

Redevelopment of previously developed sites must meet the Stormwater Management Regulations to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new stormwater management systems must be designed to improve existing conditions.

The proposed project is not considered a redevelopment project because there is an overall increase in impervious area.

Standard #8

Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.

Best management practices (BMP) for erosion and sedimentation control are staked straw wattles, filter fences, hydro seeding, and phased development. Many stormwater BMP technologies (e.g., infiltration technologies) are not designed to handle the high concentrations of sediments typically found in construction runoff and must be protected from construction-related sediment loadings. Construction BMP's **must** be maintained. In developing the proposed project certain measures will be implemented to minimize impacts erosion and sedimentation could have on surrounding areas. This section addresses items that involve proper construction techniques, close surveillance of workmanship, and immediate response to emergency situations. The developer must be prepared to provide whatever reasonable measures are necessary to protect the environment during construction and to stabilize all disturbed areas as soon as construction ends.

Pre-Construction

1. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to straw wattles, silt fence and crushed stone.
2. The contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

Preliminary Site Work

1. Excavated materials should be stockpiled, and erosion controls shall be utilized along the down slope side of the piles, side slopes shall not exceed 2:1.
2. If intense rainfall is anticipated, the installation of supplemental straw bale dikes, silt fences, or armored dikes shall be considered.
3. Unsuitable excavated material shall be removed from the site.
4. Construction entrance shall be installed.
5. Existing catch basins shall be protected with silt sacks.

Ongoing Site Work

1. Erosion control measures shall be regularly inspected and replaced as needed.
2. Dewatering shall be done in a manner so as not to transmit silt, sand or particulate matter to the receiving water or existing drainage system.

Landscaping/Site Stabilization

1. Landscaping and site stabilization shall occur as soon as possible to provide permanent stabilization of disturbed surfaces.
2. If the season or adverse weather conditions do not allow landscaping and site stabilization to occur, temporary mulching with straw or wood chips weighted with snow fence or branches, or other methods shall be provided.

Standard #9

All stormwater management systems must have an operation and maintenance plan to ensure that systems function as designed.

The information provided herein is intended to provide the base information for operation and maintenance of the site in perpetuity subject to updates and revisions as required at a future date. As such, all future

property owners must be notified in writing of this plan and be provided with a copy of this plan and a complete set of the design drawings and/or a completed as-built plan showing all the drainage features as they were constructed, which are considered part of this document. Please see the attached Operations and Maintenance Log (Appendix I).

Stormwater management system owner:	Gate Residential Development, LLC
The party responsible for operation and maintenance:	Gate Residential Development, LLC 355 Bennington Street Boston, Massachusetts 02128

Illicit Discharge - Practices to Minimize Storm Water Contamination

- All waste materials will be collected and stored in a securely lidded metal dumpster.
- All trash and debris from the site will be deposited in the dumpster. The dumpster will be emptied on a regular schedule prior to being over full.
- All personnel will be instructed regarding the correct procedure for waste disposal.
- Good housekeeping and spill control practices will be followed to minimize storm water contamination from petroleum products, paints, and cleaning products.
- All site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
- Spill kits will be provided with any activity that could provide contamination.
- All paint containers and curing compounds will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewers but will be properly disposed according to the manufacturer's instructions.
- All spills will be cleaned up immediately upon discovery. Spills large enough to reach the storm sewers will be reported to the Massachusetts Department of Environmental Protection Northeast Regional Office at 1-888-304-1133.

Infiltration BMPs

The infiltration BMPs (subsurface chamber systems) shall be inspected after every major storm for the first few months to ensure it is stabilized and functioning properly. If necessary, corrective action shall be taken until the system functions properly. Inspectors should note how long water remains standing in the inspection port after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging. Thereafter, inspect the infiltration BMP at least twice per year.

Stormceptor Water Quality Unit

The Stormceptor treatment device shall be maintained in strict conformance with the Manufacturer's recommendations. During the first year the Stormceptor is to be monitored four times and the sediment removed when it reaches an 8-inch depth. Based on the monitoring results from the first year, a cleaning schedule shall be established based on an 8-inch sediment depth removal.

Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

Initial Post-Construction Inspection

During the initial period of vegetation establishment, pruning and weeding are required twice in the first year by contractor or owner. Any dead vegetation/plantings found after the first year will be

replaced. Proper mulching is mandatory and regular watering may be required initially to ensure proper establishment of new vegetation.

Long-Term Maintenance
The planted areas shall be inspected on a semi-annual basis and any litter removed. Weeds and invasive plant species shall be removed by hand. Maintain planted areas adjacent to pavement to prevent soil washout. Immediately clean any soil deposits on pavement. Leaf litter and other detritus shall be removed twice per year. If needed to maintain aesthetic appearance, perennial plantings may be trimmed at the end of the growing season.

Trees and shrubs shall be inspected twice per year to evaluate health and attended to as necessary. Seeded ground cover or grass areas shall not receive mulching. Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming. Plant alternative mixtures of grass species in the event of unsuccessful establishment. The grass vegetation should not be cut to a height less than four inches.

Pesticide/Herbicide Usage
No pesticides are to be used unless a single spot treatment is required for a specific control application.

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

The proposed project does not have any illicit discharges to the proposed stormwater management system. An Illicit Discharge Compliance Certification is appended to the report.

3.0 SILTATION CONTROL PROCEDURES

Downslope areas will be protected through the installation of staked wattles backed by filter fabric fence to be located along the perimeter and/or elsewhere as required to protect and stabilize earthwork; and by installation of silt sacks in existing catch basins both on-site and off-site along Bennington Street and Bremen Street. All embankment slopes will be fine graded and stabilized by the means of wood chip mulch, shrubs, sod and/or seed and mulch as is appropriate.

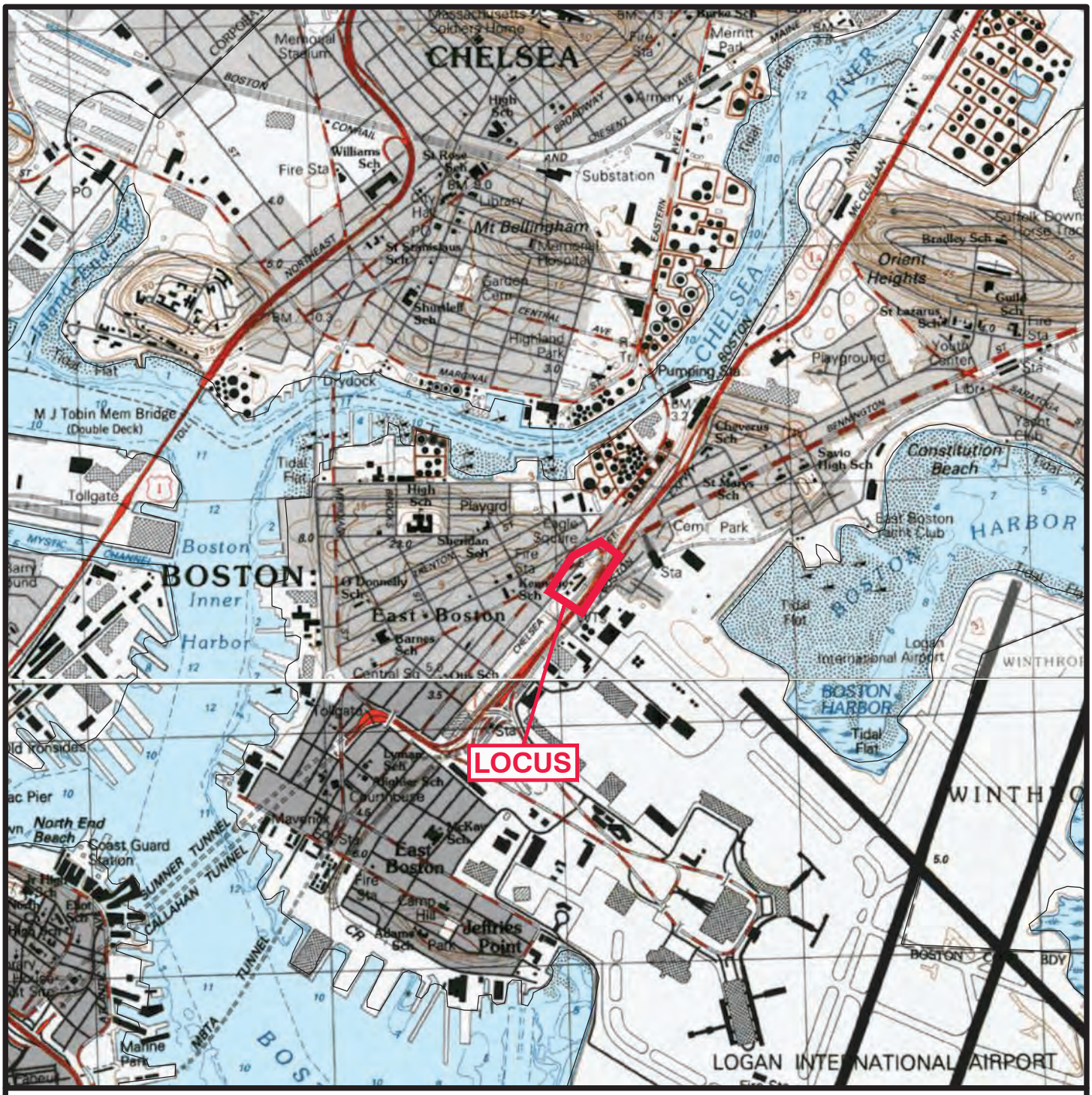
All pipe drains and catch basins will be installed early in the construction period in order to provide early control of site runoff. Crushed stone will be judiciously applied to stabilize select areas as required during the course of construction. Refer to the erosion control plan for details.

4.0 SUMMARY AND CONCLUSION

Significant attention and consideration have been given to proper management of stormwater runoff from the project site. The unique site-specific characteristics and hydrologic setting has been carefully studied to develop a comprehensive plan that fully utilizes and recognizes these attributes. Disposition of stormwater has been considered with respect to its peak rate, total volume and water quality aspects, to ensure appropriate mitigation upon project completion.

- There will be no adverse impact to any surrounding areas.
- The drainage system has been properly designed to handle the design flow rates.

Appendix A: Locus Map



USGS QUADRANGLE(s): BOSTON NORTH, MASSACHUSETTS
BOSTON SOUTH, MASSACHUSETTS

Source: Topographic Quadrangle(s) provided by Maptech, Inc.

HANCOCK ASSOCIATES	Project Title: 355 Bennington Street Location: East Boston, MA Plan Title: USGS Plan	Project #: 23109 Date: Aug. 18, 2020 Scale: 1" = 2000'	FIGURE: 1

File Name: X:\23109 - #355 Bennington St\Stormwater\23109-Locus Map.dwg Saved 8/18/2020 3:39 PM Plotted: Aug 18, 2020 3:40:22pm Tab: USGS Plot Style: 1050C.ctb Plotted By: David T. White

Appendix B: NRCS Soils Map

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,130 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
603	Urban land, wet substratum, 0 to 3 percent slopes	1.2	70.8%
655	Udorthents, wet substratum	0.5	29.2%
Totals for Area of Interest		**1.8**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

Norfolk and Suffolk Counties, Massachusetts

603—Urban land, wet substratum, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vkyl
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land over herbaceous organic material and/or alluvium and/or marine deposits

Minor Components

Udorthents

Percent of map unit: 13 percent
Hydric soil rating: Unranked

Beaches

Percent of map unit: 2 percent
Hydric soil rating: Unranked

655—Udorthents, wet substratum

Map Unit Setting

National map unit symbol: vkyd
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform position (two-dimensional): Shoulder, footslope

Landform position (three-dimensional): Riser, tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Excavated and filled sandy and gravelly human transported material over highly-decomposed herbaceous organic material

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Urban land

Percent of map unit: 3 percent
Hydric soil rating: Unranked

Ipswich

Percent of map unit: 2 percent
Landform: Marshes
Hydric soil rating: Yes

Appendix C: Soil Testing Results (by others)

FIGURE 2

NORTH

BREMEN STREET
(PUBLIC – 40' WIDE)
(CITY LAYOUT L–3815)

BENNINGTON STREET
(PUBLIC – 100' WIDE)
(CITY LAYOUT L–3131)

NEPTUNE ROAD
(PUBLIC – 100' WIDE)
(CITY LAYOUT L–4611)

EAST BOSTON/CHELSEA BYPASS ROAD

APPROXIMATE LIMITS OF SUBJECT SITE

APPROXIMATE LIMITS OF PROPOSED GROUND FLOOR LEVEL

APPROXIMATE LIMITS OF PROPOSED BUILDING LOWEST LEVEL SLAB EL. + 5 ± (SHADED)

CONCRETE BLOCK RETAINING WALL (SHADED)

B-1 (OW)
B-2
B-3
B-4 (OW)
B-5 (OW)
B-6
B-6A (OW)
B-7

EXCEL ACADEMY BREMEN STREET REALTY CORPORATION
DEED BOOK 54161, PAGE 301
PLAN NO. 73 OF 2015

ACCESS EASEMENT
PLAN NO. 73 OF 2015

MASS. PORT AUTHORITY TEMPORARY EASEMENT
DEED BOOK 48451 PAGE 47
PLAN 73 OF 2015

MASS. PORT AUTHORITY MAINTENANCE EASEMENT

1–STORY CONC. BLOCK WAREHOUSE

1–STORY CONC. BLOCK BUILDING

LOT AREA
50,932±S.F.
(1.1692±Ac)

TEMA FLOOD ZONE "C" (SEE NOTE #10)
(11,300± S.F. OR 22% OF THE LOT COVERED BY FLOOD ZONE)

GRAPHIC SCALE
40 0 40 80

NOT TO SCALE

LEGEND

⊕ — APPROXIMATE LOCATION OF BORING PERFORMED BY CARR-DEE CORP. DURING THE PERIOD NOVEMBER 16 THROUGH 20, 2019 FOR McPHAIL ASSOCIATES, LLC

(OW) — INDICATES OBSERVATION WELL INSTALLED WITHIN COMPLETED BOREHOLE.

REFERENCE: THIS PLAN WAS PREPARED FROM A 20-SCALE DRAWING ENTITLED "EXISTING CONDITIONS PLAN OF LAND" DATED DECEMBER 11, 2019 BY HANCOCK ASSOCIATES.

McPHAIL ASSOCIATES, LLC
Geotechnical and Geoenvironmental Engineers
2269 Massachusetts Avenue
Cambridge, MA 02140
617/868–1420
617/868–1423 (Fax)
www.mcphailgeo.com

355 BENNINGTON STREET
EAST BOSTON MASSACHUSETTS

SUBSURFACE EXPLORATION PLAN
FOR
GATE RESIDENTIAL PROPERTIES, LLC
BY
McPHAIL ASSOCIATES, LLC

Date: JANUARY 2020	Dwn: F.G.P.	Chkd: H.J.B.	Scale: 1" = 40'
Project No: 6900			

FILE NAME: N:\AcadJOBS\6900\6900-F02.dwg

CARR-DEE CORP.

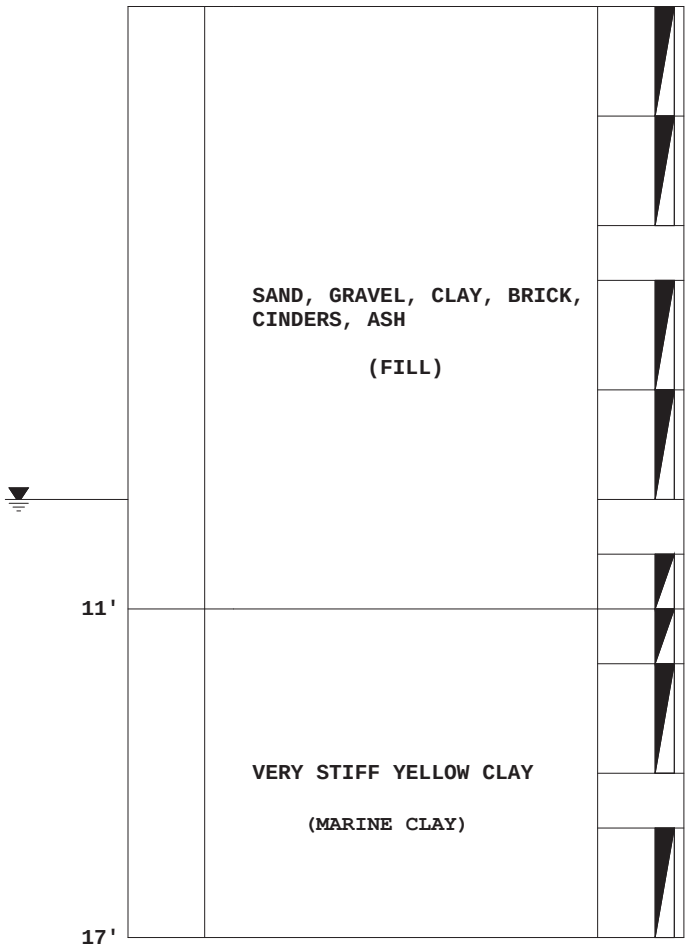
37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 11-21-2019 Job No.: 2019-236

Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 1(OW)

GROUND SURFACE EL. +17.5



S#1, 0' to 2'
(8-9-9-12)
RECOVERED 12 in.

S#2, 2' to 4'
(9-7-10-10)
RECOVERED 14 in.

S#3, 5' to 7'
(3-2-4-3)
RECOVERED 10 in.

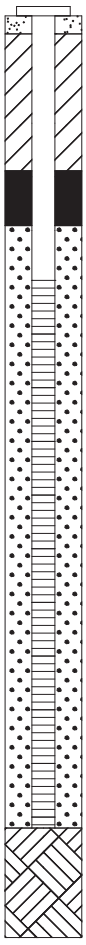
S#4, 7' to 9'
(2-1-4-4)
RECOVERED 7 in.

S#5, 10' to 11'
(4-3)
RECOVERED 4 in.

S#5A, 11' to 12'
(8-11)
RECOVERED 7 in.

S#6, 12' to 14'
(16-17-20-21)
RECOVERED 18 in.

S#7, 15' to 17'
(6-10-11-15)
RECOVERED 24 in.



FLUSH MOUNT COVER
CONCRETE SEAL
CUTTINGS

BENTONITE SEAL

WELL SAND

10' (2")PVC SLOTTED

END CAP

WATER LEVEL 9'
SIZE OF AUGERS: 3 3/4"I.D., LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: M. WHITE
DATE STARTED & COMPLETED: 11-20-2019

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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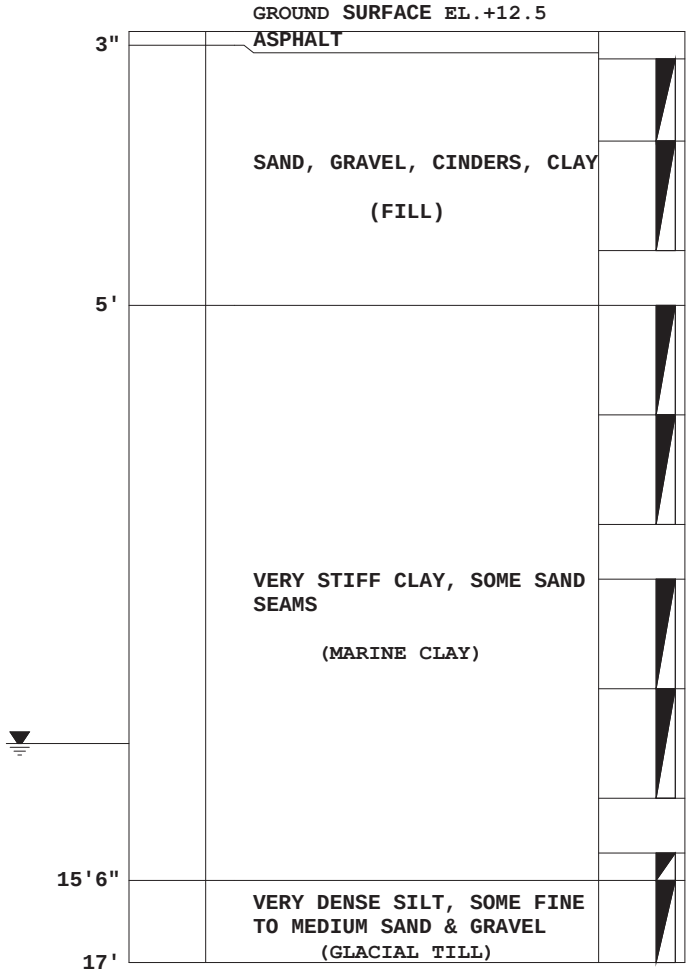
Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 2



S#1, 6" to 2'
(11-10-11)
RECOVERED 12 in.

S#2, 2' to 4'
(10-6-6-3)
RECOVERED 19 in.

S#3, 5' to 7'
(5-10-13-18)
RECOVERED 20 in.

s#4, 7' to 9'
(15-19-14-15)
RECOVERED 24 in.

s#5, 10' to 12'
(6-7-8-8)
RECOVERED 24 in.

S#6, 12' to 14'
(10-10-9-9)
RECOVERED 24 in.

S#7, 15' to 15'6"
(10)
RECOVERED 6 in.

S#7A, 15'6" to 17'
(33-58-31)
RECOVERED 18 in.

WATER LEVEL 13'
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: H. BERLIS
DATE STARTED & COMPLETED: 11-16-2019

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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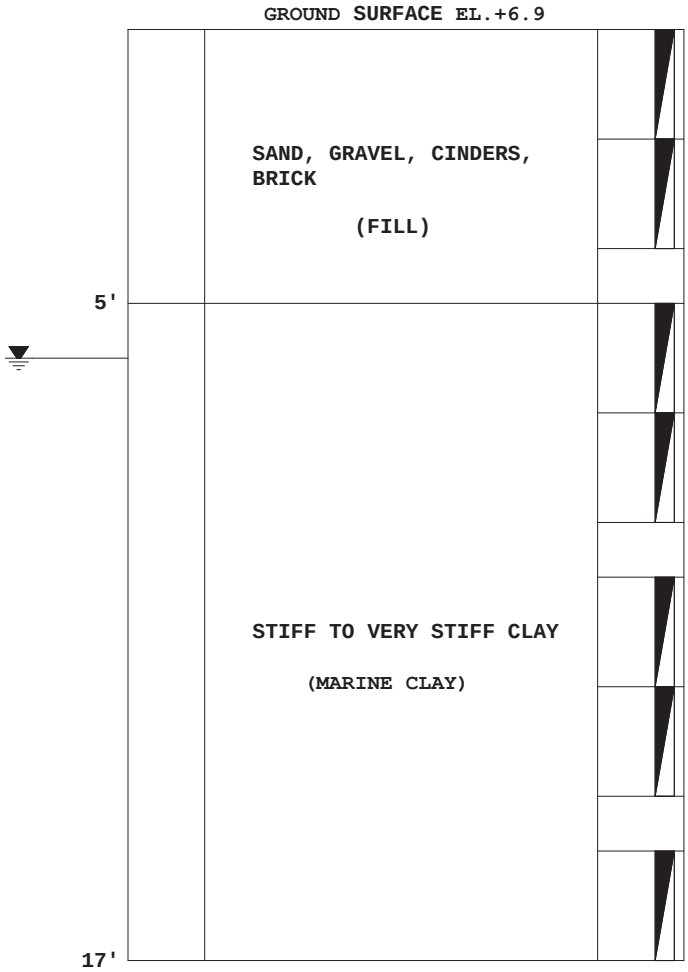
To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 11-21-2019 Job No.: 2019-236

Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 3



S#1, 0' to 2'
(14-13-15-15)
RECOVERED 15 in.

S#2, 2' to 4'
(12-8-8-8)
RECOVERED 14 in.

S#3, 5' to 7'
(3-5-3-5)
RECOVERED 20 in.

S#4, 7' to 9'
(3-3-4-5)
RECOVERED 22 in.

S#5, 10' to 12'
(4-5-5-7)
RECOVERED 22 in.

S#6, 12' to 14'
(7-10-11-9)
RECOVERED 24 in.

S#7, 15' to 17'
(3-5-5-7)
RECOVERED 24 in.

WATER LEVEL 6'
SIZE OF AUGERS: 2-1/4" I.D., LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: H. BERLIS
DATE STARTED & COMPLETED: 11-16-2019

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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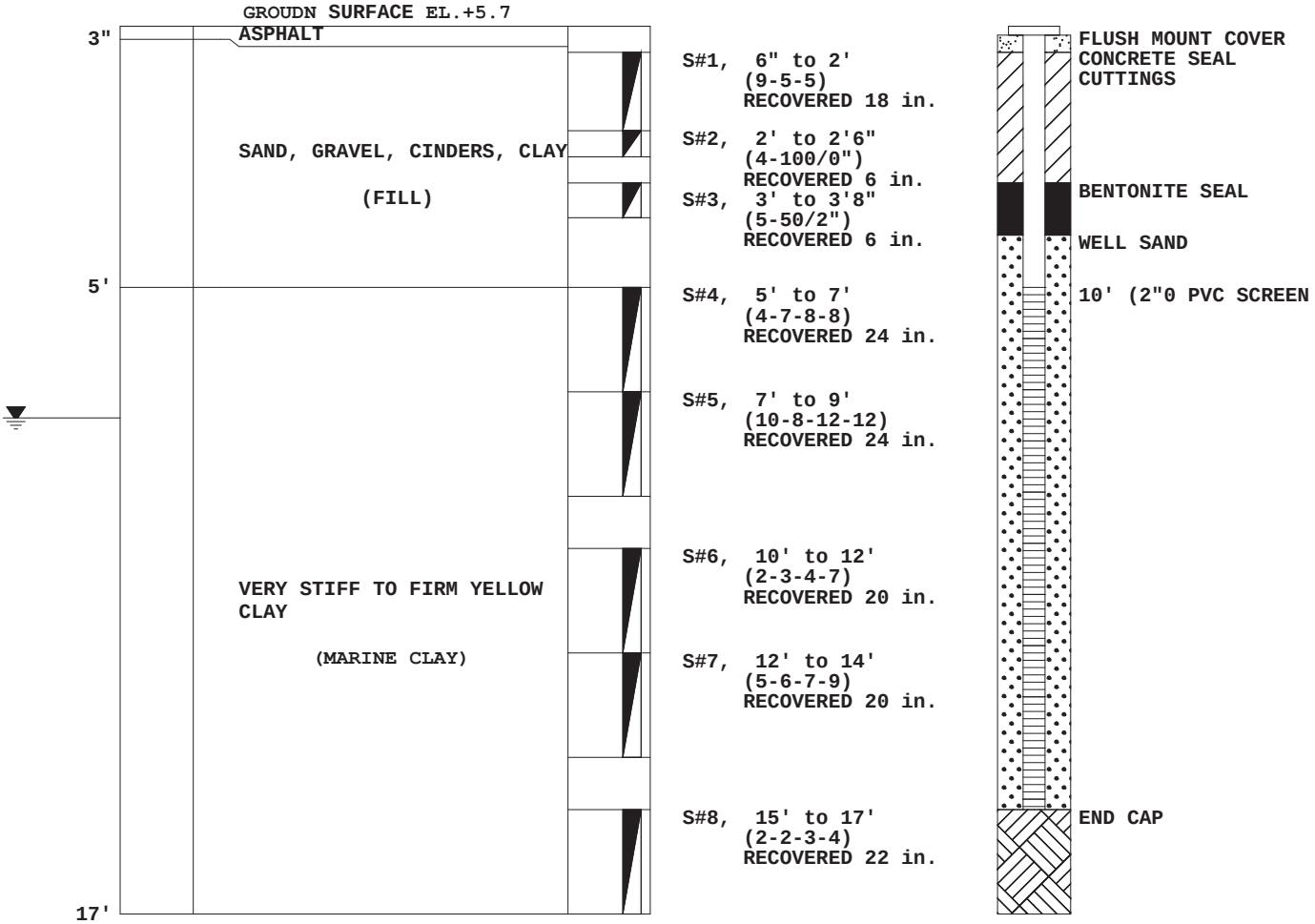
Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 4(OW)



WATER LEVEL 7'6"
SIZE OF AUGERS: 3-3/4" I.D., LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: H. BERLIS
DATE STARTED & COMPLETED: 11-16-2019

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

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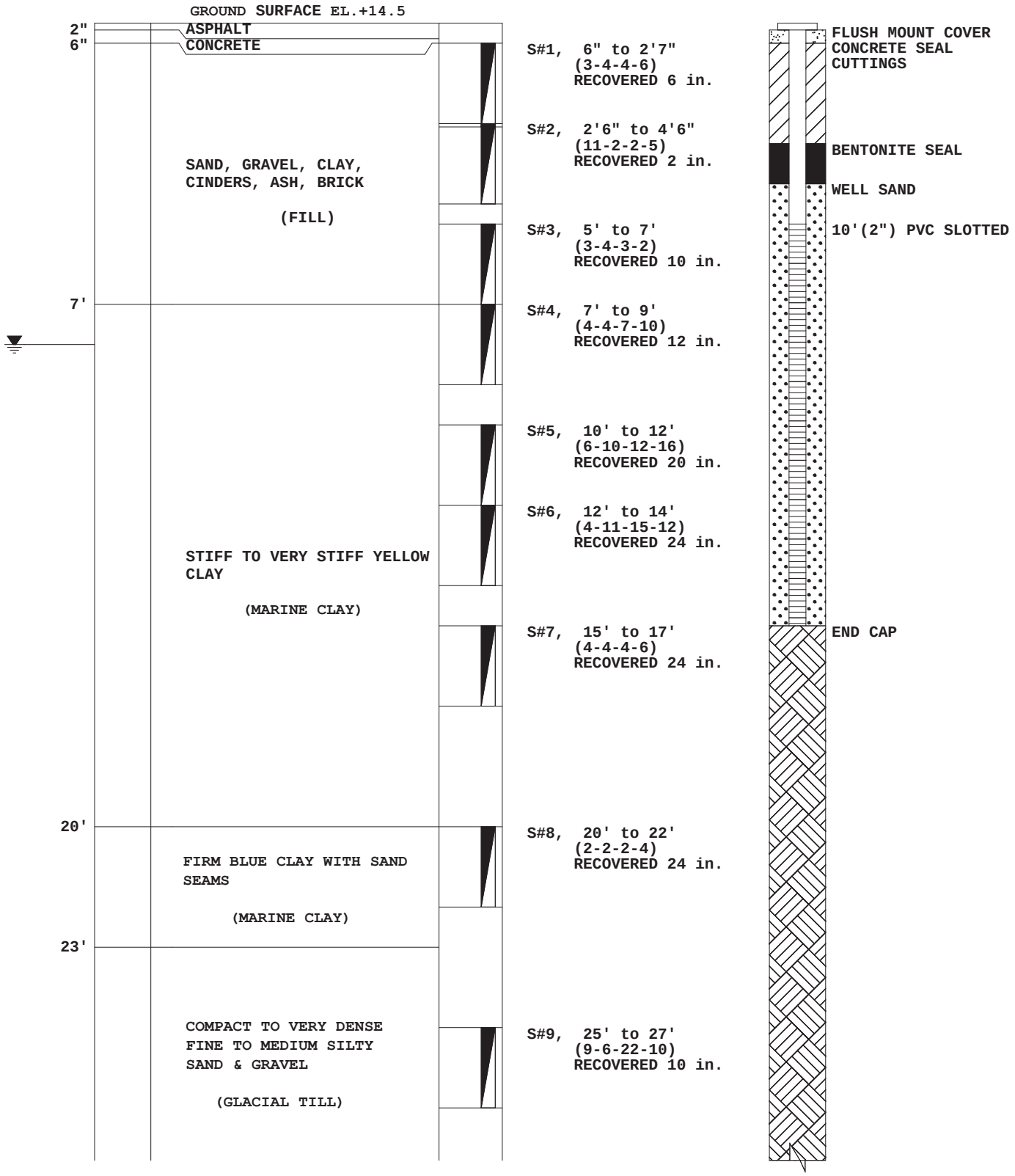
To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 11-21-2019 Job No.: 2019-236

Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 5(OW)



All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

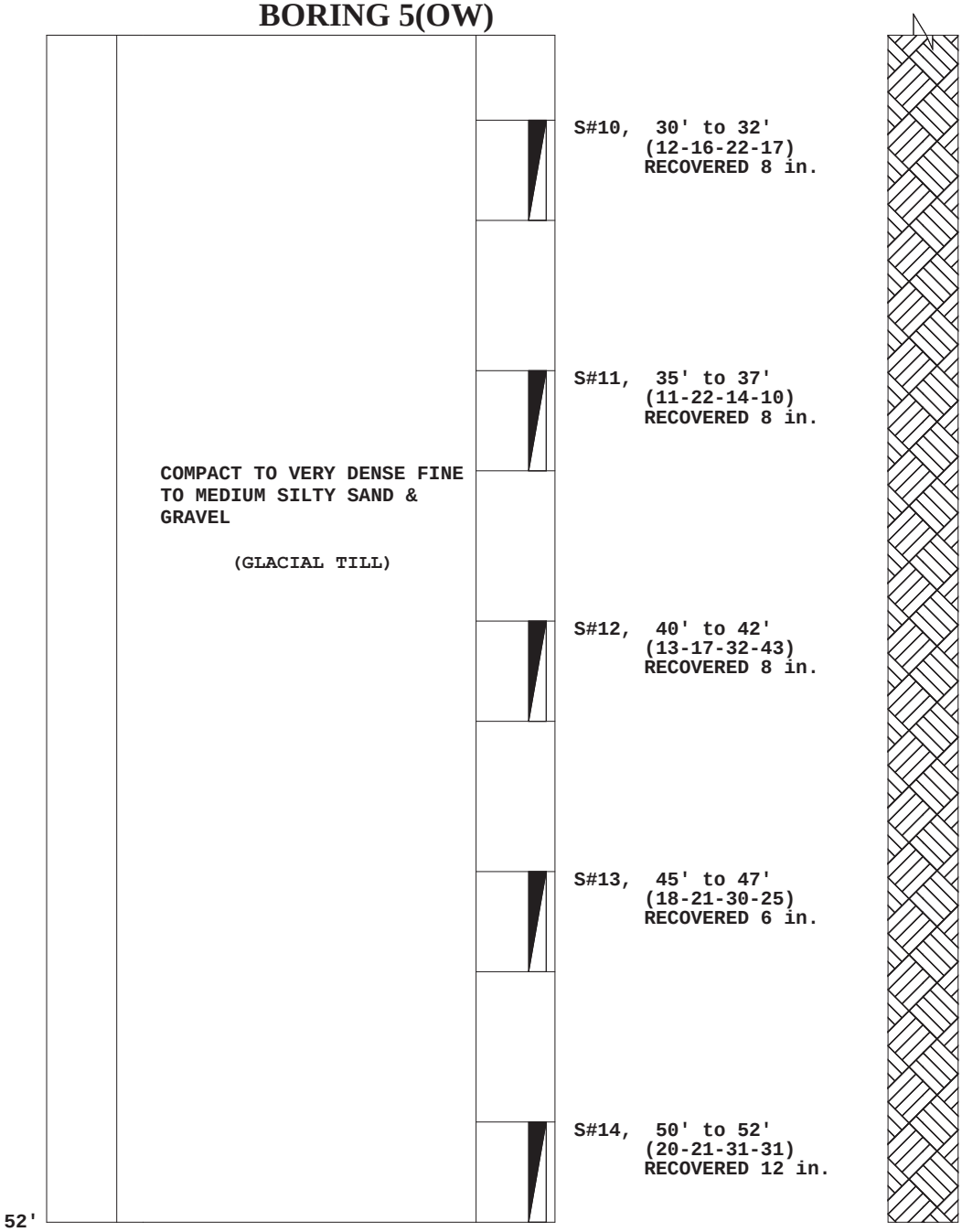
CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 11-21-2019 Job No.: 2019-236

Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 5(OW)



WATER LEVEL 8'
SIZE OF AUGERS: 2 1/4"I.D., LENGTH: 9'0"
SIZE OF CASING: NW, LENGTH: 10'0"
DRILLER: G. SMITH, INSPECTOR: M. WHITE
DATE STARTED & COMPLETED: 11-18-2019

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

CARR-DEE CORP.

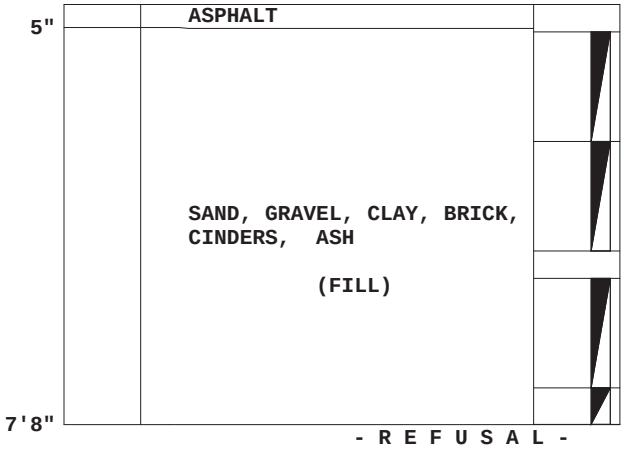
37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 11-21-2019 Job No.: 2019-236

Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 6

GROUND SURFACE EL.+15.8



S#1, 6" to 2'6"
(9-10-8-5)
RECOVERED 6 in.

S#2, 2'6" to 4'6"
(18-10-7-4)
RECOVERED 12 in.

S#3, 5' to 7'
(2-1-3-3)
RECOVERED 18 in.

S#4, 7' to 7'8"
(5-100/2)
RECOVERED 6 in.

(NO PENETRATION WITH SPLITSPOON)
NO WATER ENCOUNTERED
SIZE OF AUGERS: 3 3/4"I.D., LENGTH: 5'0"
DRILLER: G. SMITH, INSPECTOR: M. WHITE
DATE STARTED & COMPLETED: 11-20-2019

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

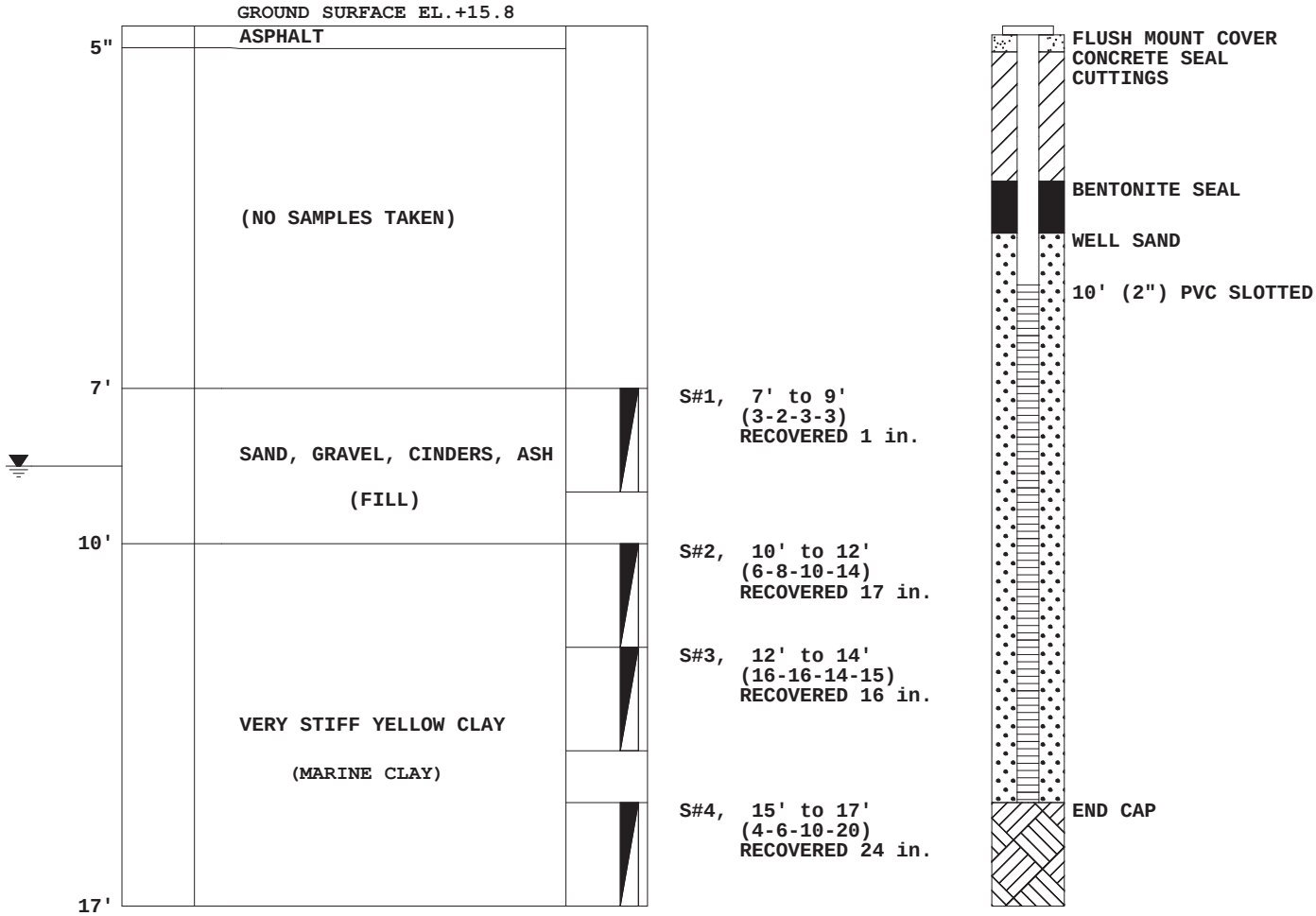
CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 11-21-2019 Job No.: 2019-236

Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 6A(OW)



WATER LEVEL 8'6"
SIZE OF AUGERS: 3 3/4"I.D., LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: M. WHITE
DATE STARTED & COMPLETED: 11-20-2019
NOTE: BORING MOVED 4'0" EAST FROM ORIGINAL LOCATION

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

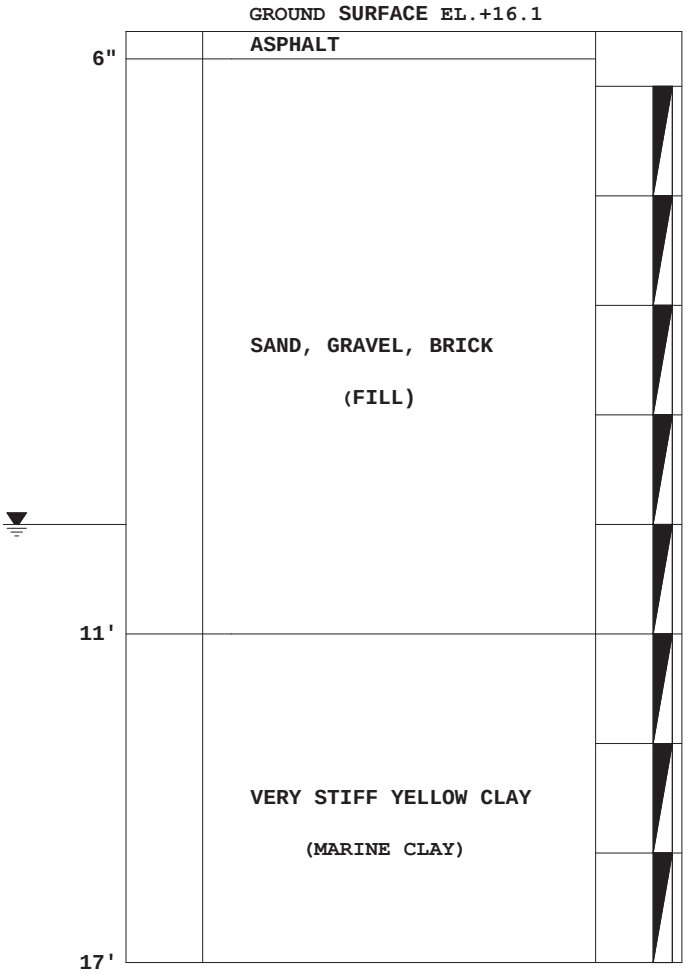
CARR-DEE CORP.

37 LINDEN STREET MEDFORD, MA 02155-0001 Telephone (781) 391-4500

To: MCPHAIL ASSOC., LLC, 2269 MASS. AVE., CAMBRIDGE, MA Date: 11-21-2019 Job No.: 2019-236

Location: 355 BENNINGTON STREET, EAST BOSTON, MA Scale: 1 in.= 3.5 ft.

BORING 7



S#1, 1' to 3'
(7-3-1-7)
RECOVERED 4 in.

S#2, 3' to 5'
(19-15-7-8)
RECOVERED 4 in.

S#3, 5' to 7'
(6-6-7-6)
RECOVERED 8 in.

S#4, 7' to 9'
(11-11-14-10)
RECOVERED 2 in.

S#5, 9' to 11'
(8-6-7-3)
RECOVERED 10 in.

S#6, 11' to 13'
(6-9-11-16)
RECOVERED 16 in.

S#7, 13' to 15'
(7-8-11-13)
RECOVERED 20 in.

S#8, 15' to 17'
(4-6-11-11)
RECOVERED 24 in.

WATER LEVEL 9'
SIZE OF AUGERS: 3 3/4"I.D., LENGTH: 15'0"
DRILLER: G. SMITH, INSPECTOR: M. WHITE
DATE STARTED & COMPLETED: 11-20-2019

All samples have been visually classified by . Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive Two-inch Split Sampler 6 inches using 140 lb. weight falling 30 inches(±). Figures in column to left (if noted) indicate number of blows to drive casing one foot, using 300 lb. weight falling 24 inches (±).

GROUNDWATER OBSERVATION REPORT

B-1 (OW)	Elevation Subtrahend : +17.5	Job No: 6900.2.00 Job Name: 355 Bennington Street; E. Boston

Date	Time	Elapsed Time	Depth To Groundwater from Ground Surface (Ft)	Elevation of Water	Remarks	Read By
11/20/2019	2:30pm	0	11.0	+6.5		MW
11/22/2019	2pm	2 Days	13.1	+4.4	Bailed 10 gallons after gauging well	JDM
11/25/2019	1pm	5 Days	12.2	+5.3		TMC

GROUNDWATER OBSERVATION REPORT

B-4 (OW)	Elevation Subtrahend : +5.7	Job No: 6900.2.00 Job Name: 355 Bennington Street; E. Boston

Date	Time	Elapsed Time	Depth To Groundwater from Ground Surface (Ft)	Elevation of Water	Remarks	Read By
11/16/2019	3pm	0	7.5	-1.8		HJB
11/22/2019	2pm	6 Days			Obstructed by parked car	JDM
11/25/2019	1pm	9 Days	0.9	+4.8		TMC

GROUNDWATER OBSERVATION REPORT

B-5(OW)	Elevation Subtrahend : +14.5	Job No: 6900.2.00 Job Name: 355 Bennington Street; E. Boston

Date	Time	Elapsed Time	Depth To Groundwater from Ground Surface (Ft)	Elevation of Water	Remarks	Read By
11/18/2019	3pm	0	8	+6.5		MW
11/22/2019	2pm	4 Days	7.2	+7.3	Bailed 10 gallons after gauging well	JDM
11/25/2019	1pm	7 Days	9.6	+4.9		TMC

GROUNDWATER OBSERVATION REPORT

B-6(OW)	Elevation Subtrahend : +15.8	Job No: 6900.2.00 Job Name: 355 Bennington Street; E. Boston

Date	Time	Elapsed Time	Depth To Groundwater from Ground Surface (Ft)	Elevation of Water	Remarks	Read By
11/20/2019	3pm	0	8.5	+7.3		MW
11/22/2019	2pm	2 Days	9.4	+6.4	Bailed 10 gallons after gauging well	JDM
11/25/2019	1pm	5 Days	8.9	+6.9		TMC

Appendix D: FEMA Firmette

National Flood Hazard Layer FIRMette

FEMA

71°1'52"W 42°23'N

71°1'15"W 42°22'33"N

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

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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 Cross Sections with 1% Annual Chance
- 17.5 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 10/8/2021 at 1:46 PM 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.

Appendix E: Existing and Proposed Drainage Figures

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02110

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC
265 Franklin Street, 6th Floor Boston, Massachusetts 02110

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE:	10/29/21	DESIGN BY:	EJR
SCALE:	1" = 20'	DRAWN BY:	EJR/JPP
APPRVD. BY:	KAC	CHECK BY:	FAK

EXISTING WATERSHED PLAN

DWG:	23109SP6.dwg
LAYOUT:	WTRSHDS-EX
SHEET:	1 OF 2

W1

1" = 20 FT.

PROJECT NO.: 23109

PLOT DATE: Nov 04, 2021 2:11 am
PATH: O:\Civil 3D Projects\23109 - Gate Residential - East Boston\DWG\

STATE PLANE COORDINATE SYSTEM (NAD83)

BREMEN STREET
(PUBLIC - 40' WIDE)
(CITY LAYOUTS L-3815, L-12388)

BENNINGTON STREET
(PUBLIC - 100' WIDE)
(CITY LAYOUT L-3131)

NEPTUNE ROAD
(PUBLIC - 100' WIDE)
(CITY LAYOUT L-4214)

EAST BOSTON/CHELSEA BYPASS ROAD

EXIST. WATERSHED E2

EXIST. WATERSHED E1

LOT AREA
50,932±S.F.
(1.1692±Ac)

1-STORY CONC. BLOCK WAREHOUSE

1-STORY CONC. BLOCK BUILDING

1-STORY CONC. BLOCK BUILDING

PORT AUTHORITY TEMPORARY EASEMENT BOOK 48451 PAGE 47 PLAN 73 OF 2015

MASS. PORT AUTHORITY MAINTENANCE EASEMENT DEED BOOK 48451 PAGE 47 PLAN 73 OF 2015

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

EXCEL ACADEMY BREMEN STREET REALTY CORPORATION
DEED BOOK 54161 PAGE 331
PLAN NO. 73 OF 2015

PEDESTRIAN EASEMENT
PLAN 154 OF 2015

ACCESS EASEMENT
PLAN NO. 73 OF 2015

0 10 20 40 80

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02110

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC
265 Franklin Street, 6th Floor Boston, Massachusetts 02110

HANCOCK ASSOCIATES

Civil Engineers

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185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE:	10/29/21	DESIGN BY:	EJR
SCALE:	1" = 20'	DRAWN BY:	EJR/JPP
APPRVD. BY:	KAC	CHECK BY:	FAK

PROPOSED WATERSHED PLAN

DWG: 23109SP6.dwg
LAYOUT: WTRSHDS-PR
SHEET: 2 OF 8

W2

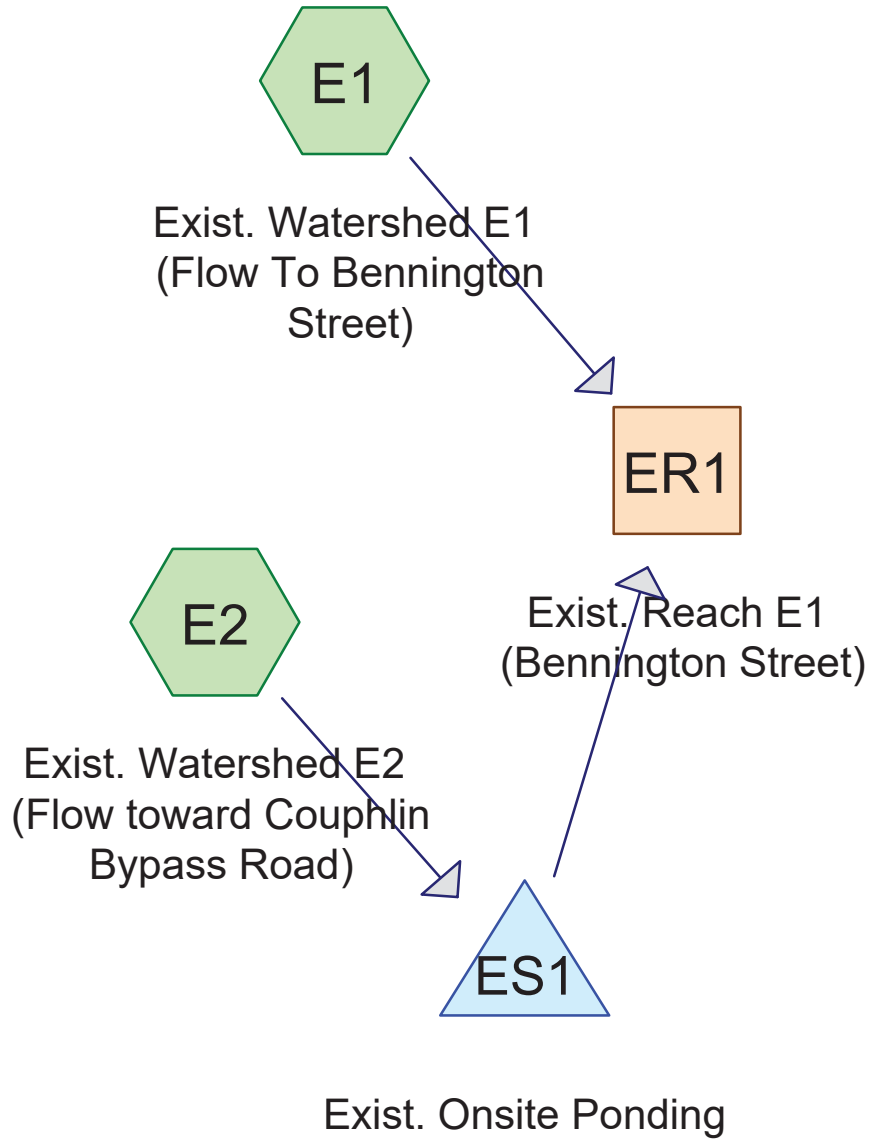
PROJECT NO.: 23109

1" = 20 FT.
0 10 20 40 80

PLOT DATE: Nov 04, 2021 2:11 pm
PATH: D:\Civil 3D Projects\23109 - Gate Residential - East Boston\DWG\

Appendix F: HydroCAD Output

Existing Conditions



Subcat Reach Pond Link

Routing Diagram for 23109-Boston-HydroCAD 2021-11-05
Prepared by Hancock Associates, Printed 11/10/2021
HydroCAD® 10.00-24 s/n 08528 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1: Exist. Watershed E1 Runoff Area=0.647 ac 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=2.01 cfs 6,964 cf

Subcatchment E2: Exist. Watershed E2 Runoff Area=0.631 ac 50.40% Impervious Runoff Depth>2.75"
Tc=6.0 min CN=96 Runoff=1.89 cfs 6,292 cf

Reach ER1: Exist. Reach E1 (Bennington Street) Inflow=2.01 cfs 6,964 cf
Outflow=2.01 cfs 6,964 cf

Pond ES1: Exist. Onsite Ponding Peak Elev=7.02' Storage=4,870 cf Inflow=1.89 cfs 6,292 cf
Discarded=0.03 cfs 1,509 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,509 cf

Summary for Subcatchment E1: Exist. Watershed E1 (Flow To Bennington Street)

Runoff = 2.01 cfs @ 12.08 hrs, Volume= 6,964 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.150	98	Roofs
*	0.497	98	Paved Parking
	0.647	98	Weighted Average
	0.647		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 1/10 Hour Minimum**

Summary for Subcatchment E2: Exist. Watershed E2 (Flow toward Couphlin Bypass Road)

Runoff = 1.89 cfs @ 12.08 hrs, Volume= 6,292 cf, Depth> 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.034	98	Paved Parking
	0.271	96	Gravel surface, HSG C
*	0.218	98	Roofs
*	0.066	98	Impervious (offsite)
	0.042	74	>75% Grass cover, Good, HSG C
	0.631	96	Weighted Average
	0.313		49.60% Pervious Area
	0.318		50.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 1/10 Hour Minimum**

Summary for Reach ER1: Exist. Reach E1 (Bennington Street)

Inflow Area = 55,670 sf, 75.51% Impervious, Inflow Depth > 1.50" for 2-Year Storm event
Inflow = 2.01 cfs @ 12.08 hrs, Volume= 6,964 cf
Outflow = 2.01 cfs @ 12.08 hrs, Volume= 6,964 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond ES1: Exist. Onsite Ponding

Inflow Area = 27,486 sf, 50.40% Impervious, Inflow Depth > 2.75" for 2-Year Storm event
Inflow = 1.89 cfs @ 12.08 hrs, Volume= 6,292 cf
Outflow = 0.03 cfs @ 19.51 hrs, Volume= 1,509 cf, Atten= 99%, Lag= 445.6 min
Discarded = 0.03 cfs @ 19.51 hrs, Volume= 1,509 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 7.02' @ 19.51 hrs Surf.Area= 7,068 sf Storage= 4,870 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 182.7 min (956.2 - 773.5)

Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	13,145 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
6.00	2,486	0	0
7.00	7,023	4,755	4,755
8.00	9,758	8,391	13,145

Device	Routing	Invert	Outlet Devices
#1	Primary	7.87'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	6.00'	**0.170 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 19.51 hrs HW=7.02' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=6.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1: Exist. Watershed E1 Runoff Area=0.647 ac 100.00% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=98 Runoff=2.91 cfs 10,241 cf

Subcatchment E2: Exist. Watershed E2 Runoff Area=0.631 ac 50.40% Impervious Runoff Depth>4.13"
Tc=6.0 min CN=96 Runoff=2.78 cfs 9,464 cf

Reach ER1: Exist. Reach E1 (Bennington Street) Inflow=2.91 cfs 10,241 cf
Outflow=2.91 cfs 10,241 cf

Pond ES1: Exist. Onsite Ponding Peak Elev=7.39' Storage=7,722 cf Inflow=2.78 cfs 9,464 cf
Discarded=0.03 cfs 1,767 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,767 cf

Summary for Pond ES1: Exist. Onsite Ponding

Inflow Area = 27,486 sf, 50.40% Impervious, Inflow Depth > 4.13" for 10-Year Storm event
Inflow = 2.78 cfs @ 12.08 hrs, Volume= 9,464 cf
Outflow = 0.03 cfs @ 21.90 hrs, Volume= 1,767 cf, Atten= 99%, Lag= 589.0 min
Discarded = 0.03 cfs @ 21.90 hrs, Volume= 1,767 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 7.39' @ 21.90 hrs Surf.Area= 8,097 sf Storage= 7,722 cf

Plug-Flow detention time= 413.1 min calculated for 1,767 cf (19% of inflow)
Center-of-Mass det. time= 177.4 min (941.3 - 763.8)

Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	13,145 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
6.00	2,486	0	0
7.00	7,023	4,755	4,755
8.00	9,758	8,391	13,145

Device	Routing	Invert	Outlet Devices
#1	Primary	7.87'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	6.00'	**0.170 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.03 cfs @ 21.90 hrs HW=7.39' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=6.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond ES1: Exist. Onsite Ponding

Inflow Area = 27,486 sf, 50.40% Impervious, Inflow Depth > 6.52" for 100-Year Storm event
Inflow = 4.29 cfs @ 12.08 hrs, Volume= 14,931 cf
Outflow = 0.10 cfs @ 16.84 hrs, Volume= 2,996 cf, Atten= 98%, Lag= 285.5 min
Discarded = 0.04 cfs @ 16.84 hrs, Volume= 2,108 cf
Primary = 0.06 cfs @ 16.84 hrs, Volume= 887 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 7.89' @ 16.84 hrs Surf.Area= 9,452 sf Storage= 12,070 cf

Plug-Flow detention time= 476.3 min calculated for 2,996 cf (20% of inflow)
Center-of-Mass det. time= 230.3 min (984.7 - 754.4)

Volume	Invert	Avail.Storage	Storage Description
#1	6.00'	13,145 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
6.00	2,486	0	0
7.00	7,023	4,755	4,755
8.00	9,758	8,391	13,145

Device	Routing	Invert	Outlet Devices
#1	Primary	7.87'	**10.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	6.00'	**0.170 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 16.84 hrs HW=7.89' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.06 cfs @ 16.84 hrs HW=7.89' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.34 fps)

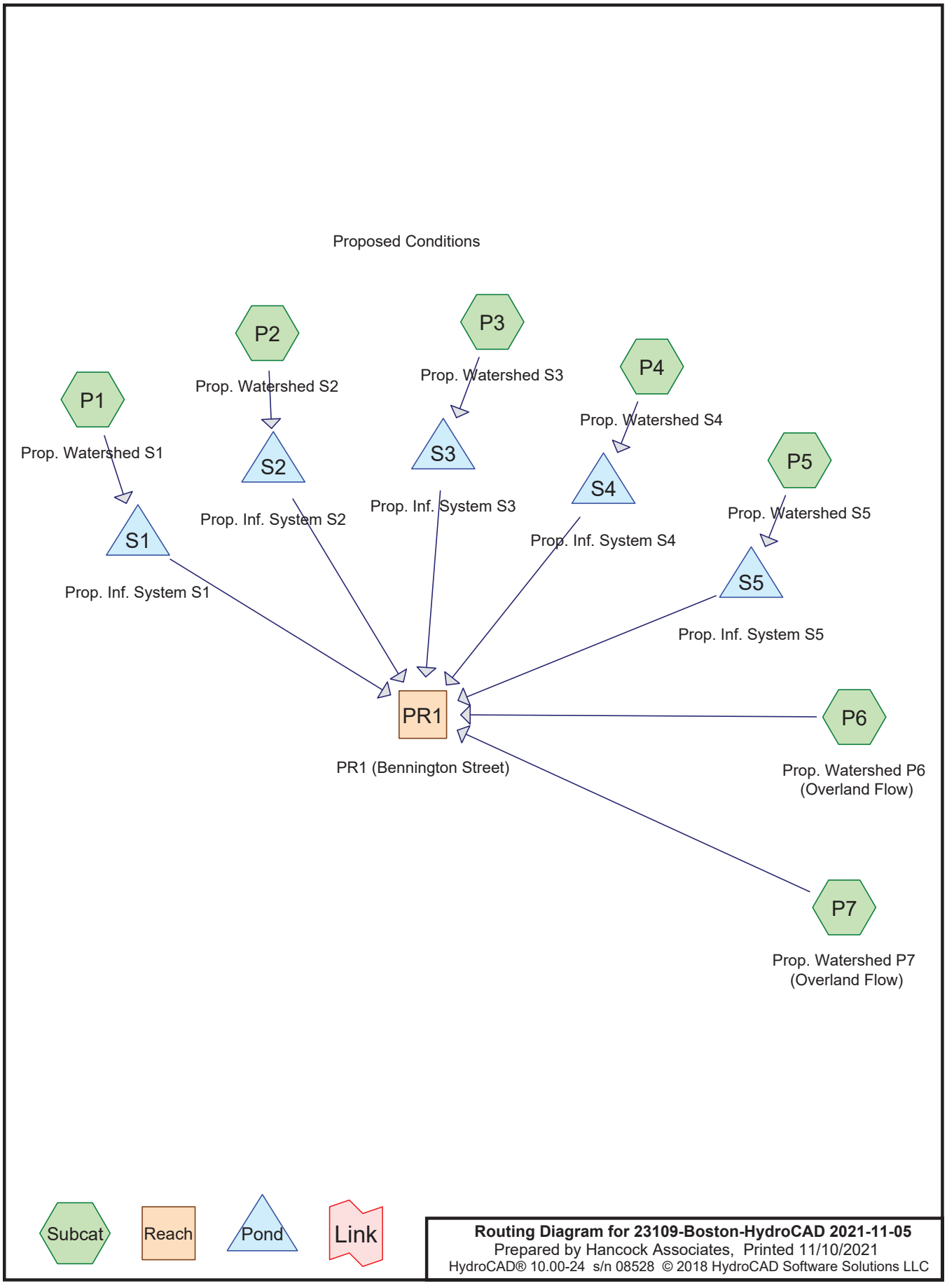
Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1: Exist. Watershed E1 Runoff Area=0.647 ac 100.00% Impervious Runoff Depth>6.76"
Tc=6.0 min CN=98 Runoff=4.44 cfs 15,866 cf

Subcatchment E2: Exist. Watershed E2 Runoff Area=0.631 ac 50.40% Impervious Runoff Depth>6.52"
Tc=6.0 min CN=96 Runoff=4.29 cfs 14,931 cf

Reach ER1: Exist. Reach E1 (Bennington Street) Inflow=4.44 cfs 16,754 cf
Outflow=4.44 cfs 16,754 cf

Pond ES1: Exist. Onsite Ponding Peak Elev=7.89' Storage=12,070 cf Inflow=4.29 cfs 14,931 cf
Discarded=0.04 cfs 2,108 cf Primary=0.06 cfs 887 cf Outflow=0.10 cfs 2,996 cf



Routing Diagram for 23109-Boston-HydroCAD 2021-11-05
Prepared by Hancock Associates, Printed 11/10/2021

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1: Prop. Watershed S1 Runoff Area=0.293 ac 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=0.91 cfs 3,154 cf

Subcatchment P2: Prop. Watershed S2 Runoff Area=0.059 ac 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=0.18 cfs 635 cf

Subcatchment P3: Prop. Watershed S3 Runoff Area=0.161 ac 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=0.50 cfs 1,733 cf

Subcatchment P4: Prop. Watershed S4 Runoff Area=0.228 ac 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=0.71 cfs 2,454 cf

Subcatchment P5: Prop. Watershed S5 Runoff Area=0.395 ac 96.46% Impervious Runoff Depth>2.85"
Tc=6.0 min CN=97 Runoff=1.21 cfs 4,093 cf

Subcatchment P6: Prop. Watershed P6 Runoff Area=0.089 ac 100.00% Impervious Runoff Depth>2.97"
Tc=6.0 min CN=98 Runoff=0.28 cfs 958 cf

Subcatchment P7: Prop. Watershed P7 Runoff Area=0.053 ac 71.70% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=91 Runoff=0.14 cfs 434 cf

Reach PR1: PR1 (Bennington Street) Inflow=1.28 cfs 7,050 cf
Outflow=1.28 cfs 7,050 cf

Pond S1: Prop. Inf. System S1 Peak Elev=14.94' Storage=0.024 af Inflow=0.91 cfs 3,154 cf
Discarded=0.00 cfs 160 cf Primary=0.58 cfs 2,253 cf Outflow=0.59 cfs 2,413 cf

Pond S2: Prop. Inf. System S2 Peak Elev=6.43' Storage=0.008 af Inflow=0.18 cfs 635 cf
Discarded=0.00 cfs 115 cf Primary=0.07 cfs 177 cf Outflow=0.07 cfs 292 cf

Pond S3: Prop. Inf. System S3 Peak Elev=5.45' Storage=0.022 af Inflow=0.50 cfs 1,733 cf
Discarded=0.00 cfs 211 cf Primary=0.12 cfs 644 cf Outflow=0.12 cfs 855 cf

Pond S4: Prop. Inf. System S4 Peak Elev=11.24' Storage=782 cf Inflow=0.71 cfs 2,454 cf
Discarded=0.00 cfs 257 cf Primary=0.37 cfs 1,776 cf Outflow=0.37 cfs 2,032 cf

Pond S5: Prop. Inf. System S5 Peak Elev=5.25' Storage=0.064 af Inflow=1.21 cfs 4,093 cf
Discarded=0.01 cfs 672 cf Primary=0.05 cfs 808 cf Outflow=0.06 cfs 1,480 cf

Summary for Subcatchment P1: Prop. Watershed S1

Runoff = 0.91 cfs @ 12.08 hrs, Volume= 3,154 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.293	98	Roofs
	0.293		100.00% Impervious Area

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

Summary for Subcatchment P2: Prop. Watershed S2

Runoff = 0.18 cfs @ 12.08 hrs, Volume= 635 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.059	98	Roofs
	0.059		100.00% Impervious Area

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

Summary for Subcatchment P3: Prop. Watershed S3

Runoff = 0.50 cfs @ 12.08 hrs, Volume= 1,733 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.161	98	Roofs
	0.161		100.00% Impervious Area

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

Summary for Subcatchment P4: Prop. Watershed S4

Runoff = 0.71 cfs @ 12.08 hrs, Volume= 2,454 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.228	98	Roofs
	0.228		100.00% Impervious Area

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

Summary for Subcatchment P5: Prop. Watershed S5

Runoff = 1.21 cfs @ 12.08 hrs, Volume= 4,093 cf, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.151	98	Roof
*	0.230	98	Impervious
	0.014	74	>75% Grass cover, Good, HSG C
	0.395	97	Weighted Average
	0.014		3.54% Pervious Area
	0.381		96.46% Impervious Area

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

Summary for Subcatchment P6: Prop. Watershed P6 (Overland Flow)

Runoff = 0.28 cfs @ 12.08 hrs, Volume= 958 cf, Depth> 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.089	98	Paved Parking
	0.089		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 1/10 Hour Minimum**

Summary for Subcatchment P7: Prop. Watershed P7 (Overland Flow)

Runoff = 0.14 cfs @ 12.09 hrs, Volume= 434 cf, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

	Area (ac)	CN	Description
*	0.038	98	Paved Parking
	0.015	74	>75% Grass cover, Good, HSG C
	0.053	91	Weighted Average
	0.015		28.30% Pervious Area
	0.038		71.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 1/10 Hour Minimum**

Summary for Reach PR1: PR1 (Bennington Street)

Inflow Area = 55,670 sf, 97.73% Impervious, Inflow Depth > 1.52" for 2-Year Storm event
Inflow = 1.28 cfs @ 12.12 hrs, Volume= 7,050 cf
Outflow = 1.28 cfs @ 12.12 hrs, Volume= 7,050 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond S1: Prop. Inf. System S1

Inflow Area = 12,763 sf,100.00% Impervious, Inflow Depth > 2.97" for 2-Year Storm event
Inflow = 0.91 cfs @ 12.08 hrs, Volume= 3,154 cf
Outflow = 0.59 cfs @ 12.17 hrs, Volume= 2,413 cf, Atten= 36%, Lag= 5.5 min
Discarded = 0.00 cfs @ 12.17 hrs, Volume= 160 cf
Primary = 0.58 cfs @ 12.17 hrs, Volume= 2,253 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 14.94' @ 12.17 hrs Surf.Area= 0.009 ac Storage= 0.024 af

Plug-Flow detention time= 151.4 min calculated for 2,413 cf (77% of inflow)
Center-of-Mass det. time= 68.6 min (824.4 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.00'	0.003 af	**11.00'W x 17.00'L x 5.00'H Field A** 0.021 af Overall - 0.012 af Embedded = 0.009 af x 30.0% Voids
#2A	12.00'	0.012 af	**Brentwood StormTank 48"** x 30 Inside #1 Inside= 18.0"W x 48.0"H => 5.77 sf x 3.00'L = 17.3 cf Outside= 18.0"W x 48.0"H => 6.00 sf x 3.00'L = 18.0 cf 30 Chambers in 6 Rows
#3B	7.50'	0.002 af	**11.00'W x 17.00'L x 4.50'H Field B** 0.019 af Overall - 0.012 af Embedded = 0.007 af x 30.0% Voids
#4B	8.00'	0.012 af	**Brentwood StormTank 48"** x 30 Inside #3

Inside= 18.0"W x 48.0"H => 5.77 sf x 3.00'L = 17.3 cf
Outside= 18.0"W x 48.0"H => 6.00 sf x 3.00'L = 18.0 cf
30 Chambers in 6 Rows

0.029 af Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**8.0" Round Culvert** L= 5.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.00' / -2.79' S= 2.1580 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	16.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	12.85'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	7.50'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.17 hrs HW=14.94' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.58 cfs @ 12.17 hrs HW=14.94' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.58 cfs of 3.81 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.58 cfs @ 6.67 fps)

Summary for Pond S2: Prop. Inf. System S2

Inflow Area = 2,570 sf,100.00% Impervious, Inflow Depth > 2.97" for 2-Year Storm event
Inflow = 0.18 cfs @ 12.08 hrs, Volume= 635 cf
Outflow = 0.07 cfs @ 12.31 hrs, Volume= 292 cf, Atten= 62%, Lag= 13.6 min
Discarded = 0.00 cfs @ 12.31 hrs, Volume= 115 cf
Primary = 0.07 cfs @ 12.31 hrs, Volume= 177 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 6.43' @ 12.31 hrs Surf.Area= 0.005 ac Storage= 0.008 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 104.2 min (860.0 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1B	3.50'	0.003 af	**6.50'W x 35.00'L x 3.00'H Field B** 0.016 af Overall - 0.005 af Embedded = 0.011 af x 30.0% Voids
#2B	4.00'	0.005 af	**Brentwood StormTank 18"** x 33 Inside #1 Inside= 18.0"W x 18.0"H => 2.15 sf x 3.00'L = 6.4 cf Outside= 18.0"W x 18.0"H => 2.25 sf x 3.00'L = 6.8 cf 33 Chambers in 3 Rows

0.008 af Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	3.50'	**8.0" Round Culvert** L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 3.50' / 0.05' S= 0.1150 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.40'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	3.50'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.31 hrs HW=6.43' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.07 cfs @ 12.31 hrs HW=6.43' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.07 cfs of 2.71 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.53 fps)

Summary for Pond S3: Prop. Inf. System S3

Inflow Area = 7,013 sf,100.00% Impervious, Inflow Depth > 2.97" for 2-Year Storm event
Inflow = 0.50 cfs @ 12.08 hrs, Volume= 1,733 cf
Outflow = 0.12 cfs @ 12.46 hrs, Volume= 855 cf, Atten= 76%, Lag= 22.9 min
Discarded = 0.00 cfs @ 12.46 hrs, Volume= 211 cf
Primary = 0.12 cfs @ 12.46 hrs, Volume= 644 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5.45' @ 12.46 hrs Surf.Area= 0.012 ac Storage= 0.022 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 114.0 min (869.9 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1C	3.00'	0.007 af	**17.00'W x 32.00'L x 3.50'H Field C** 0.044 af Overall - 0.021 af Embedded = 0.023 af x 30.0% Voids
#2C	3.50'	0.020 af	**Brentwood StormTank 24"** x 100 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 100 Chambers in 10 Rows
		0.027 af	Total Available Storage

Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	3.83'	**8.0" Round Culvert** L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 3.83' / 0.50' S= 0.0574 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.30'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	5.20'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	3.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.46 hrs HW=5.45' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.12 cfs @ 12.46 hrs HW=5.45' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.12 cfs of 1.90 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.12 cfs @ 1.69 fps)

Summary for Pond S4: Prop. Inf. System S4

Inflow Area = 9,932 sf,100.00% Impervious, Inflow Depth > 2.97" for 2-Year Storm event
Inflow = 0.71 cfs @ 12.08 hrs, Volume= 2,454 cf
Outflow = 0.37 cfs @ 12.21 hrs, Volume= 2,032 cf, Atten= 47%, Lag= 7.7 min
Discarded = 0.00 cfs @ 12.21 hrs, Volume= 257 cf
Primary = 0.37 cfs @ 12.21 hrs, Volume= 1,776 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 11.24' @ 12.21 hrs Surf.Area= 580 sf Storage= 782 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 57.6 min (813.4 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1D	9.00'	404 cf	**5.00'W x 116.00'L x 3.50'H Field D** 2,030 cf Overall - 684 cf Embedded = 1,346 cf x 30.0% Voids
#2D	9.50'	658 cf	**Brentwood StormTank 24"** x 76 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 76 Chambers in 2 Rows
		1,062 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	9.40'	**8.0" Round Culvert** L= 37.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 9.40' / 9.20' S= 0.0054 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	12.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	10.30'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	9.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.21 hrs HW=11.24' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.37 cfs @ 12.21 hrs HW=11.24' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.37 cfs of 1.82 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.37 cfs @ 4.22 fps)

Summary for Pond S5: Prop. Inf. System S5

Inflow Area = 17,206 sf, 96.46% Impervious, Inflow Depth > 2.85" for 2-Year Storm event
Inflow = 1.21 cfs @ 12.08 hrs, Volume= 4,093 cf
Outflow = 0.06 cfs @ 14.12 hrs, Volume= 1,480 cf, Atten= 95%, Lag= 122.5 min
Discarded = 0.01 cfs @ 14.12 hrs, Volume= 672 cf
Primary = 0.05 cfs @ 14.12 hrs, Volume= 808 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5.25' @ 14.12 hrs Surf.Area= 0.040 ac Storage= 0.064 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 163.3 min (928.8 - 765.5)

Volume	Invert	Avail.Storage	Storage Description
#1D	3.00'	0.023 af	**9.50'W x 185.00'L x 3.50'H Field D** 0.141 af Overall - 0.063 af Embedded = 0.078 af x 30.0% Voids
#2D	3.50'	0.061 af	**Brentwood StormTank 24"** x 305 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 305 Chambers in 5 Rows
		0.084 af	Total Available Storage

Storage Group D created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.25'	**8.0" Round Culvert** L= 111.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1.25' / 0.05' S= 0.0108 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.10'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	5.10'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	3.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 14.12 hrs HW=5.25' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.05 cfs @ 14.12 hrs HW=5.25' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.05 cfs of 2.48 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 1.32 fps)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1: Prop. Watershed S1 Runoff Area=0.293 ac 100.00% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=98 Runoff=1.32 cfs 4,638 cf

Subcatchment P2: Prop. Watershed S2 Runoff Area=0.059 ac 100.00% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=98 Runoff=0.27 cfs 934 cf

Subcatchment P3: Prop. Watershed S3 Runoff Area=0.161 ac 100.00% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=98 Runoff=0.72 cfs 2,548 cf

Subcatchment P4: Prop. Watershed S4 Runoff Area=0.228 ac 100.00% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=98 Runoff=1.02 cfs 3,609 cf

Subcatchment P5: Prop. Watershed S5 Runoff Area=0.395 ac 96.46% Impervious Runoff Depth>4.25"
Tc=6.0 min CN=97 Runoff=1.76 cfs 6,087 cf

Subcatchment P6: Prop. Watershed P6 Runoff Area=0.089 ac 100.00% Impervious Runoff Depth>4.36"
Tc=6.0 min CN=98 Runoff=0.40 cfs 1,409 cf

Subcatchment P7: Prop. Watershed P7 Runoff Area=0.053 ac 71.70% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=91 Runoff=0.22 cfs 691 cf

Reach PR1: PR1 (Bennington Street) Inflow=2.57 cfs 13,375 cf
Outflow=2.57 cfs 13,375 cf

Pond S1: Prop. Inf. System S1 Peak Elev=16.74' Storage=0.028 af Inflow=1.32 cfs 4,638 cf
Discarded=0.00 cfs 172 cf Primary=0.90 cfs 3,724 cf Outflow=0.90 cfs 3,895 cf

Pond S2: Prop. Inf. System S2 Peak Elev=6.46' Storage=0.008 af Inflow=0.27 cfs 934 cf
Discarded=0.00 cfs 120 cf Primary=0.26 cfs 470 cf Outflow=0.27 cfs 590 cf

Pond S3: Prop. Inf. System S3 Peak Elev=6.32' Storage=0.026 af Inflow=0.72 cfs 2,548 cf
Discarded=0.00 cfs 221 cf Primary=0.45 cfs 1,444 cf Outflow=0.45 cfs 1,665 cf

Pond S4: Prop. Inf. System S4 Peak Elev=12.03' Storage=980 cf Inflow=1.02 cfs 3,609 cf
Discarded=0.01 cfs 272 cf Primary=0.53 cfs 2,909 cf Outflow=0.53 cfs 3,182 cf

Pond S5: Prop. Inf. System S5 Peak Elev=5.98' Storage=0.078 af Inflow=1.76 cfs 6,087 cf
Discarded=0.01 cfs 716 cf Primary=0.36 cfs 2,729 cf Outflow=0.37 cfs 3,444 cf

Summary for Pond S1: Prop. Inf. System S1

Inflow Area = 12,763 sf,100.00% Impervious, Inflow Depth > 4.36" for 10-Year Storm event
Inflow = 1.32 cfs @ 12.08 hrs, Volume= 4,638 cf
Outflow = 0.90 cfs @ 12.17 hrs, Volume= 3,895 cf, Atten= 32%, Lag= 5.3 min
Discarded = 0.00 cfs @ 12.17 hrs, Volume= 172 cf
Primary = 0.90 cfs @ 12.17 hrs, Volume= 3,724 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 16.74' @ 12.17 hrs Surf.Area= 0.009 ac Storage= 0.028 af

Plug-Flow detention time= 127.2 min calculated for 3,895 cf (84% of inflow)
Center-of-Mass det. time= 59.8 min (808.7 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.00'	0.003 af	**11.00'W x 17.00'L x 5.00'H Field A** 0.021 af Overall - 0.012 af Embedded = 0.009 af x 30.0% Voids
#2A	12.00'	0.012 af	**Brentwood StormTank 48"** x 30 Inside #1 Inside= 18.0"W x 48.0"H => 5.77 sf x 3.00'L = 17.3 cf Outside= 18.0"W x 48.0"H => 6.00 sf x 3.00'L = 18.0 cf 30 Chambers in 6 Rows
#3B	7.50'	0.002 af	**11.00'W x 17.00'L x 4.50'H Field B** 0.019 af Overall - 0.012 af Embedded = 0.007 af x 30.0% Voids
#4B	8.00'	0.012 af	**Brentwood StormTank 48"** x 30 Inside #3 Inside= 18.0"W x 48.0"H => 5.77 sf x 3.00'L = 17.3 cf Outside= 18.0"W x 48.0"H => 6.00 sf x 3.00'L = 18.0 cf 30 Chambers in 6 Rows
		0.029 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**8.0" Round Culvert** L= 5.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.00' / -2.79' S= 2.1580 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	16.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	12.85'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	7.50'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.17 hrs HW=16.73' (Free Discharge)
↑└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.89 cfs @ 12.17 hrs HW=16.73' TW=0.00' (Dynamic Tailwater)
↑└**1=Culvert** (Passes 0.89 cfs of 4.30 cfs potential flow)
↑ ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.08 cfs @ 0.60 fps)
└**3=Orifice/Grate** (Orifice Controls 0.81 cfs @ 9.28 fps)

Summary for Pond S2: Prop. Inf. System S2

Inflow Area = 2,570 sf,100.00% Impervious, Inflow Depth > 4.36" for 10-Year Storm event
Inflow = 0.27 cfs @ 12.08 hrs, Volume= 934 cf
Outflow = 0.27 cfs @ 12.09 hrs, Volume= 590 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.00 cfs @ 12.09 hrs, Volume= 120 cf
Primary = 0.26 cfs @ 12.09 hrs, Volume= 470 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 6.46' @ 12.09 hrs Surf.Area= 0.005 ac Storage= 0.008 af

Plug-Flow detention time= 181.0 min calculated for 590 cf (63% of inflow)
Center-of-Mass det. time= 76.4 min (825.3 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1B	3.50'	0.003 af	**6.50'W x 35.00'L x 3.00'H Field B** 0.016 af Overall - 0.005 af Embedded = 0.011 af x 30.0% Voids
#2B	4.00'	0.005 af	**Brentwood StormTank 18"** x 33 Inside #1 Inside= 18.0"W x 18.0"H => 2.15 sf x 3.00'L = 6.4 cf Outside= 18.0"W x 18.0"H => 2.25 sf x 3.00'L = 6.8 cf 33 Chambers in 3 Rows
		0.008 af	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	3.50'	**8.0" Round Culvert** L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 3.50' / 0.05' S= 0.1150 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.40'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	3.50'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.09 hrs HW=6.46' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.26 cfs @ 12.09 hrs HW=6.46' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.26 cfs of 2.73 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.26 cfs @ 0.83 fps)

Summary for Pond S3: Prop. Inf. System S3

Inflow Area = 7,013 sf,100.00% Impervious, Inflow Depth > 4.36" for 10-Year Storm event
Inflow = 0.72 cfs @ 12.08 hrs, Volume= 2,548 cf
Outflow = 0.45 cfs @ 12.18 hrs, Volume= 1,665 cf, Atten= 38%, Lag= 5.9 min
Discarded = 0.00 cfs @ 12.18 hrs, Volume= 221 cf
Primary = 0.45 cfs @ 12.18 hrs, Volume= 1,444 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 6.32' @ 12.18 hrs Surf.Area= 0.012 ac Storage= 0.026 af

Plug-Flow detention time= 189.0 min calculated for 1,665 cf (65% of inflow)
Center-of-Mass det. time= 87.4 min (836.3 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1C	3.00'	0.007 af	**17.00'W x 32.00'L x 3.50'H Field C** 0.044 af Overall - 0.021 af Embedded = 0.023 af x 30.0% Voids
#2C	3.50'	0.020 af	**Brentwood StormTank 24"** x 100 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 100 Chambers in 10 Rows
		0.027 af	Total Available Storage

Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	3.83'	**8.0" Round Culvert** L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 3.83' / 0.50' S= 0.0574 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.30'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	5.20'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	3.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.18 hrs HW=6.32' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.44 cfs @ 12.18 hrs HW=6.32' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.44 cfs of 2.47 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.45 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.41 cfs @ 4.70 fps)

Summary for Pond S4: Prop. Inf. System S4

Inflow Area = 9,932 sf,100.00% Impervious, Inflow Depth > 4.36" for 10-Year Storm event
Inflow = 1.02 cfs @ 12.08 hrs, Volume= 3,609 cf
Outflow = 0.53 cfs @ 12.22 hrs, Volume= 3,182 cf, Atten= 48%, Lag= 7.9 min
Discarded = 0.01 cfs @ 12.22 hrs, Volume= 272 cf
Primary = 0.53 cfs @ 12.22 hrs, Volume= 2,909 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 12.03' @ 12.22 hrs Surf.Area= 580 sf Storage= 980 cf

Plug-Flow detention time= 108.5 min calculated for 3,182 cf (88% of inflow)
Center-of-Mass det. time= 52.9 min (801.8 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1D	9.00'	404 cf	**5.00'W x 116.00'L x 3.50'H Field D** 2,030 cf Overall - 684 cf Embedded = 1,346 cf x 30.0% Voids
#2D	9.50'	658 cf	**Brentwood StormTank 24"** x 76 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 76 Chambers in 2 Rows
		1,062 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	9.40'	**8.0" Round Culvert** L= 37.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 9.40' / 9.20' S= 0.0054 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	12.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	10.30'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	9.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.22 hrs HW=12.03' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.53 cfs @ 12.22 hrs HW=12.03' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.53 cfs of 2.25 cfs potential flow)
  └**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.53 cfs @ 6.02 fps)

Summary for Pond S5: Prop. Inf. System S5

Inflow Area = 17,206 sf, 96.46% Impervious, Inflow Depth > 4.25" for 10-Year Storm event
Inflow = 1.76 cfs @ 12.08 hrs, Volume= 6,087 cf
Outflow = 0.37 cfs @ 12.50 hrs, Volume= 3,444 cf, Atten= 79%, Lag= 24.9 min
Discarded = 0.01 cfs @ 12.50 hrs, Volume= 716 cf
Primary = 0.36 cfs @ 12.50 hrs, Volume= 2,729 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 5.98' @ 12.50 hrs Surf.Area= 0.040 ac Storage= 0.078 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 113.7 min (870.7 - 757.0)

Volume	Invert	Avail.Storage	Storage Description
#1D	3.00'	0.023 af	**9.50'W x 185.00'L x 3.50'H Field D** 0.141 af Overall - 0.063 af Embedded = 0.078 af x 30.0% Voids
#2D	3.50'	0.061 af	**Brentwood StormTank 24"** x 305 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 305 Chambers in 5 Rows
		0.084 af	Total Available Storage

Storage Group D created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.25'	**8.0" Round Culvert** L= 111.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1.25' / 0.05' S= 0.0108 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.10'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	5.10'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	3.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.50 hrs HW=5.98' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.36 cfs @ 12.50 hrs HW=5.98' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.36 cfs of 2.67 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.36 cfs @ 4.08 fps)

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment P1: Prop. Watershed S1 Runoff Area=0.293 ac 100.00% Impervious Runoff Depth>6.76"
Tc=6.0 min CN=98 Runoff=2.01 cfs 7,185 cf

Subcatchment P2: Prop. Watershed S2 Runoff Area=0.059 ac 100.00% Impervious Runoff Depth>6.76"
Tc=6.0 min CN=98 Runoff=0.41 cfs 1,447 cf

Subcatchment P3: Prop. Watershed S3 Runoff Area=0.161 ac 100.00% Impervious Runoff Depth>6.76"
Tc=6.0 min CN=98 Runoff=1.11 cfs 3,948 cf

Subcatchment P4: Prop. Watershed S4 Runoff Area=0.228 ac 100.00% Impervious Runoff Depth>6.76"
Tc=6.0 min CN=98 Runoff=1.57 cfs 5,591 cf

Subcatchment P5: Prop. Watershed S5 Runoff Area=0.395 ac 96.46% Impervious Runoff Depth>6.64"
Tc=6.0 min CN=97 Runoff=2.70 cfs 9,516 cf

Subcatchment P6: Prop. Watershed P6 Runoff Area=0.089 ac 100.00% Impervious Runoff Depth>6.76"
Tc=6.0 min CN=98 Runoff=0.61 cfs 2,183 cf

Subcatchment P7: Prop. Watershed P7 Runoff Area=0.053 ac 71.70% Impervious Runoff Depth>5.93"
Tc=6.0 min CN=91 Runoff=0.35 cfs 1,142 cf

Reach PR1: PR1 (Bennington Street) Inflow=8.65 cfs 24,330 cf
Outflow=8.65 cfs 24,330 cf

Pond S1: Prop. Inf. System S1 Peak Elev=16.90' Storage=0.029 af Inflow=2.01 cfs 7,185 cf
Discarded=0.00 cfs 185 cf Primary=2.03 cfs 6,255 cf Outflow=2.03 cfs 6,440 cf

Pond S2: Prop. Inf. System S2 Peak Elev=6.48' Storage=0.008 af Inflow=0.41 cfs 1,447 cf
Discarded=0.00 cfs 127 cf Primary=0.40 cfs 977 cf Outflow=0.40 cfs 1,103 cf

Pond S3: Prop. Inf. System S3 Peak Elev=6.44' Storage=0.027 af Inflow=1.11 cfs 3,948 cf
Discarded=0.00 cfs 231 cf Primary=1.10 cfs 2,827 cf Outflow=1.10 cfs 3,058 cf

Pond S4: Prop. Inf. System S4 Peak Elev=12.38' Storage=1,040 cf Inflow=1.57 cfs 5,591 cf
Discarded=0.01 cfs 288 cf Primary=1.56 cfs 4,869 cf Outflow=1.56 cfs 5,157 cf

Pond S5: Prop. Inf. System S5 Peak Elev=6.41' Storage=0.083 af Inflow=2.70 cfs 9,516 cf
Discarded=0.01 cfs 759 cf Primary=2.64 cfs 6,077 cf Outflow=2.65 cfs 6,836 cf

Summary for Pond S1: Prop. Inf. System S1

Inflow Area = 12,763 sf,100.00% Impervious, Inflow Depth > 6.76" for 100-Year Storm event
Inflow = 2.01 cfs @ 12.08 hrs, Volume= 7,185 cf
Outflow = 2.03 cfs @ 12.07 hrs, Volume= 6,440 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 12.07 hrs, Volume= 185 cf
Primary = 2.03 cfs @ 12.07 hrs, Volume= 6,255 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 16.90' @ 12.07 hrs Surf.Area= 0.009 ac Storage= 0.029 af

Plug-Flow detention time= 99.9 min calculated for 6,440 cf (90% of inflow)
Center-of-Mass det. time= 48.7 min (791.1 - 742.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	12.00'	0.003 af	**11.00'W x 17.00'L x 5.00'H Field A** 0.021 af Overall - 0.012 af Embedded = 0.009 af x 30.0% Voids
#2A	12.00'	0.012 af	**Brentwood StormTank 48"** x 30 Inside #1 Inside= 18.0"W x 48.0"H => 5.77 sf x 3.00'L = 17.3 cf Outside= 18.0"W x 48.0"H => 6.00 sf x 3.00'L = 18.0 cf 30 Chambers in 6 Rows
#3B	7.50'	0.002 af	**11.00'W x 17.00'L x 4.50'H Field B** 0.019 af Overall - 0.012 af Embedded = 0.007 af x 30.0% Voids
#4B	8.00'	0.012 af	**Brentwood StormTank 48"** x 30 Inside #3 Inside= 18.0"W x 48.0"H => 5.77 sf x 3.00'L = 17.3 cf Outside= 18.0"W x 48.0"H => 6.00 sf x 3.00'L = 18.0 cf 30 Chambers in 6 Rows
		0.029 af	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	8.00'	**8.0" Round Culvert** L= 5.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 8.00' / -2.79' S= 2.1580 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	16.70'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	12.85'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	7.50'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.07 hrs HW=16.90' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=2.00 cfs @ 12.07 hrs HW=16.90' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.00 cfs of 4.34 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.18 cfs @ 1.47 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.83 cfs @ 9.49 fps)

Summary for Pond S2: Prop. Inf. System S2

Inflow Area = 2,570 sf,100.00% Impervious, Inflow Depth > 6.76" for 100-Year Storm event
Inflow = 0.41 cfs @ 12.08 hrs, Volume= 1,447 cf
Outflow = 0.40 cfs @ 12.09 hrs, Volume= 1,103 cf, Atten= 0%, Lag= 0.2 min
Discarded = 0.00 cfs @ 12.09 hrs, Volume= 127 cf
Primary = 0.40 cfs @ 12.09 hrs, Volume= 977 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 6.48' @ 12.09 hrs Surf.Area= 0.005 ac Storage= 0.008 af

Plug-Flow detention time= 150.4 min calculated for 1,103 cf (76% of inflow)
Center-of-Mass det. time= 65.4 min (807.8 - 742.4)

Volume	Invert	Avail.Storage	Storage Description
#1B	3.50'	0.003 af	**6.50'W x 35.00'L x 3.00'H Field B** 0.016 af Overall - 0.005 af Embedded = 0.011 af x 30.0% Voids
#2B	4.00'	0.005 af	**Brentwood StormTank 18"** x 33 Inside #1 Inside= 18.0"W x 18.0"H => 2.15 sf x 3.00'L = 6.4 cf Outside= 18.0"W x 18.0"H => 2.25 sf x 3.00'L = 6.8 cf 33 Chambers in 3 Rows
		0.008 af	Total Available Storage

Storage Group B created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	3.50'	**8.0" Round Culvert** L= 30.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 3.50' / 0.05' S= 0.1150 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.40'	**5.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Discarded	3.50'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.09 hrs HW=6.48' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.40 cfs @ 12.09 hrs HW=6.48' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.40 cfs of 2.74 cfs potential flow)
└**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.40 cfs @ 0.95 fps)

Summary for Pond S3: Prop. Inf. System S3

Inflow Area = 7,013 sf,100.00% Impervious, Inflow Depth > 6.76" for 100-Year Storm event
Inflow = 1.11 cfs @ 12.08 hrs, Volume= 3,948 cf
Outflow = 1.10 cfs @ 12.09 hrs, Volume= 3,058 cf, Atten= 0%, Lag= 0.4 min
Discarded = 0.00 cfs @ 12.09 hrs, Volume= 231 cf
Primary = 1.10 cfs @ 12.09 hrs, Volume= 2,827 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Peak Elev= 6.44' @ 12.09 hrs Surf.Area= 0.012 ac Storage= 0.027 af

Plug-Flow detention time= 157.0 min calculated for 3,058 cf (77% of inflow)
Center-of-Mass det. time= 74.3 min (816.7 - 742.4)

Volume	Invert	Avail.Storage	Storage Description
#1C	3.00'	0.007 af	**17.00'W x 32.00'L x 3.50'H Field C** 0.044 af Overall - 0.021 af Embedded = 0.023 af x 30.0% Voids
#2C	3.50'	0.020 af	**Brentwood StormTank 24"** x 100 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 100 Chambers in 10 Rows
		0.027 af	Total Available Storage

Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	3.83'	**8.0" Round Culvert** L= 58.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 3.83' / 0.50' S= 0.0574 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.30'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	5.20'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	3.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.00 cfs @ 12.09 hrs HW=6.44' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.10 cfs @ 12.09 hrs HW=6.44' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.10 cfs of 2.53 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.66 cfs @ 1.21 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.43 cfs @ 4.98 fps)

Summary for Pond S4: Prop. Inf. System S4

Inflow Area = 9,932 sf,100.00% Impervious, Inflow Depth > 6.76" for 100-Year Storm event
Inflow = 1.57 cfs @ 12.08 hrs, Volume= 5,591 cf
Outflow = 1.56 cfs @ 12.09 hrs, Volume= 5,157 cf, Atten= 0%, Lag= 0.5 min
Discarded = 0.01 cfs @ 12.09 hrs, Volume= 288 cf
Primary = 1.56 cfs @ 12.09 hrs, Volume= 4,869 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 12.38' @ 12.09 hrs Surf.Area= 580 sf Storage= 1,040 cf

Plug-Flow detention time= 86.1 min calculated for 5,157 cf (92% of inflow)
Center-of-Mass det. time= 44.5 min (786.9 - 742.4)

Volume	Invert	Avail.Storage	Storage Description
#1D	9.00'	404 cf	**5.00'W x 116.00'L x 3.50'H Field D** 2,030 cf Overall - 684 cf Embedded = 1,346 cf x 30.0% Voids
#2D	9.50'	658 cf	**Brentwood StormTank 24"** x 76 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 76 Chambers in 2 Rows
		1,062 cf	Total Available Storage

Storage Group D created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	9.40'	**8.0" Round Culvert** L= 37.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 9.40' / 9.20' S= 0.0054 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	12.20'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	10.30'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	9.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.09 hrs HW=12.38' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=1.55 cfs @ 12.09 hrs HW=12.38' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 1.55 cfs of 2.41 cfs potential flow)
  └**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.97 cfs @ 1.38 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.58 cfs @ 6.66 fps)

Summary for Pond S5: Prop. Inf. System S5

Inflow Area = 17,206 sf, 96.46% Impervious, Inflow Depth > 6.64" for 100-Year Storm event
Inflow = 2.70 cfs @ 12.08 hrs, Volume= 9,516 cf
Outflow = 2.65 cfs @ 12.10 hrs, Volume= 6,836 cf, Atten= 2%, Lag= 1.0 min
Discarded = 0.01 cfs @ 12.10 hrs, Volume= 759 cf
Primary = 2.64 cfs @ 12.10 hrs, Volume= 6,077 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 6.41' @ 12.10 hrs Surf.Area= 0.040 ac Storage= 0.083 af

Plug-Flow detention time= 179.1 min calculated for 6,836 cf (72% of inflow)
Center-of-Mass det. time= 87.4 min (836.3 - 748.8)

Volume	Invert	Avail.Storage	Storage Description
#1D	3.00'	0.023 af	**9.50'W x 185.00'L x 3.50'H Field D** 0.141 af Overall - 0.063 af Embedded = 0.078 af x 30.0% Voids
#2D	3.50'	0.061 af	**Brentwood StormTank 24"** x 305 Inside #1 Inside= 18.0"W x 24.0"H => 2.89 sf x 3.00'L = 8.7 cf Outside= 18.0"W x 24.0"H => 3.00 sf x 3.00'L = 9.0 cf 305 Chambers in 5 Rows
		0.084 af	Total Available Storage

Storage Group D created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.25'	**8.0" Round Culvert** L= 111.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1.25' / 0.05' S= 0.0108 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf
#2	Device 1	6.10'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 1	5.10'	**4.0" Vert. Orifice/Grate** C= 0.600
#4	Discarded	3.00'	**0.170 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.01 cfs @ 12.10 hrs HW=6.41' (Free Discharge)
└**4=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.64 cfs @ 12.10 hrs HW=6.41' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 2.64 cfs of 2.78 cfs potential flow)
  ├**2=Sharp-Crested Rectangular Weir** (Weir Controls 2.19 cfs @ 1.81 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.45 cfs @ 5.14 fps)

Appendix G: Recharge Calculations

STORMWATER MANAGEMENT STANDARDS

STANDARD # 3

RECHARGE TO GROUNDWATER

HYD. SOIL GROUP		RECHARGE PER ACRE
A	=	0.60 in.
B	=	0.35 in.
C	=	0.25 in.
D	=	0.10 in.

TOTAL PROPOSED IMPERVIOUS AREA = 1.07 ac.

MassDEP Requirement

HYD. SOIL GROUP			
A	=	0.00	ac.
B	=	0.00	ac.
C	=	1.07	ac.
D	=	0.00	ac.

0.60	in.	x	0.00	ac.	x	1/12	=	0.00	cf.
0.35	in.	x	0.00	ac.	x	1/12	=	0.00	cf.
0.25	in.	x	1.07	ac.	x	1/12	=	968.75	cf.
0.10	in.	x	0.00	ac.	x	1/12	=	0.00	cf.

Total = 968.75

Boston Planning & Development Agency Requirement

1.25	in.	x	1.07	ac.	x	1/12	=	4843.75	cf.

CAPTURE AREA ADJUSTMENT

TOTAL STORAGE VOLUME OF INFILTRATION SYSTEM 1	=	**779.0**	cf.
TOTAL STORAGE VOLUME OF INFILTRATION SYSTEM 2	=	**459.9**	cf.
TOTAL STORAGE VOLUME OF INFILTRATION SYSTEM 3	=	**922.8**	cf.
TOTAL STORAGE VOLUME OF INFILTRATION SYSTEM 4	=	**429.3**	cf.
TOTAL STORAGE VOLUME OF INFILTRATION SYSTEM 5	=	**2,723.2**	cf.

TOTAL RECHARGE VOLUME PROVIDED = **5,314.2** **cf.**
(Storage Volume + Infiltration Volume per day)

5,314 cf **>>>** **4,844 cf** **STANDARD #3 SATISFIED**

RECHARGE CALCULATION

#1

INFILTRATION SYSTEM STORAGE VOLUME

Stormtank

	OUTLET ORIFICE INVERT	I_W	=	12.85	ft.
	BOTTOM INVERT CHAMBERS	I_C	=	8.0	ft.
	STORMWATER DEPTH	D_C	=	4.9	ft.
	VOLUME PER CHAMBER	V_C	=	22.1	cf.
	NUMER OF ROWS	R_C	=	7.5	
	CHAMBERS PER ROW	C_C	=	4.0	
$N_C = (R_C * C_C)$	NUMBER OF CHAMBERS	N_C	=	30	
$V_{CHAMBERS} = (V_C * N_C)$	TOTAL VOLUME OF CHAMBERS BELOW OUTLET	$V_{CHAMBERS}$	=	663.5	cf.

STONE VOLUME

	STONE BOTTOM INVERT	I_S	=	7.5	ft.
$D_S = I_W - I_S$	STONE STORMWATER DEPTH	D_S		5.4	
	STONE WIDTH	W_S	=	14.0	ft.
	STONE LENGTH	L_S	=	14.0	ft.
	% VOIDS	VOIDS	=	30%	
$V_{STONE} = [(W_S * L_S * (I_W - I_S)) - V_{CHAMBERS}] * VOIDS$	STONE VOLUME	V_{stone}	=	115.5	cf.

TOTAL VOLUME BELOW INVERT

$V_{TOTAL} = V_{CHAMBERS} + V_{STONE}$	**TOTAL STORAGE VOLUME**	V_{TOTAL}	=	**779.0**	cf.

BOTTOM AREA

$A_{bottom} = W_S * L_S$	BOTTOM SURFACE AREA	A_{bottom}	=	**196.0**	sf.

72 HOUR DRAWDOWN

	SOIL TYPE		=	D	
	RAWLS RATE	K	=	0.09	in/hr
	REQUIRED RECHARGE VOLUME	Rv	=	779.0	cf.
	BOTTOM AREA	A_{bottom}	=	196.0	sf.
$T_D = (Rv) / (K * A_{bottom})$	DRAWDOWN TIME	T_D	=	**529.9**	hr.

529.9 hr. >>> 72.0 hr.

72 HOUR DRAWDOWN NOT SATISFIED

RECHARGE CALCULATION

#2

INFILTRATION SYSTEM STORAGE VOLUME

Stormtank

	OUTLET ORIFICE INVERT	I_W	=	6.4	ft.
	BOTTOM INVERT CHAMBERS	I_C	=	4.0	ft.
	STORMWATER DEPTH	D_C	=	2.4	ft.
	VOLUME PER CHAMBER	V_C	=	10.9	cf.
	NUMER OF ROWS	R_C	=	3.0	
	CHAMBERS PER ROW	C_C	=	11.0	
$N_C = (R_C * C_C)$	NUMBER OF CHAMBERS	N_C	=	33	
$V_{CHAMBERS} = (V_C * N_C)$	TOTAL VOLUME OF CHAMBERS BELOW OUTLET	$V_{CHAMBERS}$	=	361.2	cf.

STONE VOLUME

	STONE BOTTOM INVERT	I_S	=	3.5	ft.
$D_S = I_W - I_S$	STONE STORMWATER DEPTH	D_S		2.9	
	STONE WIDTH	W_S	=	6.8	ft.
	STONE LENGTH	L_S	=	35.0	ft.
	% VOIDS	VOIDS	=	30%	
$V_{STONE} = [(W_S * L_S * (I_W - I_S)) - V_{CHAMBERS}] * VOIDS$	STONE VOLUME	V_{stone}	=	98.7	cf.

TOTAL VOLUME BELOW INVERT

$V_{TOTAL} = V_{CHAMBERS} + V_{STONE}$	**TOTAL STORAGE VOLUME**	V_{TOTAL}	=	**459.9**	cf.

BOTTOM AREA

$A_{bottom} = W_S * L_S$	BOTTOM SURFACE AREA	A_{bottom}	=	**238.0**	sf.

72 HOUR DRAWDOWN

	SOIL TYPE		=	D	
	RAWLS RATE	K	=	0.09	in/hr
	REQUIRED RECHARGE VOLUME	Rv	=	459.9	cf.
	BOTTOM AREA	A_{bottom}	=	238.0	sf.
$T_D = (Rv) / (K * A_{bottom})$	DRAWDOWN TIME	T_D	=	**257.6**	hr.

257.6 hr. >>> 72.0 hr.

72 HOUR DRAWDOWN NOT SATISFIED

RECHARGE CALCULATION

#3

INFILTRATION SYSTEM STORAGE VOLUME

Stormtank

	OUTLET ORIFICE INVERT	I_W	=	5.2	ft.
	BOTTOM INVERT CHAMBERS	I_C	=	3.5	ft.
	STORMWATER DEPTH	D_C	=	1.7	ft.
	VOLUME PER CHAMBER	V_C	=	7.8	cf.
	NUMER OF ROWS	R_C	=	10.0	
	CHAMBERS PER ROW	C_C	=	10.0	
$N_C = (R_C * C_C)$	NUMBER OF CHAMBERS	N_C	=	100	
$V_{CHAMBERS} = (V_C * N_C)$	TOTAL VOLUME OF CHAMBERS BELOW OUTLET	$V_{CHAMBERS}$	=	775.2	cf.

STONE VOLUME

	STONE BOTTOM INVERT	I_S	=	3.0	ft.
$D_S = I_W - I_S$	STONE STORMWATER DEPTH	D_S		2.2	
	STONE WIDTH	W_S	=	18.0	ft.
	STONE LENGTH	L_S	=	32.0	ft.
	% VOIDS	VOIDS	=	30%	
$V_{STONE} = [(W_S * L_S * (I_W - I_S)) - V_{CHAMBERS}] * VOIDS$	STONE VOLUME	V_{stone}	=	147.6	cf.

TOTAL VOLUME BELOW INVERT

$V_{TOTAL} = V_{CHAMBERS} + V_{STONE}$	**TOTAL STORAGE VOLUME**	V_{TOTAL}	=	**922.8**	cf.

BOTTOM AREA

$A_{bottom} = W_S * L_S$	BOTTOM SURFACE AREA	A_{bottom}	=	**576.0**	sf.

72 HOUR DRAWDOWN

	SOIL TYPE		=	D	
	RAWLS RATE	K	=	0.09	in/hr
	REQUIRED RECHARGE VOLUME	Rv	=	922.8	cf.
	BOTTOM AREA	A_{bottom}	=	576.0	sf.
$T_D = (Rv) / (K * A_{bottom})$	DRAWDOWN TIME	T_D	=	**213.6**	hr.

213.6 hr. >>> 72.0 hr.

72 HOUR DRAWDOWN NOT SATISFIED

RECHARGE CALCULATION

#4

INFILTRATION SYSTEM STORAGE VOLUME

Stormtank

	OUTLET ORIFICE INVERT	I_W	=	10.3	ft.
	BOTTOM INVERT CHAMBERS	I_C	=	9.5	ft.
	STORMWATER DEPTH	D_C	=	0.8	ft.
	VOLUME PER CHAMBER	V_C	=	3.6	cf.
	NUMER OF ROWS	R_C	=	2.0	
	CHAMBERS PER ROW	C_C	=	38.0	
$N_C = (R_C * C_C)$	NUMBER OF CHAMBERS	N_C	=	76	
$V_{CHAMBERS} = (V_C * N_C)$	TOTAL VOLUME OF CHAMBERS BELOW OUTLET	$V_{CHAMBERS}$	=	277.2	cf.

STONE VOLUME

	STONE BOTTOM INVERT	I_S	=	9.0	ft.
$D_S = I_W - I_S$	STONE STORMWATER DEPTH	D_S		1.3	
	STONE WIDTH	W_S	=	5.2	ft.
	STONE LENGTH	L_S	=	116.0	ft.
	% VOIDS	VOIDS	=	30%	
$V_{STONE} = [(W_S * L_S * (I_W - I_S)) - V_{CHAMBERS}] * VOIDS$	STONE VOLUME	V_{stone}	=	152.1	cf.

TOTAL VOLUME BELOW INVERT

$V_{TOTAL} = V_{CHAMBERS} + V_{STONE}$	**TOTAL STORAGE VOLUME**	V_{TOTAL}	=	**429.3**	cf.

BOTTOM AREA

$A_{bottom} = W_S * L_S$	BOTTOM SURFACE AREA	A_{bottom}	=	**603.2**	sf.

72 HOUR DRAWDOWN

	SOIL TYPE		=	D	
	RAWLS RATE	K	=	0.09	in/hr
	REQUIRED RECHARGE VOLUME	Rv	=	429.3	cf.
	BOTTOM AREA	A_{bottom}	=	603.2	sf.
$T_D = (Rv) / (K * A_{bottom})$	DRAWDOWN TIME	T_D	=	**94.9**	hr.

94.9 hr. >>> 72.0 hr.

72 HOUR DRAWDOWN NOT SATISFIED

RECHARGE CALCULATION

#5

INFILTRATION SYSTEM STORAGE VOLUME

Stormtank

	OUTLET ORIFICE INVERT	I_W	=	5.10	ft.
	BOTTOM INVERT CHAMBERS	I_C	=	3.5	ft.
	STORMWATER DEPTH	D_C	=	1.6	ft.
	VOLUME PER CHAMBER	V_C	=	7.3	cf.
	NUMER OF ROWS	R_C	=	5.0	
	CHAMBERS PER ROW	C_C	=	61.0	
$N_C = (R_C * C_C)$	NUMBER OF CHAMBERS	N_C	=	305	
$V_{CHAMBERS} = (V_C * N_C)$	TOTAL VOLUME OF CHAMBERS BELOW OUTLET	$V_{CHAMBERS}$	=	2225.3	cf.

STONE VOLUME

	STONE BOTTOM INVERT	I_S	=	3.0	ft.
$D_S = I_W - I_S$	STONE STORMWATER DEPTH	D_S		2.1	
	STONE WIDTH	W_S	=	10.0	ft.
	STONE LENGTH	L_S	=	185.0	ft.
	% VOIDS	VOIDS	=	30%	
$V_{STONE} = [(W_S * L_S * (I_W - I_S)) - V_{CHAMBERS}] * VOIDS$	STONE VOLUME	V_{stone}	=	497.9	cf.

TOTAL VOLUME BELOW INVERT

$V_{TOTAL} = V_{CHAMBERS} + V_{STONE}$	**TOTAL STORAGE VOLUME**	V_{TOTAL}	=	**2723.2**	cf.

BOTTOM AREA

$A_{bottom} = W_S * L_S$	BOTTOM SURFACE AREA	A_{bottom}	=	**1850.0**	sf.

72 HOUR DRAWDOWN

	SOIL TYPE		=	D	
	RAWLS RATE	K	=	0.09	in/hr
	REQUIRED RECHARGE VOLUME	Rv	=	2723.2	cf.
	BOTTOM AREA	A_{bottom}	=	1850.0	sf.
$T_D = (Rv) / (K * A_{bottom})$	DRAWDOWN TIME	T_D	=	**196.3**	hr.

196.3 hr. >>> 72.0 hr.

72 HOUR DRAWDOWN NOT SATISFIED

Infiltration System S2

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
0.1800	*R*	**Recharge (infiltration) rate (feet/day)**
0.020	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
1.80	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
4.000	x	**1/2 length of basin (x direction, in feet)**
22.000	y	**1/2 width of basin (y direction, in feet)**
3.000	t	**duration of infiltration period (days)**
40.000	hi(0)	**initial thickness of saturated zone (feet)**

40.393	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.393	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Conversion Table

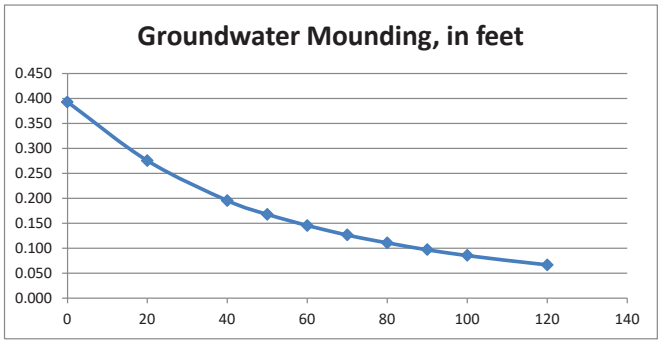
inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.393	0
0.276	20
0.196	40
0.168	50
0.146	60
0.127	70
0.111	80
0.097	90
0.086	100
0.067	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Infiltration System S3

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
0.1800	*R*	**Recharge (infiltration) rate (feet/day)**
0.020	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
1.80	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
8.500	x	**1/2 length of basin (x direction, in feet)**
16.000	y	**1/2 width of basin (y direction, in feet)**
3.000	t	**duration of infiltration period (days)**
40.000	hi(0)	**initial thickness of saturated zone (feet)**

40.625	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.625	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Conversion Table

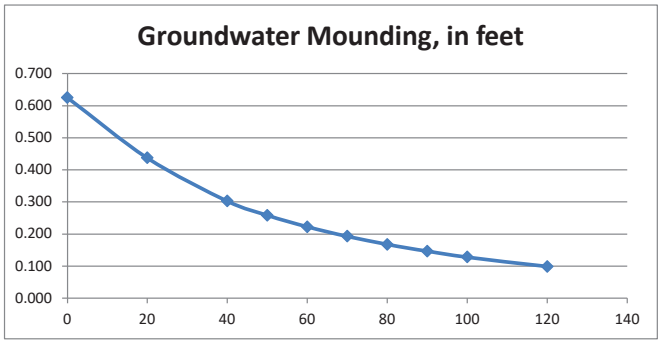
inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.625	0
0.437	20
0.303	40
0.258	50
0.222	60
0.193	70
0.168	80
0.146	90
0.128	100
0.098	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Infiltration System S4

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
0.1800	*R*	**Recharge (infiltration) rate (feet/day)**
0.020	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
1.80	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
2.500	x	**1/2 length of basin (x direction, in feet)**
59.000	y	**1/2 width of basin (y direction, in feet)**
3.000	t	**duration of infiltration period (days)**
40.000	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

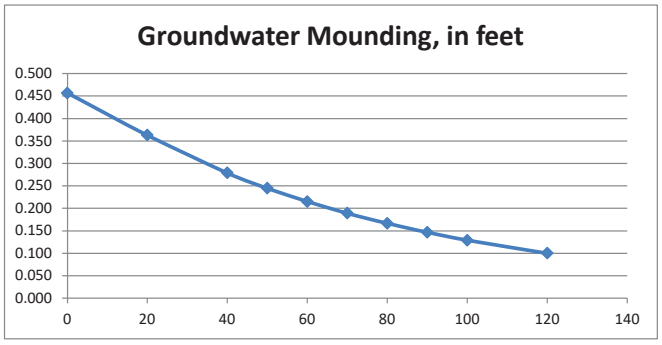
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

40.457	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.457	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.457	0
0.363	20
0.279	40
0.245	50
0.215	60
0.189	70
0.166	80
0.147	90
0.129	100
0.100	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Infiltration System S5

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
0.1800	*R*	**Recharge (infiltration) rate (feet/day)**
0.020	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
1.80	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
4.750	x	**1/2 length of basin (x direction, in feet)**
92.500	y	**1/2 width of basin (y direction, in feet)**
3.000	t	**duration of infiltration period (days)**
40.000	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table	
inch/hour	**feet/day**
0.67	1.33
2.00	4.00

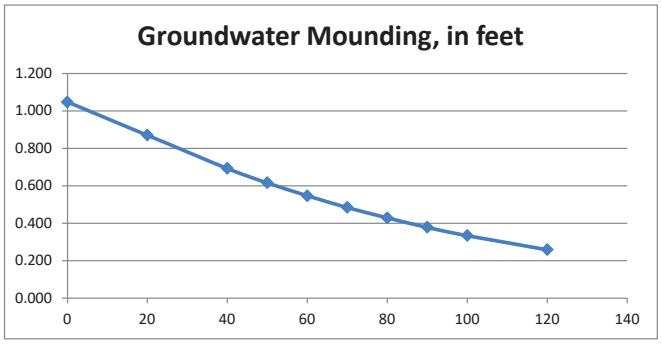
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

41.048	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.048	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.048	**0**
0.871	**20**
0.693	**40**
0.616	**50**
0.547	**60**
0.485	**70**
0.429	**80**
0.379	**90**
0.334	**100**
0.258	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Infiltration System S1

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
0.1800	*R*	**Recharge (infiltration) rate (feet/day)**
0.020	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
1.80	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
7.000	x	**1/2 length of basin (x direction, in feet)**
7.750	y	**1/2 width of basin (y direction, in feet)**
3.000	t	**duration of infiltration period (days)**
40.000	hi(0)	**initial thickness of saturated zone (feet)**

40.294	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.294	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Conversion Table

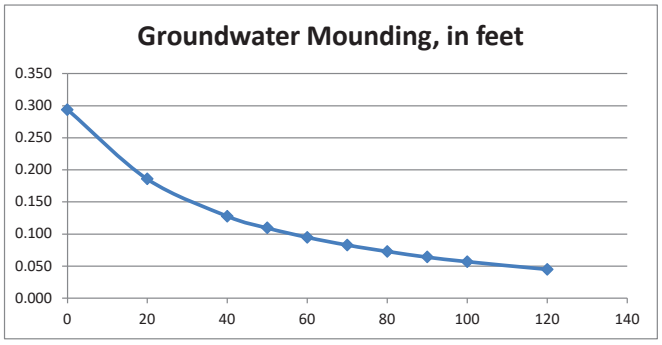
inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.294	0
0.186	20
0.128	40
0.109	50
0.095	60
0.083	70
0.073	80
0.064	90
0.057	100
0.045	120

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Appendix H: Water Quality Calculations

HANCOCK
ASSOCIATES

355 Bennington Street
Boston, MA

PAGE: 1 of 2
DATE: 11/3/21
REVISED:

STORMWATER MANAGEMENT STANDARDS

STANDARD # 4

WATER QUALITY FLOW RATE FOR WQD D-10

[ ] CRITICAL AREA OR LUHPPL

WQV = **1.00** inch runoff x TOTAL IMPERVIOUS AREA

[X] OTHER AREA

WQV = **0.50** inch runoff x TOTAL IMPERVIOUS AREA

IMPERVIOUS AREA = 0.23 acre = 0.00036 sq. mi

Time of Concentration = 5.0 min.

Ia/P Curve = 0.058

qu = 773 csm/in

$Q_{0.5}$ = 0.5 -inch x 0.00036 sq. mi. x 773 csm/min = 0.14 cfs

Use Stormceptor 900 Model

Water Quality Flow Rate Provided = 0.89 cfs

0.89 >>> 0.14 **Standard #4 Satisfied**

STORMWATER MANAGEMENT STANDARDS

STANDARD # 4

WATER QUALITY VOLUME (WQV) - INFILTRATION SYSTEM S5

Capture Area = 0.38 ac.

[ ] CRITICAL AREA

WQV = **1.00** inch runoff x TOTAL IMPERVIOUS AREA

[X] OTHER AREA

WQV = **0.50** inch runoff x TOTAL IMPERVIOUS AREA

0.50 x **0.38** = 691.5 cf.

TOTAL WATER QUALITY VOLUME REQUIRED = **691.5** **cf.**

WATER QUALITY VOLUME

INFILTRATION SYSTEM 5* = **2723.0** cf.
* FROM RECHARGE CALCULAITONS

TOTAL WATER QUALITY VOLUME PROVIDED = **2723.0** **cf.**

2723.0 cf **>>>** **691.5 cf** **STANDARD #4 SATISFIED**

UNIVERSITY OF MASSACHUSETTS
AT AMHERST
Water Resources Research Center
Blaisdell House, UMass
310 Hicks Way
Amherst, MA 01003

Massachusetts Stormwater Evaluation Project

(413) 545-5532
(413) 545-2304 FAX
www.mastep.net

MASTEP Technology Review

Technology Name: Stormceptor

Studies Reviewed: Final NJCAT Technology Verification Stormceptor STC900 September 2004; Coventry University Study, 1996; Technology Assessment, University of Massachusetts, 1997; SeaTac Stormceptor Performance report 2001; SWAMP report Ontario 2004; Phoenix Group Edmonton report 1995; Stormceptor 1200 Field Evaluation report 2004; Applied Hydrology Associates Denver report 2003; Rinker Materials Como Park St. Paul MN report 2002; VA DOT / UVA "Testing of Ultra-Urban Stormwater Best Management Practices" report 2001.
Hydrodynamic Separator Sediment Retention Testing, Mohseni, 2010.

Date: September 17, 2013

Reviewer: Jerry Schoen

Rating: 2

Brief rationale for rating: This rating is primarily based on the 2005 NJCAT Technology Verification study. In general, this was a well-conducted test, which in large part followed NJDEP test guidelines for laboratory studies, which MASTEP considers as the laboratory equivalent of TARP field protocols. Issues of concern: the study measured suspended sediment concentration (SSC) rather than total suspended solids (TSS). Although SSC is considered by many scientists to be the preferred method, it is at odds with Massachusetts stormwater regulations, which are based on TSS treatment. Comparing SSC and TSS results is considered an inexact science. The test was conducted with higher influent sediment concentrations than is preferred, but results were fairly consistent across all ranges studied. The particle size distribution also appears to be slightly higher than the target test range. There are additional field studies that in general support the results obtained in this laboratory studies. These studies do not satisfy TARP protocols, but they do not contradict results obtained in the NJCAT study.

TARP Requirements Not Met*:

- Measurements in TSS.
- Influent sediment concentration is 100 – 300 mg/l: actual was 153-460.
- No documentation of a Quality Assurance Project Plan
- Third party studies are preferred. This was conducted by Stormceptor personnel, with sample analyses conducted by an external laboratory.

Other Comments:
* The 2010 Mohseni study evaluates the susceptibility of the Stormceptor to scouring, or washout of collected sediments. Report concluded that the unit does not scour at high flows as long as sediment depth does not exceed maintenance level.

* Criteria also based on NJDEP laboratory testing guidelines.

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration System S5 (Driveway)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	25%	1.00	0.25	0.75
Stormwater Quality Unit (Proprietary)	77%	0.75	0.57	0.18
Stormwater Quality Unit (Proprietary)	80%	0.18	0.14	0.04

Total TSS Removal = 0.96

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 355 Bennington Street

Prepared By: DTW

Date: 11/3/2021

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Appendix I: Operations and Maintenance Log

355 Bennington Street, Boston, Massachusetts
Stormwater Operation and Maintenance Plan

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Best Management practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, If Necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc.)
Catch Basins	Quarterly				
Subsurface Infiltration Systems	Annual				
Stormceptor Water Quality Unit	Biannual				
Overall Site Condition	Quarterly				

Property Manager: _____ Date: _____

ATTACHMENT D

PROJECT PLANS

PERMIT SITE PLAN

355 BENNINGTON STREET

BOSTON, MASSACHUSETTS 02128

FOR

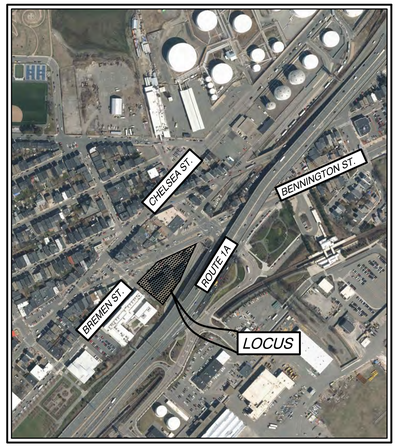
GATE RESIDENTIAL PROPERTIES, LLC

GENERAL NOTES

1. ELEVATIONS SHOWN HEREON REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
2. THE CONTRACTOR SHALL VERIFY THE LOCATION AND RELATIVE ELEVATION OF BENCH MARKS PRIOR TO COMMENCEMENT OF CONSTRUCTION. ANY DISCREPANCY SHALL BE REPORTED TO THE ENGINEER.
3. CONTRACTOR SHALL FURNISH CONSTRUCTION LAYOUT OF BUILDING AND SITE IMPROVEMENTS. THIS WORK SHALL BE PERFORMED BY A PROFESSIONAL LAND SURVEYOR.
4. SAFETY MEASURES, CONSTRUCTION METHODS AND CONTROL OF WORK SHALL BE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL SITE CONSTRUCTION SHALL COMPLY WITH THE BOSTON DEPARTMENT OF PUBLIC WORKS STANDARDS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ANY EXISTING IMPROVEMENTS DAMAGED DURING CONSTRUCTION THAT ARE NOT DESIGNATED FOR DEMOLITION AND / OR REMOVAL HEREON. DAMAGED IMPROVEMENTS SHALL BE REPAIRED TO THE SATISFACTION OF THEIR RESPECTIVE OWNERS.
7. ANY INTENDED REVISION OF THE HORIZONTAL AND/OR VERTICAL LOCATION OF IMPROVEMENTS TO BE CONSTRUCTED AS SHOWN HEREON SHALL BE REVIEWED AND APPROVED BY ENGINEER PRIOR TO IMPLEMENTATION.
8. THIS PLAN IS NOT INTENDED TO SHOW AN ENGINEERED BUILDING FOUNDATION DESIGN, WHICH WOULD INCLUDE DETAILS AND FINAL ELEVATIONS OF FOOTINGS, WALLS AND SUBSURFACE DRAINAGE TO PREVENT INTERIOR FLOODING. SEE ARCHITECTURAL AND/OR STRUCTURAL DRAWINGS.
9. PROPOSED BUILDING FOUNDATION CONFIGURATION AND LOCATION ON THE LOT AS SHOWN ARE CONCEPTUAL AND SHALL BE VERIFIED AS TO CONFORMANCE WITH FINAL ARCHITECTURAL PLANS AND ZONING ORDINANCES PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECORDING HORIZONTAL AND VERTICAL MEASUREMENTS FOR ALL SUBSURFACE STRUCTURES. THIS INFORMATION SHALL BE REPORTED TO THE ENGINEER.
11. TRASH AND RECYCLING COLLECTION AREAS ARE LOCATED WITHIN THE BUILDINGS.
12. WHERE EXISTING UTILITY LINES/STRUCTURES ARE TO BE CUT/BROKEN DOWN/ ABANDONED, LINES/STRUCTURES SHALL BE PLUGGED/CAPPED/FILLED IN ACCORDANCE WITH OWNER REQUIREMENTS.
13. WHERE NEW PAVING MEETS EXISTING PAVING, MEET LINE AND GRADE OF EXISTING WITH NEW PAVING. AT LOCATIONS WHERE EXISTING PAVEMENT ABUTS NEW CONSTRUCTION, THE EDGE OF THE EXISTING PAVEMENT SHALL BE SAWCUT TO A CLEAN, SMOOTH EDGE.
14. ALL DISTURBED AREAS NOT COVERED WITH PAVEMENT, STRUCTURES, INDIVIDUAL PLANTINGS, OR MULCH SHALL HAVE LOAM AND SOD, OR LOAM AND SEED AS SHOWN ON THE LANDSCAPE PLANS OR AS DIRECTED BY THE ENGINEER.
15. STRAW WATTLE BARRIERS SHOWN HEREON SHALL BE INSTALLED BEFORE EARTH DISTURBANCE OCCURS AND SHALL SERVE AS THE LIMIT OF WORK.
16. CONTRACTOR SHALL PROVIDE DUST CONTROL FOR CONSTRUCTION OPERATIONS.
17. ALL POINTS OF CONSTRUCTION EGRESS OR INGRESS SHALL BE MAINTAINED TO PREVENT TRACKING OR FLOWING OF SEDIMENT ON TO PUBLIC ROADS.

REGULATORY NOTES

1. CONTRACTOR SHALL CONTACT "DIG-SAFE" FOR AN UNDERGROUND UTILITY MARKING AT 811 AT LEAST 72 HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK.
2. CONTRACTOR SHALL MAKE HIMSELF AWARE OF ALL CONSTRUCTION REQUIREMENTS, CONDITIONS AND LIMITATIONS IMPOSED BY PERMITS AND APPROVALS ISSUED BY REGULATORY AUTHORITIES PRIOR TO THE COMMENCEMENT OF ANY WORK. CONTRACTOR SHALL COORDINATE AND OBTAIN ALL CONSTRUCTION PERMITS REQUIRED BY REGULATORY AUTHORITIES.
3. ALL WORK OUTSIDE OF THE BUILDING THAT IS LESS THAN 10 FEET FROM THE INSIDE FACE OF THE BUILDING FOUNDATION SHALL CONFORM WITH THE UNIFORM STATE PLUMBING CODE OF MASSACHUSETTS, 248 CMR 2.00.
4. CONSTRUCTION ACTIVITIES SHALL CONFORM TO THE RULES AND REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).
5. CONTRACTOR SHALL INSTALL ALL PARKING AREAS AND WALKWAYS IN ACCORDANCE WITH APPLICABLE ADA AND MAAB REQUIREMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:
   - HANDICAPPED SPACES AND STRIPED AREA SLOPES SHALL NOT EXCEED 2% IN ANY DIRECTION.
   - HANDICAPPED RAMPS SHALL NOT EXCEED 8% FOR A MAXIMUM VERTICAL DISTANCE OF 6 INCHES.
   - SIDEWALKS SHALL HAVE A MAXIMUM SLOPE IN THE PATH OF TRAVEL OF 5% AND A MAXIMUM CROSS SLOPE OF 2% CONTRACTOR SHOULD NOT LAYOUT SLOPES EXCEEDING 4.5% AND 1.5% RESPECTIVELY TO ALLOW FOR CONSTRUCTION TOLERANCES. IF THE CONTRACTOR DETERMINES THAT THE REQUIRED SLOPES CANNOT BE ACHIEVED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPORTING THE INFORMATION TO THE ENGINEER FOR RESOLUTION.



VICINITY MAP

SCALE: 1"= 500'

SHEET INDEX

OWNER:

413-419 BREMEN STREET LLC
1222 BENNINGTON STREET
EAST BOSTON, MASSACHUSETTS 02128

APPLICANT:

GATE RESIDENTIAL PROPERTIES, LLC
265 FRANKLIN STREET, 6TH FLOOR
BOSTON, MASSACHUSETTS 02110

PROJECT TEAM

LANDSCAPE ARCHITECTS:
COPLEY WOLFF DESIGN GROUP
10 POST OFFICE SQUARE, SUITE 1315
BOSTON, MASSACHUSETTS 02109

CIVIL ENGINEERS & LAND SURVEYORS:
HANCOCK ASSOCIATES
185 CENTRE STREET
DANVERS, MASSACHUSETTS 01923

ARCHITECTS:
ARROWSTREET INC.
10 POST OFFICE SQUARE, SUITE 700N
BOSTON, MASSACHUSETTS 02109

PROPOSED LEGEND

- DRAIN
- WATER SERVICE
- SEWER SERVICE
- ELECTRIC CONDUIT
- TELEPHONE CONDUIT
- PIPE FLOW ARROW
- SURFACE FLOW ARROW
- CATCH BASIN
- DRAIN MANHOLE
- SEWER MANHOLE
- CLEANOUT
- TRANSFORMER
- CONSTRUCTION FENCE
- EROSION CONTROL SILT FENCE & STRAW WATTLES
- PROPOSED CONTOUR
- 22.43 SPOT GRADE
- TW/BW TOP OF WALL/BOTTOM OF WALL
- TC/BC TOP OF CURB/BOTTOM OF CURB

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02128

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC
265 Franklin Street, 6th Floor
Boston, Massachusetts 02110

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM

COMMONWEALTH OF MASSACHUSETTS
KATHERINE A. CRUZ
CIVIL
No. 51384
REGISTERED PROFESSIONAL ENGINEER

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION
1	EJR	KAC	11/23/21	GRADING & DRAINAGE AT REAR GARAGE LEVEL

DATE:	11/10/21	DESIGN BY:	EJR
SCALE:	1" = 20'	DRAWN BY:	EJR/JPP
APPRVD. BY:	KAC	CHECK BY:	FAK

TITLE SHEET

PLOT DATE: Nov 23, 2021 9:49 am
PATH: O:\Civil 3D Projects\23109 - Gate Residential - East Boston\DWG\

DWG: 23109ts.dwg	C0
LAYOUT: TS	
SHEET: 1 OF 8	
PROJECT NO.: 23109	

#355 BENNINGTON STREET

East Boston, Massachusetts 02128

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC

265 Franklin Street, 6th Floor
Boston, Massachusetts 02110

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

121 EAST BERKELEY STREET, BOSTON, MA 02118
VOICE (617) 357-8145, FAX (617) 357-9495
WWW.HANCOCKASSOCIATES.COM

COMMONWEALTH OF MASSACHUSETTS
JASON A. ELLIS
No. 49052
PROFESSIONAL LAND SURVEYOR

ASSESSORS: PARCEL ID: 0104196100

REFERENCES: DEED BOOK 51007, PAGE 86
PLAN IN BOOK 6316, PAGE 518

RECORD OWNER: 413-419 BREMEN STREET, LLC
1220 BENNINGTON STREET
BOSTON, MA 02128

ZONING: EAST BOSTON NEIGHBORHOOD
SUB-DISTRICT "CE" - CORRIDOR ENHANCEMENT

NOTES:

1) THE HORIZONTAL DATUM FOR THIS SURVEY IS THE MASSACHUSETTS COORDINATE SYSTEM, NAD 1983, MAINLAND ZONE. THE VERTICAL DATUM FOR THIS SURVEY IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). SAID DATUMS WERE ESTABLISHED VIA GPS OBSERVATIONS UTILIZING REALIZATION NAD83(2011) AND GEOID 12A.

2) ELEVATIONS SHOWN HEREON REFER TO NAVD88. PROJECT BENCH MARK IS AN MGS DISK "E2" SET IN A CONCRETE SIDEWALK ON THE WEST SIDE OF BREMEN STREET AND ABOUT 65.6 FEET NORTH OF THE INTERSECTION WITH PRESCOTT STREET. ELEVATION IS 9.68 (NAVD88).

3) UNDERGROUND UTILITIES SHOWN HEREON ARE COMPILED FROM FIELD LOCATIONS OF STRUCTURES AND FROM AVAILABLE RECORD INFORMATION ON FILE AT THE BOSTON WATER AND SEWER COMMISSION, MASS HIGHWAY DEPT. AND UTILITY COMPANIES. OTHER UNDERGROUND UTILITIES MAY EXIST. IT SHALL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER AND THE CONTRACTOR TO VERIFY THE LOCATION, SIZE & ELEVATION OF ALL UTILITIES WITHIN THE AREA OF PROPOSED WORK AND TO CONTACT "DIG-SAFE" AT 811 AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.

4) BUILDING OFFSETS SHOWN HEREON ARE TO CORNER CONC. BLOCK UNLESS OTHERWISE NOTED.

5) EVIDENCE OF UNDERGROUND TRAFFIC CONTROL LINES EXIST WITHIN BENNINGTON STREET. NO INFORMATION FOR SAID LINES WAS AVAILABLE AT THE TIME OF THE SURVEY.

6) NO PLANS OR SKETCHES SHOWING THE LOCATION OF THE SEWER LATERAL(S) FROM THE PREMISES WERE AVAILABLE FROM THE BOSTON WATER AND SEWER COMMISSION AT THE TIME OF THE SURVEY.

7) FEMA FLOOD ZONE AE (10) SHOWN HEREON WAS OBTAINED FROM THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL No. 25025C0019J, EFFECTIVE DATE 3/16/2016.

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM - MAINLAND ZONE (NAD83)

BREMEN STREET (PUBLIC - 40' WIDE) (CITY LAYOUTS L-3815, L-12388)

BENNINGTON STREET (PUBLIC - 100' WIDE) (CITY LAYOUT L-3131)

NEPTUNE ROAD (PUBLIC - 100' WIDE) (CITY LAYOUT L-4611)

EAST BOSTON/CHELSEA BYPASS ROAD (PLAN NO. 285 OF 2011)

(NO ACCESS - COMMERCIAL VEHICLES ONLY)

LOT AREA
50,932±S.F.
(1.169±Ac)

FRIENDS OF EXCEL ACADEMY CHARTER SCHOOL, INC.
DEED BOOK 62000, PAGE 207
PLAN NO. 73 OF 2015

PEDESTRIAN EASEMENT
PLAN 154 OF 2015

ACCESS & UTILITY EASEMENT
DEED BOOK 54166, PAGE 301
PLAN NO. 73 OF 2015

MASS. PORT AUTHORITY TEMPORARY EASEMENT
DEED BOOK 48451 PAGE 47
PLAN 73 OF 2015

MASS. PORT AUTHORITY MAINTENANCE EASEMENT
DEED BOOK 48451 PAGE 47
PLAN 73 OF 2015

N/F MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

1-STORY CONC. BLOCK WAREHOUSE

1-STORY CONC. BLOCK BUILDING

1-STORY CONC. BLOCK BUILDING

TEMA FLOOD ZONE AE (10) (SEE NOTE #7) (11,302± S.F. OF THE LOT COVERED BY FLOOD ZONE)

Site low
11.84 BCB
5.38 NAVD88

Site high
29.46 BCB
23.03 NAVD88

ELEVATION BENCH MARKS ▲ DATUM: NAVD88		
NO.	DESCRIPTION	ELEV.
1.	X-CUT IN HYDRANT BOLT OVER MAIN OUTLET	17.12
2.	MAG NAIL IN UTILITY POLE	14.36
3.	BOX CUT ON CONC. TRANDFORMER PAD	12.20

LEGEND

- METAL GUARDRAIL
- EDGE OF PAVEMENT
- CHAIN LINK FENCE
- WIRE FENCE
- WOOD FENCE
- 86.75 / 86.25 CURB WITH TOP AND BOTTOM CURB ELEVATION
- EDGE OF VEGETATED AREA
- 12"RCP — DRAINLINE WITH PIPE SIZE, MATERIAL & FLOW DIRECTION, CATCHBASIN, MANHOLE & ROUND CATCHBASIN
- W — 6"CI — WATER MANHOLE, WATER MAIN WITH SIZE, TEE, GATE VALVE & FIRE HYDRANT
- GV — 10"DI — GAS MAIN WITH SIZE & GATE VALVE
- (ABAN.) ABANDONED
- #181 OHW — EXISTING UTILITY POLE WITH DESIGNATION OVERHEAD WIRES AND GUY POLE
- E — ELECTRIC MANHOLE & UNDERGROUND ELECTRIC LINES
- T — TELEPHONE MANHOLE & UNDERGROUND TELEPHONE LINES
- RETAINING WALL
- EDGE OF GRAVEL ROAD
- × 100.7 SPOT ELEVATION
- 93.7 / 12"M PROMINENT DECIDUOUS TREE WITH ELEVATION, SIZE AND SPECIES
- 96.2 / 18"P PROMINENT CONIFEROUS TREE WITH ELEVATION, SIZE AND SPECIES
- LIGHT POLE
- (W) 104.1 MONITORING WELL WITH TOP METAL CASING EL.
- N.P.V. NO PIPES VISIBLE

- FEMA FLOOD ZONE AE (10)
- RCP REINFORCED CONCRETE PIPE
- CI CAST IRON
- SGC SLOPED GRANITE CURB
- SMH (S) SEWER MANHOLE
- DMH (D) DRAIN MANHOLE
- CB CATCH BASIN
- DOUBLE GRATE CATCHBASIN
- (3) PARKING SPACE COUNT
- GM GAS METER
- EM ELECTRIC METER
- CU CONNECTION UNKNOWN
- BOLLARD
- SIGN
- (W) MANHOLE (UNKNOWN UTILITY)
- (R) RECORD
- (C) CALCULATED
- (FD) FOUND
- DH DRILL HOLE
- MHB MASS HIGHWAY BOUND
- VGC VERTICAL GRANITE CURB
- (BB) BOTTOM OF CONC. BRIDGE BEAM
- (BI) BOTTOM OF STEEL I-BEAM
- CLF CHAIN LINK FENCE

NOT TO SCALE

NOT TO SCALE

NOT TO SCALE

SCALE: 1" = 20'

0 20 40 80

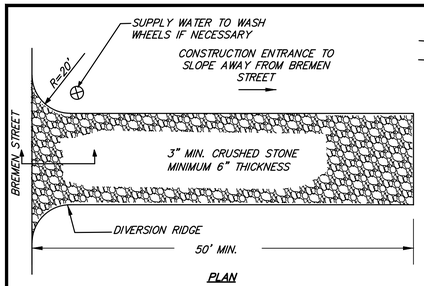
NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

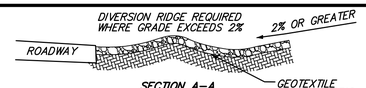
DATE: 12/11/19 DRAWN BY: JML
SCALE: 1"=20' CHECK BY: JAE

EXISTING CONDITIONS PLAN OF LAND IN EAST BOSTON, MA

PLOT DATE: Nov 18, 2021 8:41 am

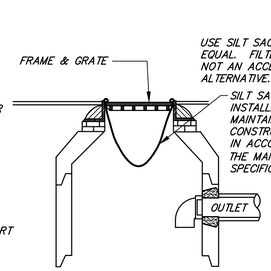
DWG: 23109sv-C3D18.dwg
LAYOUT: EC
SHEET: 1 OF 1
PROJECT NO.: 23109



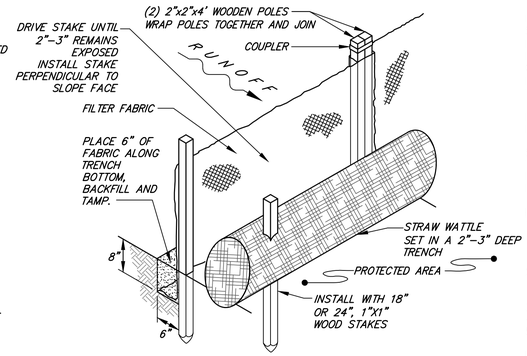


NOTES:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
4. IN THE DIRECTION OF TRAVEL, THE CONSTRUCTION ENTRANCE/EXIT SHALL SLOPE DOWN TOWARDS THE SITE AND AWAY FROM THE ROADWAY.
5. A 3-6" BERM SHALL BE CONSTRUCTED AT THE STREET AT THE START OF THE CONSTRUCTION ENTRANCE. ANY DEBRIS TRACKED TO THE RIGHT-OF-WAY SHALL BE CLEANED UP AT THE END OF EACH CONSTRUCTION DAY.

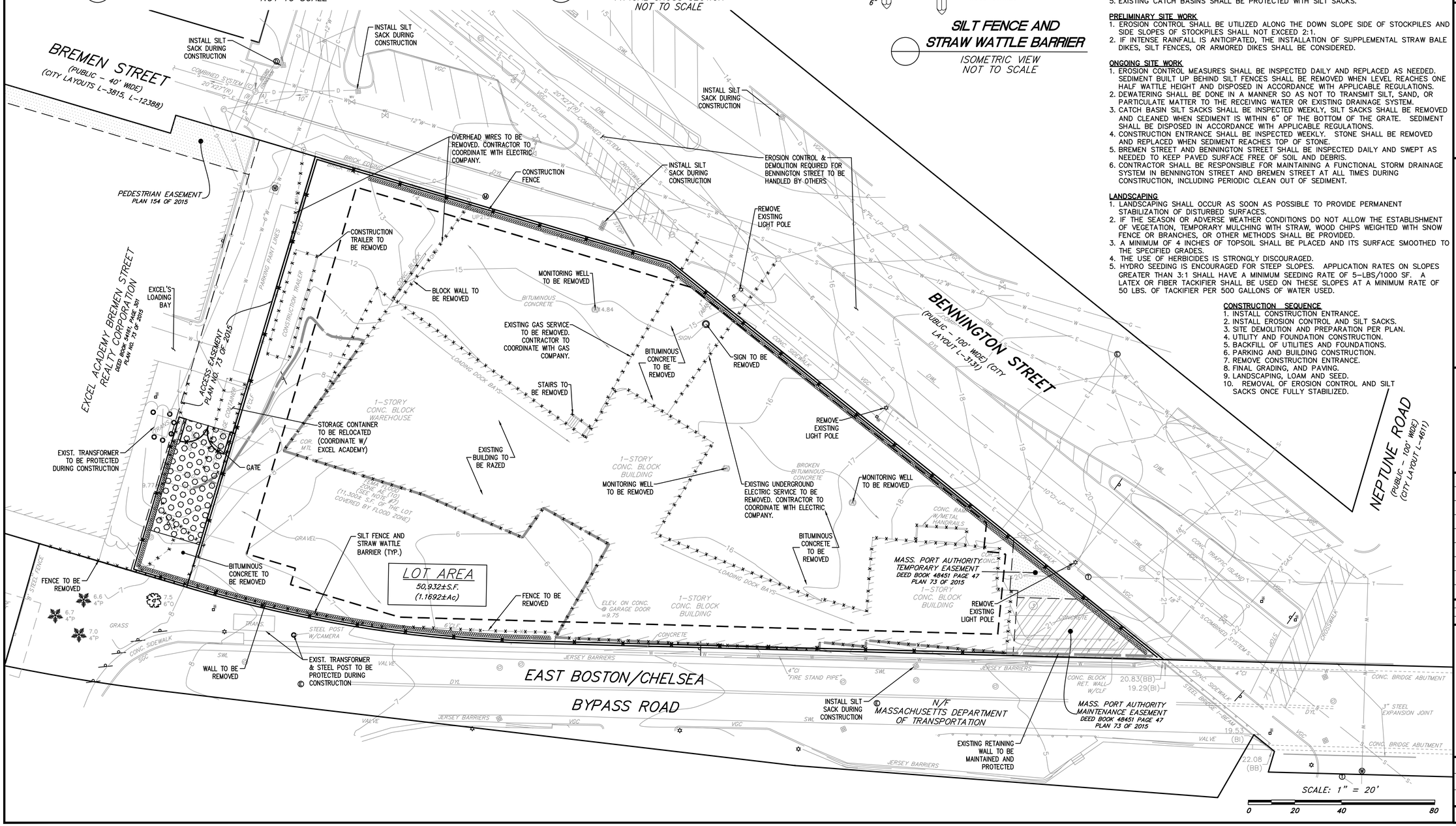
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT
NOT TO SCALE



CATCH BASIN SILT SACK
TYPICAL CROSS SECTION
NOT TO SCALE



SILT FENCE AND STRAW WATTLE BARRIER
ISOMETRIC VIEW
NOT TO SCALE



EROSION AND SEDIMENTATION PLAN

BEST MANAGEMENT PRACTICES (BMP) FOR EROSION AND SEDIMENTATION CONTROL ARE STAKED STRAW WATTLES, FILTER FENCES, HYDRO SEEDING, AND PHASED DEVELOPMENT. MANY STORMWATER BMP TECHNOLOGIES (E.G., INFILTRATION TECHNOLOGIES) ARE NOT DESIGNED TO HANDLE THE HIGH CONCENTRATIONS OF SEDIMENTS TYPICALLY FOUND IN CONSTRUCTION RUNOFF AND MUST BE PROTECTED FROM CONSTRUCTION-RELATED SEDIMENT LOADINGS. CONSTRUCTION BMP'S WILL BE INSPECTED DAILY AND MAINTAINED AS REQUIRED TO ENSURE PROPER FUNCTION.

IN DEVELOPING THE PROPOSED PROJECT CERTAIN MEASURES WILL BE IMPLEMENTED TO MINIMIZE IMPACTS EROSION AND SEDIMENTATION COULD HAVE ON SURROUNDING AREAS. THIS SECTION ADDRESSES ITEMS THAT INVOLVE PROPER CONSTRUCTION TECHNIQUES, CLOSE SURVEILLANCE OF WORKMANSHIP, AND IMMEDIATE RESPONSE TO EMERGENCY SITUATIONS. THE DEVELOPER MUST BE PREPARED TO PROVIDE WHATEVER REASONABLE MEASURES ARE NECESSARY TO PROTECT THE ENVIRONMENT DURING CONSTRUCTION AND TO STABILIZE ALL DISTURBED AREAS AS SOON AS CONSTRUCTION ENDS.

PRE-CONSTRUCTION
1. THE CONTRACTOR SHALL HAVE A STOCKPILE OF MATERIALS REQUIRED TO CONTROL EROSION ON-SITE TO BE USED TO SUPPLEMENT OR REPAIR EROSION CONTROL DEVICES. THESE MATERIALS SHALL INCLUDE, BUT ARE NOT LIMITED TO STRAW WATTLES, SILT FENCE AND CRUSHED STONE.
2. THE CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL ON SITE AND SHALL UTILIZE EROSION CONTROL MEASURES WHERE NEEDED, REGARDLESS OF WHETHER THE MEASURES ARE SPECIFIED ON THE PLAN OR IN THE ORDER OF CONDITIONS.
3. UNSUITABLE EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.
4. CONSTRUCTION ENTRANCE SHALL BE INSTALLED.
5. EXISTING CATCH BASINS SHALL BE PROTECTED WITH SILT SACKS.

PRELIMINARY SITE WORK
1. EROSION CONTROL SHALL BE UTILIZED ALONG THE DOWN SLOPE SIDE OF STOCKPILES AND SIDE SLOPES OF STOCKPILES SHALL NOT EXCEED 2:1.
2. IF INTENSE RAINFALL IS ANTICIPATED, THE INSTALLATION OF SUPPLEMENTAL STRAW BALE DIKES, SILT FENCES, OR ARMORED DIKES SHALL BE CONSIDERED.

ONGOING SITE WORK
1. EROSION CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPLACED AS NEEDED. SEDIMENT BUILT UP BEHIND SILT FENCES SHALL BE REMOVED WHEN LEVEL REACHES ONE HALF WATTLE HEIGHT AND DISPOSED IN ACCORDANCE WITH APPLICABLE REGULATIONS.
2. DEWATERING SHALL BE DONE IN A MANNER SO AS NOT TO TRANSMIT SILT, SAND, OR PARTICULATE MATTER TO THE RECEIVING WATER OR EXISTING DRAINAGE SYSTEM.
3. CATCH BASIN SILT SACKS SHALL BE INSPECTED WEEKLY, SILT SACKS SHALL BE REMOVED AND CLEANED WHEN SEDIMENT IS WITHIN 6" OF THE BOTTOM OF THE GRATE. SEDIMENT SHALL BE DISPOSED IN ACCORDANCE WITH APPLICABLE REGULATIONS.
4. CONSTRUCTION ENTRANCE SHALL BE INSPECTED WEEKLY. STONE SHALL BE REMOVED AND REPLACED WHEN SEDIMENT REACHES TOP OF STONE.
5. BREMEN STREET AND BENNINGTON STREET SHALL BE INSPECTED DAILY AND SWEPT AS NEEDED TO KEEP PAVED SURFACE FREE OF SOIL AND DEBRIS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING A FUNCTIONAL STORM DRAINAGE SYSTEM IN BENNINGTON STREET AND BREMEN STREET AT ALL TIMES DURING CONSTRUCTION, INCLUDING PERIODIC CLEAN OUT OF SEDIMENT.

LANDSCAPING
1. LANDSCAPING SHALL OCCUR AS SOON AS POSSIBLE TO PROVIDE PERMANENT STABILIZATION OF DISTURBED SURFACES.
2. IF THE SEASON OR ADVERSE WEATHER CONDITIONS DO NOT ALLOW THE ESTABLISHMENT OF VEGETATION, TEMPORARY MULCHING WITH STRAW, WOOD CHIPS WEIGHTED WITH SNOW FENCE OR BRANCHES, OR OTHER METHODS SHALL BE PROVIDED.
3. A MINIMUM OF 4 INCHES OF TOPSOIL SHALL BE PLACED AND ITS SURFACE SMOOTHED TO THE SPECIFIED GRADES.
4. THE USE OF HERBICIDES IS STRONGLY DISCOURAGED.
5. HYDRO SEEDING IS ENCOURAGED FOR STEEP SLOPES. APPLICATION RATES ON SLOPES GREATER THAN 3:1 SHALL HAVE A MINIMUM SEEDING RATE OF 5-LBS/1000 SF. A LATEX OR FIBER TACKIFIER SHALL BE USED ON THESE SLOPES AT A MINIMUM RATE OF 50 LBS. OF TACKIFIER PER 500 GALLONS OF WATER USED.

CONSTRUCTION SEQUENCE
1. INSTALL CONSTRUCTION ENTRANCE.
2. INSTALL EROSION CONTROL AND SILT SACKS.
3. SITE DEMOLITION AND PREPARATION PER PLAN.
4. UTILITY AND FOUNDATION CONSTRUCTION.
5. BACKFILL OF UTILITIES AND FOUNDATIONS.
6. PARKING AND BUILDING CONSTRUCTION.
7. REMOVE CONSTRUCTION ENTRANCE.
8. FINAL GRADING, AND PAVING.
9. LANDSCAPING, LOAM AND SEED.
10. REMOVAL OF EROSION CONTROL AND SILT SACKS ONCE FULLY STABILIZED.

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02128

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC
265 Franklin Street, 6th Floor
Boston, Massachusetts 02110

HANCOCK ASSOCIATES
Civil Engineers
Land Surveyors
Wetland Scientists
185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM

COMMONWEALTH OF MASSACHUSETTS
KATHERINE A. CRUZ
CIVIL
No. 51384
REGISTERED PROFESSIONAL ENGINEER
11/10/2021

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE:	11/10/21	DESIGN BY:	EJR
SCALE:	1" = 20'	DRAWN BY:	EJR/JPP
APPRVD. BY:	KAC	CHECK BY:	FAK

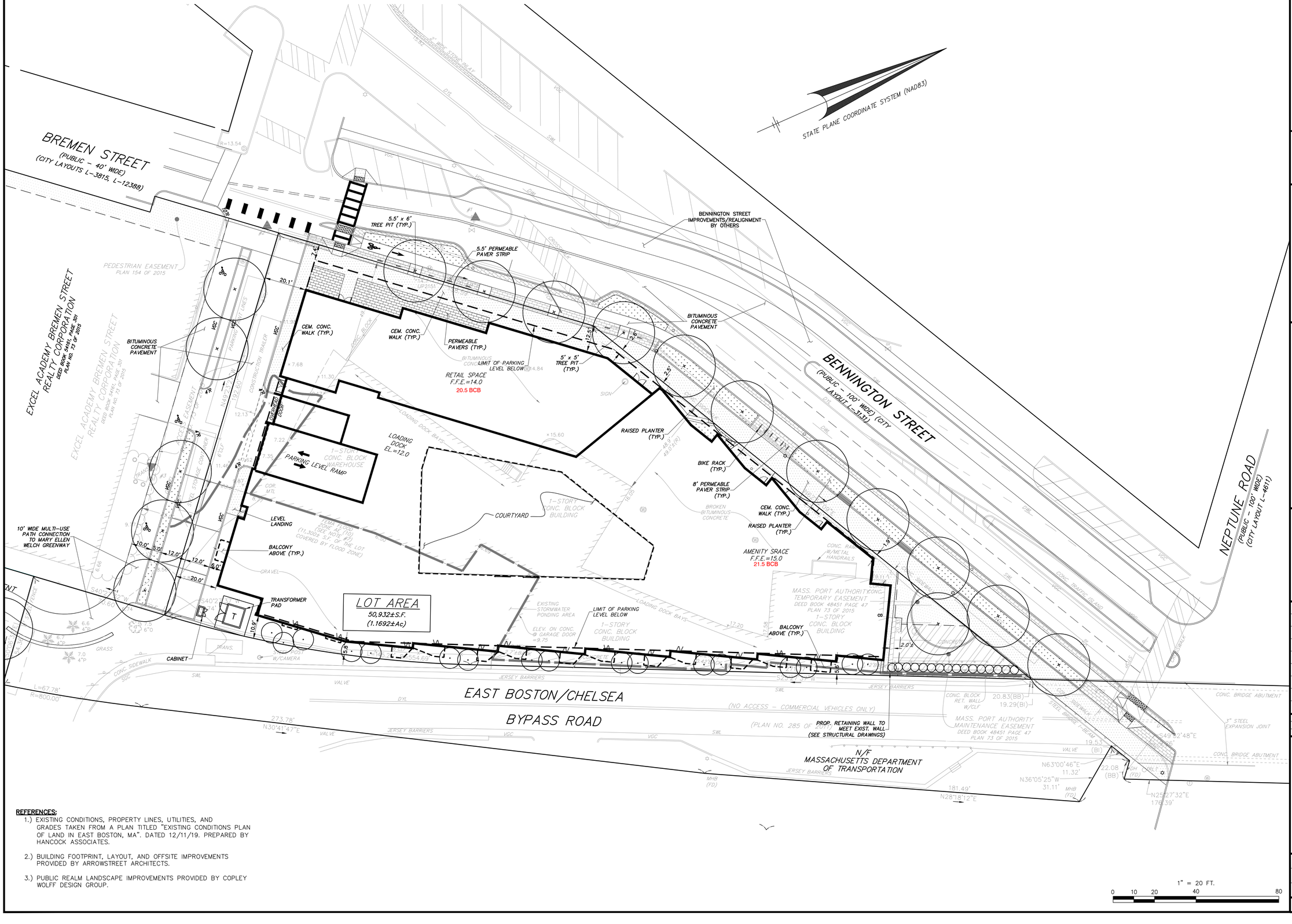
SITE PREPARATION & EROSION CONTROL PLAN

PLOT DATE: Nov 10, 2021 10:53 am
PATH: O:\Civil 3D Projects\23109 - Gate Residential - East Boston\DWG\

DWG: 23109sp-EC.dwg
LAYOUT: SP
SHEET: 3 OF 8

C1

PROJECT NO.: 23109



REFERENCES:

1.) EXISTING CONDITIONS, PROPERTY LINES, UTILITIES, AND GRADES TAKEN FROM A PLAN TITLED "EXISTING CONDITIONS PLAN OF LAND IN EAST BOSTON, MA". DATED 12/11/19. PREPARED BY HANCOCK ASSOCIATES.

2.) BUILDING FOOTPRINT, LAYOUT, AND OFFSITE IMPROVEMENTS PROVIDED BY ARROWSTREET ARCHITECTS.

3.) PUBLIC REALM LANDSCAPE IMPROVEMENTS PROVIDED BY COPLEY WOLFF DESIGN GROUP.

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02110

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC

265 Franklin Street, 6th Floor Boston, Massachusetts 02110

HANCOCK ASSOCIATES

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NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE:	11/10/21	DESIGN BY:	EJR
SCALE:	1" = 20'	DRAWN BY:	EJR/JPP
APPRVD. BY:	KAC	CHECK BY:	FAK

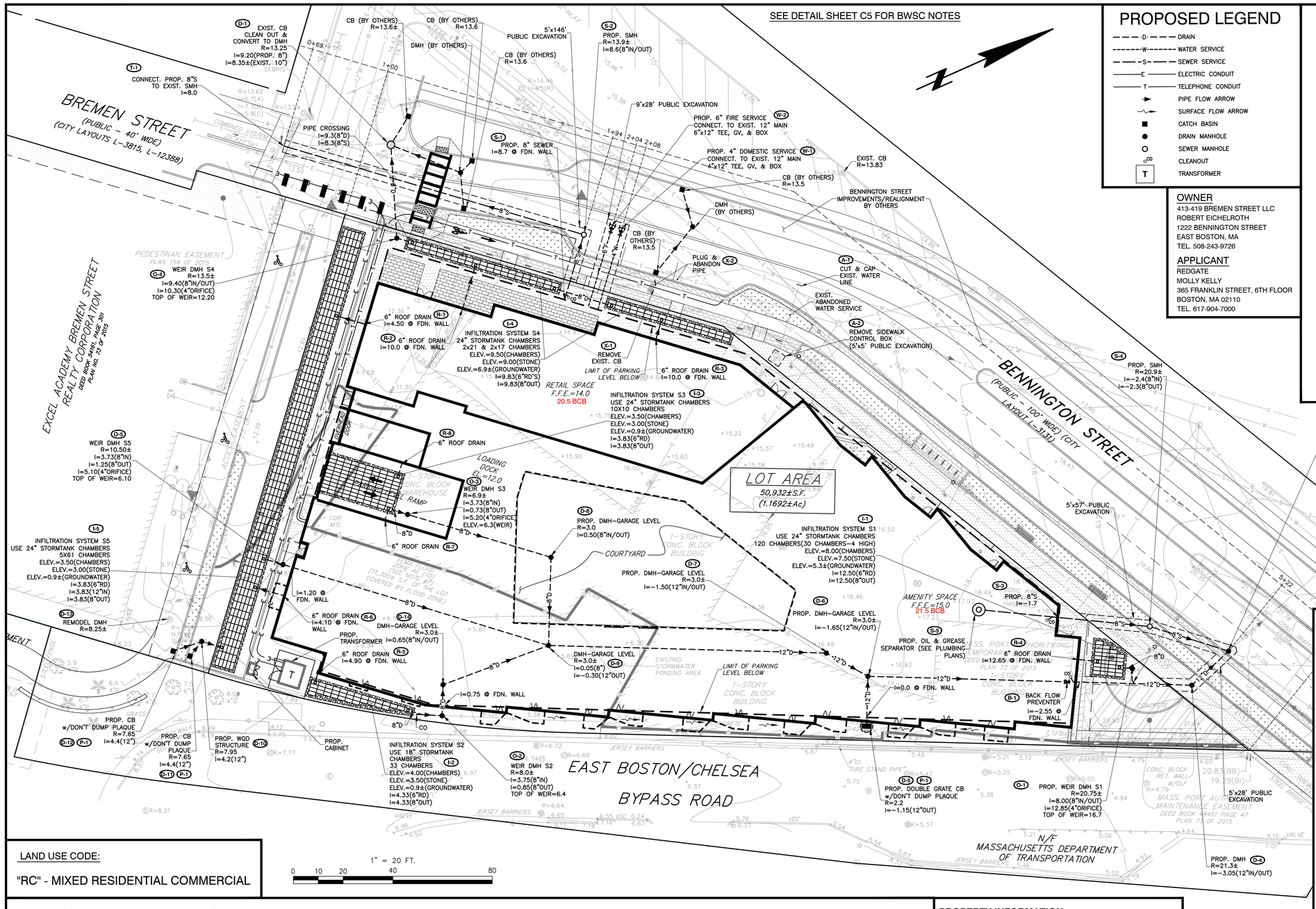
LAYOUT & MATERIALS PLAN

DWG:	23109SP7.dwg
LAYOUT:	SP
SHEET:	4 OF 8

C2

PROJECT NO.: 23109

PLOT DATE: Nov 10, 2021 10:46 am
PATH: O:\Civil 3D Projects\23109 - Gate Residential - East Boston\DWG\



PROPOSED LEGEND

- DRAIN
- WATER SERVICE
- SEWER SERVICE
- ELECTRIC CONDUIT
- TELEPHONE CONDUIT
- PIPE FLOW ARROW
- SURFACE FLOW ARROW
- CATCH BASIN
- DRAIN MANHOLE
- SEWER MANHOLE
- CLEANOUT
- TRANSFORMER

OWNER
413-419 BREMEN STREET LLC
ROBERT EICHELROTH
1222 BENNINGTON STREET
EAST BOSTON, MA
TEL. 508-243-9726

APPLICANT
REDGATE
MOLLY KELLY
365 FRANKLIN STREET, 6TH FLOOR
BOSTON, MA 02110
TEL. 617-904-7000

SERVICE CONNECTION TABLE

	ITEM	QTY	BWSC INSPECTOR/DATE
A-1	CUT & CAP EXIST. WATER SERVICE	1	
A-2	REMOVE SIDEWALK CONTROL BOX	1	
B-1	BACKFLOW PREVENTER	1	
D-1	CONVERT EXIST. CB TO DMH	1	
D-2	REMODEL EXIST MH	1	
D-3	CONNECT TO 12" DRAIN	1	
D-4	DMH	1	
D-5	DOUBLE GRATE CB	1	
D-6	DMH - GARAGE LEVEL	1	
D-7	DMH - GARAGE LEVEL	1	
D-8	DMH - GARAGE LEVEL	1	
D-9	DMH - GARAGE LEVEL	1	
D-10	WATER QUALITY DEVICE (WQD)	1	
D-11	CB	1	
D-12	CB	1	
D-13	REMODEL EXIST. DMH	1	
D-14	DMH - GARAGE LEVEL	1	
I-1	INFILTRATION SYSTEM S1	1	
I-2	INFILTRATION SYSTEM S2	1	
I-3	INFILTRATION SYSTEM S3	1	
I-4	INFILTRATION SYSTEM S4	1	
I-5	INFILTRATION SYSTEM S5	1	
O-1	WEIR DMH S1	1	
O-2	WEIR DMH S2	1	
O-3	WEIR DMH S3	1	
O-4	WEIR DMH S4	1	
O-5	WEIR DMH S5	1	
P-1	"DON'T DUMP" PLAQUE	3	
R-1	6" ROOF DRAIN	1	
R-2	6" ROOF DRAIN	1	
R-3	6" ROOF DRAIN	1	
R-4	6" ROOF DRAIN	1	
R-5	6" ROOF DRAIN	1	
R-6	6" ROOF DRAIN	1	
R-7	6" ROOF DRAIN	1	
R-8	6" ROOF DRAIN	1	
S-1	8" SEWER SERVICE	1	
S-2	SMH	1	
S-3	8" SEWER SERVICE	1	
S-4	SMH	1	
S-5	OIL & GREASE SEPARATOR	1	
T-1	DYE TEST COMBINED SEWER	1	
T-2	DYE TEST COMBINED SEWER	1	
W-1	4" DOMESTIC SERVICE	1	
W-2	6" FIRE PROTECTION SERVICE	1	
X-1	REMOVE EXIST. CB	1	
X-2	PLUG & ABANDON EXIST. DRAIN	1	
Z-1	AS-BUILT PLAN - INSPECTION FEE	1	
Z-2	4:1 I/I FEE	1	

LAND USE CODE:

"RC" - MIXED RESIDENTIAL COMMERCIAL

1" = 20 FT.
0 10 20 40 80

BWSC STORMWATER INFILTRATION CALCULATIONS

PROPOSED TOTAL BUILDING AREA = 179,783± GSF

DESIGN RUNOFF VOLUME:

USE 1.25-INCH RAINFALL EVENT
SITE IMPERVIOUS AREA = 46,500± S.F.

RUNOFF VOLUME = 46,500 S.F. X 1.25"/12" = 4,843.75 C.F.

DESIGN VOLUME = 4,845 C.F.

PROPOSED INFILTRATION SYSTEM VOLUME

INFILTRATION SYSTEM S1
USE 120 STORMTANK MODULE 25 24" CHAMBERS SURROUNDED BY CRUSHED STONE

CHAMBER VOLUME = (3'x4 CHAMBERS)x(1.6'x7.5 CHAMBERS)x4.9'x95% VOIDS = 663.5 C.F.

STONE VOLUME = [(194.2 SF X 5.4 FT) - 663.5 C.F.] X 0.3 VOIDS = 115.5 C.F.

SUBTOTAL = 663.5 C.F. + 115.5 C.F. = 779.0 C.F.

INFILTRATION SYSTEM S2
USE 33 STORMTANK MODULE 25 18" CHAMBERS SURROUNDED BY CRUSHED STONE

CHAMBER VOLUME = 10.944 C.F./CHAMBER X 33 CHAMBERS = 361.2 C.F.

STONE VOLUME = [(238 SF X 2.9 FT) - 361.2 C.F.] X 0.3 VOIDS = 98.7 C.F.

SUBTOTAL = 361.2 C.F. + 98.7 C.F. = 459.9 C.F.

INFILTRATION SYSTEM S3
USE 100 STORMTANK MODULE 25 24" CHAMBERS SURROUNDED BY CRUSHED STONE

CHAMBER VOLUME = 7.752 C.F./CHAMBER X 100 CHAMBERS = 775.2 C.F.

STONE VOLUME = [(576 SF X 2.2 FT) - 775.2 C.F.] X 0.3 VOIDS = 147.6 C.F.

SUBTOTAL = 775.2 C.F. + 147.6 C.F. = 922.8 C.F.

INFILTRATION SYSTEM S4
USE 76 STORMTANK MODULE 25 24" CHAMBERS SURROUNDED BY CRUSHED STONE
- 42 STORMTANK MODULES CONNECTED TO 34 STORMTANK MODULES

CHAMBER VOLUME = 3.648 C.F./CHAMBER X 42 CHAMBERS = 153.2 C.F.

CHAMBER VOLUME = 3.648 C.F./CHAMBER X 34 CHAMBERS = 124.0 C.F.

STONE VOLUME = [(340 SF X 1.3 FT) - 153.2 C.F.] X 0.3 VOIDS = 86.6 C.F.
STONE VOLUME = [(265 SF X 1.3 FT) - 124.0 C.F.] X 0.3 VOIDS = 66.2 C.F.

SUBTOTAL = 153.2 C.F. + 124.0 C.F. + 86.6 C.F. + 66.2 C.F. = 430 C.F.

INFILTRATION SYSTEM S5
USE 305 STORMTANK MODULE 25 24" CHAMBERS SURROUNDED BY CRUSHED STONE

CHAMBER VOLUME = 7.296 C.F./CHAMBER X 305 CHAMBERS = 2225.3 C.F.

STONE VOLUME = [(1850 SF X 2.1 FT) - 2225.3 C.F.] X 0.3 VOIDS = 497.9 C.F.

SUBTOTAL = 2225.3 C.F. + 497.9 C.F. = 2723.2 C.F.

TOTAL VOLUME PROVIDED

= SYSTEMS "S1" + "S2" + "S3" + "S4" + "S5"

=779.0 C.F. + 459.9 C.F + 922.8 C.F + 430.0 C.F. + 2723.2 C.F. = 5,314.9 C.F.

STORMWATER STORAGE VOLUME = 5,314.9 C.F. > 4,845.0 C.F.

PROPERTY INFORMATION

Account Number NEW Parcel Number 0104196100 Ward 1
Property Location 355 BENNINGTON STREET
Project Name 355 BENNINGTON STREET
Neighborhood EAST BOSTON Extended Zip Code 02128
Type of Premise PROP. MIXED-USE RESIDENTIAL BUILDING

WATER METER INFORMATION

NEW WATER ACCOUNT No. :
NEW METER No.:
MTU (METER TRANSMISSION UNIT) TO BE INSTALLED BY BWSC
WATER METER SIZE = 2-INCH

ANTICIPATED SEWAGE FLOW

STUDIOS (32), 1-BEDROOMS (82), 2-BEDROOMS (48), 3-BEDROOMS (8)
234 BEDROOMS x 110 GPD/BEDROOM = 25,740 GPD
TOTAL = 25,740 GPD

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02110

ASSESSORS:
PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC

265 Franklin Street, 6th Floor Boston, Massachusetts 02110

HANCOCK ASSOCIATES
Civil Engineers
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185 CENTRE STREET, DANVERS, MA 01923
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COMMONWEALTH OF MASSACHUSETTS
CATHERINE A. CRUZ
CIVIL
No. 51384
REGISTERED PROFESSIONAL ENGINEER

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION
1	EJR	KAC	11/23/21	DRAINAGE AT REAR GARAGE LEVEL

DATE:	10/29/21	DESIGN BY:	EJR
SCALE:	1" = 20'	DRAWN BY:	EJR/JPP
APPRVD. BY:	KAC	CHECK BY:	FAK

SITE UTILITY PLAN

PLOT DATE: Nov 23, 2021 11:20 am
PATH: O:\Civil 3D Projects\23109 - Gate Residential - East Boston\DWG\

DWG:	23109SP8.dwg
LAYOUT:	UTILITY
SHEET:	5 OF 8

C3

PROJECT NO.: 23109

ADA NOTE:

CONTRACTOR SHALL INSTALL ALL PARKING AREAS AND WALKWAYS IN ACCORDANCE WITH APPLICABLE ADA AND MAAB REQUIREMENTS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

- **HANDICAPPED SPACES AND STRIPED AREA SLOPES SHALL NOT EXCEED 2% IN ANY DIRECTION.**
- **HANDICAPPED RAMPS SHALL NOT EXCEED 8% FOR A MAXIMUM VERTICAL DISTANCE OF 6 INCHES.**
- **SIDEWALKS SHALL HAVE A MAXIMUM SLOPE IN THE PATH OF TRAVEL OF 5% AND A MAXIMUM CROSS SLOPE OF 2%. CONTRACTOR SHOULD NOT LAYOUT SLOPES EXCEEDING 4.5% AND 1.5% RESPECTIVELY TO ALLOW FOR CONSTRUCTION TOLERANCES. IF THE CONTRACTOR DETERMINES THAT THE REQUIRED SLOPES CANNOT BE ACHIEVED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPORTING THE INFORMATION TO THE ENGINEER FOR RESOLUTION.**

STATE PLANE COORDINATE SYSTEM (NAD83)

16.46 BOSTON CITY BASE (BCB)

6.46

10.00 NAVD 88

ELEVATION 10.00 NAVD 88 = ELEVATION 16.46 BCB

DATUM EQUATION

BREMEN STREET (PUBLIC – 40' WIDE) (CITY LAYOUTS L–3815, L–12388)

BENNINGTON STREET (PUBLIC – 100' WIDE) (CITY LAYOUT L–4631)

NEPTUNE ROAD (PUBLIC – 100' WIDE) (CITY LAYOUT L–4611)

EAST BOSTON/CHELSEA BYPASS ROAD

EXCEL ACADEMY BREMEN STREET REALTY CORPORATION DEED BOOK 51161, PAGE 301 PLAN NO. 15 OF 2015

EXIST. CB CLEAN OUT & CONVERT TO DMH R=13.25 I=9.20(PROP.- 8") I=8.35±(EXIST. 10") DEBRIS

CB (BY OTHERS) R=13.6± | CB (BY OTHERS) R=13.6 | DMH (BY OTHERS) | CB (BY OTHERS) R=13.6

PIPE CROSSING I=9.3(8"D) I=8.3(8"S)

EXIST. CB R=13.83 | CB (BY OTHERS) R=13.5 | BENNINGTON STREET IMPROVEMENTS/REALIGNMENT BY OTHERS | DMH (BY OTHERS) | CB (BY OTHERS) R=13.5 | PLUG & ABANDON PIPE

PEDESTRIAN EASEMENT PLAN 154 OF 2015

WEIR DMH S4 R=13.5± I=9.40(8"IN/OUT) I=10.30(4"ORIFICE) TOP OF WEIR=12.20 TC: 13.26 BC: 12.76

6" ROOF DRAIN I=4.50 @ FDN. WALL | 6" ROOF DRAIN I=10.0 @ FDN. WALL

INFILTRATION SYSTEM S4 24" STORMTANK CHAMBERS 2x21 & 2x17 CHAMBERS ELEV.=9.50(CHAMBERS) ELEV.=9.00(STONE) ELEV.=6.9±(GROUNDWATER) I=9.83(6"RD'S) I=9.83(8"OUT)

RETAIL SPACE F.F.E.=14.0 20.5 BCB

REMOVE EXIST. CB | LIMIT OF PARKING LEVEL BELOW | 6" ROOF DRAIN I=10.0 @ FDN. WALL

INFILTRATION SYSTEM S3 USE 24" STORMTANK CHAMBERS 10X10 CHAMBERS ELEV.=3.50(CHAMBERS) ELEV.=3.00(STONE) ELEV.=0.9±(GROUNDWATER) I=3.83(6"RD) I=3.83(8"OUT)

12.0(NAVD) 18.46(BCB) | 15.0(NAVD) 21.46(BCB) | 17.5(NAVD) 23.96(BCB) | 18.5(NAVD) 24.96(BCB)

6" ROOF DRAIN | LOADING DOCK EL.=12.0 | CONC. BLOCK WAREHOUSE | RAMP

WEIR DMH S3 R=6.9± I=3.73(8"IN) I=0.73(8"OUT) I=5.20(4"ORIFICE) ELEV.=6.3(WEIR)

LOT AREA 50,932±S.F. (1.1692±Ac)

PROP. DMH–GARAGE LEVEL R=3.0 I=0.50(8"IN/OUT) | COURTYARD | PROP. DMH–GARAGE LEVEL R=3.0± I=–1.50(12"IN/OUT)

INFILTRATION SYSTEM S1 USE 24" STORMTANK CHAMBERS 120 CHAMBERS(30 CHAMBERS–4 HIGH) ELEV.=8.00(CHAMBERS) ELEV.=7.50(STONE) ELEV.=5.3±(GROUNDWATER) I=12.50(6"RD) I=12.50(8"OUT)

AMENITY SPACE F.F.E.=15.0 21.5 BCB

PROP. DMH–GARAGE LEVEL R=3.0± I=–1.65(12"IN/OUT)

INFILTRATION SYSTEM S5 USE 24" STORMTANK CHAMBERS 5X61 CHAMBERS ELEV.=3.50(CHAMBERS) ELEV.=3.00(STONE) ELEV.=0.9±(GROUNDWATER) I=3.83(6"RD) I=3.83(12"IN) I=3.83(8"OUT)

WEIR DMH S5 R=10.50± I=3.73(8"IN) I=1.25(8"OUT) I=5.10(4"ORIFICE) TOP OF WEIR=6.10

8 STACKED PARKING SPACES

REMODEL DMH R=8.25±

I=1.20 @ FDN. WALL | 6" ROOF DRAIN I=4.10 @ FDN. WALL | FIRST FLOOR BALCONY (TYP.) | 6" ROOF DRAIN I=4.90 @ FDN. WALL

DMH–GARAGE LEVEL R=3.0± I=0.65(8"IN/OUT) | DMH–GARAGE LEVEL R=3.0± I=0.05(8") I=–0.30(12"OUT)

Site low 9.36 BCB 2.9 NAVD88

I=0.75 @ FDN. WALL | I=0.0 @ FDN. WALL | FIRST FLOOR BALCONY (TYP.) | BACK FLOW PREVENTER I=–2.55 @ FDN. WALL

LIMIT OF PARKING LEVEL BELOW | FINISHED GRADE=3.0 (TYP.) ALONG FACE OF GARAGE LEVEL

MASS. PORT AUTHORITY CONC. TEMPORARY DEED BOOK 48451 PAGE 47 PLAN 73 OF 2015 | 6" ROOF DRAIN I=12.65 @ FDN. WALL | 1 STORY CONC. BLOCK BUILDING

PROP. CB w/DON'T DUMP PLAQUE R=7.65 I=4.4(12") | PROP. CB w/DON'T DUMP PLAQUE R=7.65 I=4.4(12") | PROP. WOD STRUCTURE R=7.95 I=4.2(12")

PROP. CONNECTION TO GREENWAY

INFILTRATION SYSTEM S2 USE 18" STORMTANK CHAMBERS 33 CHAMBERS ELEV.=4.00(CHAMBERS) ELEV.=3.50(STONE) ELEV.=0.9±(GROUNDWATER) I=4.33(6"RD) I=4.33(8"OUT)

WEIR DMH S2 R=8.0± I=3.75(8"IN) I=0.85(8"OUT) TOP OF WEIR=6.4

SLOPE TO DRAIN | SLOPE TO DRAIN | 4"CI FIRE STAND PIPE | TW: 23.0± BW: 7.5±

PROP. DOUBLE GRATE CB w/DON'T DUMP PLAQUE R=2.2 I=–1.15(12"OUT)

PROP. WEIR DMH S1 R=20.75± I=8.00(8"IN/OUT) I=12.85(4"ORIFICE) TOP OF WEIR=16.7

Site high 29.49 BCB 23.03 NAVD88

N/F MASSACHUSETTS DEPARTMENT OF TRANSPORTATION

MASS. PORT AUTHORITY MAINTENANCE EASEMENT DEED BOOK 48451 PAGE 47 PLAN 73 OF 2015

PROP. DMH R=21.3± I=–3.05(12"IN/OUT)

EXIST. MANHOLE – REMODEL R=21.1± I=–2.9(PROP. 8"S) I=–3.2(PROP. 12" DRAIN) I=–3.7(EXIST. 18"CS)

0 10 20 40 80

1" = 20 FT.

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02110

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC

265 Franklin Street, 6th Floor Boston, Massachusetts 02110

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777–3050, FAX (978) 774–7816
WWW.HANCOCKASSOCIATES.COM

COMMONWEALTH OF MASSACHUSETTS CATHERINE A. CRUZ CIVIL No. 51384 REGISTERED PROFESSIONAL ENGINEER

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION
1	EJR	KAC	11/23/21	GRADING & DRAINAGE AT REAR GARAGE LEVEL

DATE:	11/10/21
SCALE:	1" = 20'
APPRVD. BY:	KAC
DESIGN BY:	EJR
DRAWN BY:	EJR/JPP
CHECK BY:	FAK

GRADING & DRAINAGE PLAN

DWG: 23109SP8.dwg
LAYOUT: GD
SHEET: 6 OF 8

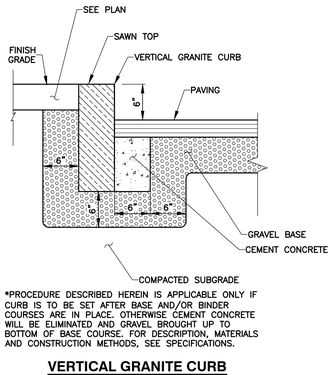
C4

PROJECT NO.: 23109

PLOT DATE: Nov 23, 2021 11:20 am
PATH: O:\Civil 3D Projects\23109 – Gate Residential – East Boston\DWG\

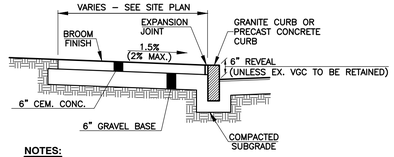
BWSC NOTES:

1. LOCATIONS AND ELEVATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE REFERENCED PLAN AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. HANCOCK ASSOCIATES ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES INACCURATELY SHOWN OR OMITTED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY DEPARTMENT SHALL BE NOTIFIED AND THE ACTUAL LOCATIONS OF SUBSURFACE STRUCTURES SHALL BE VERIFIED IN THE FIELD. CALL THE BWSC, (617)989-7000 AND DIG-SAFE CALL CENTER, (888)344-7233, 72 HOURS (3 WORKING DAYS) PRIOR TO EXCAVATION.
2. ALL CONSTRUCTION METHODS AND MATERIALS SHALL CONFORM TO BWSC REQUIREMENTS AND ALL OTHER APPLICABLE MUNICIPAL REGULATIONS.
3. ALL DISTURBANCES WITHIN THE TRAVELED WAYS SHALL CONFORM TO CITY AND BWSC STANDARDS.
4. THIS PLAN HAS BEEN PREPARED FOR APPROVAL OF THE WATER, DRAIN AND SEWER CONNECTIONS TO THE BWSC FACILITIES. IT IS UNDERSTOOD THAT THE RESPONSIBILITY OF OWNERSHIP AND MAINTENANCE OF THE SEWER CONNECTIONS ON PRIVATE PROPERTY AND/OR PRIVATE AND PUBLIC WAYS SHALL BE THE RESPONSIBILITY OF THE DEVELOPER AND/OR OWNERS. IT IS ALSO UNDERSTOOD THAT THE WATER CONNECTIONS ON PRIVATE PROPERTY INCLUDING PRIVATE WAYS ARE ALSO THE RESPONSIBILITY OF THE DEVELOPER AND/OR OWNERS. IF THE CONNECTIONS CROSS, OR ARE NEAR INDIVIDUAL PROPERTY LINES, PROVISIONS MUST BE MADE TO ALLOW EACH OWNER TO MAINTAIN OR RECONSTRUCT THEIR RESPECTIVE CONNECTIONS. THIS FACT MUST BE INCORPORATED INTO ANY PURCHASE AND SALES AGREEMENT AND DEEDS RELATED TO THE TRANSFER OF OWNERSHIP OF THE PROPERTIES.
5. THE PROPOSED BUILDING CONNECTIONS (BY PLUMBER) SHALL BE 10' OUTSIDE THE FOUNDATION WALL.
6. SITE CONTRACTOR TO PROVIDE ALL EXCAVATION, INSTALLATION, BACK FILLING, PAVEMENT PATCHING, ETC. FOR THE INSTALLATION OF UNDERGROUND GAS, ELECTRIC, TELEPHONE, FIRE ALARM, WATER, SEWER, DRAIN AND SIMILAR SERVICES.
7. IF EXISTING ABANDONED BWSC SERVICES ARE ENCOUNTERED THEY SHALL BE CUT AND CAPPED AT THE MAIN PER BWSC STANDARDS.
8. THE SEWER GRAVITY PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PIPE SDR 35 CONFORMING TO ASTM STANDARD SPECIFICATIONS D3034 UNLESS OTHERWISE NOTED.
9. STORM DRAIN PIPES SHALL BE POLYVINYL CHLORIDE (PVC) PIPE SDR 35 CONFORMING TO ASTM STANDARD SPECIFICATIONS D3034 UNLESS NOTED OTHERWISE.
10. CONTRACTOR IS TO OBTAIN THE ROUGH CONSTRUCTION SIGN OFF DOCUMENT FROM THE CITY OF BOSTON INSPECTIONAL SERVICES DEPARTMENT PRIOR TO FILING A GENERAL SERVICES APPLICATION WITH BWSC.
11. CONTRACTOR WILL BE RESPONSIBLE FOR PREPARING AS-BUILT PLANS IN ACCORDANCE WITH BWSC REQUIREMENTS.
12. CONTRACTOR TO CONFIRM THE LOCATIONS AND INVERTS OF THE EXISTING UTILITIES IN THE STREET PRIOR TO THE INSTALLATION OF NEW SERVICE CONNECTIONS. SERVICES SHALL BE FIELD VERIFIED BEFORE BEGINNING CONSTRUCTION.
13. ANY CONSTRUCTION DEWATERING SHALL EMPLOY MEASURES TO FILTER OUT SEDIMENT PRIOR TO ITS DISCHARGE AND SHALL CONFORM WITH BWSC REQUIREMENTS. CONTRACTOR TO SUBMIT A SKETCH OF THESE TO THE ARCHITECT FOR APPROVAL.
14. CONTRACTOR TO EMPLOY MEASURES TO CONTROL DUST DURING CONSTRUCTION.
15. RIM ELEVATIONS OF DRAINAGE STRUCTURES ARE APPROXIMATE. FINAL ELEVATIONS ARE TO BE SET FLUSH. ADJUST ALL OTHER RIM ELEVATIONS OF EXISTING MANHOLES, WATER GATES, GAS GATES AND OTHER UTILITIES TO FINISHED GRADE WITHIN LIMITS OF SITE WORK.
16. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, FIRE ALARM AND OTHER PRIVATE COMPANIES, AS REQUIRED.
17. COORDINATE CATV, TELEPHONE, ELECTRIC AND GAS INSTALLATION WITH THE UTILITY COMPANIES.
18. FIRE AND DOMESTIC WATER SERVICES SHALL BE DUCTILE IRON, MANUFACTURED IN ACCORDANCE WITH THE REQUIREMENTS OF ANSI/AWWA C151/A21.51 AND SHALL BE CLASS 56. JOINTS SHALL BE INSTALLED WITH MEGALUG MECHANICAL JOINTS OR EQUAL. ALL NEW WATER PIPE SHALL BE ZINC COATED.
19. SEE PLUMBING PLANS FOR ALL PIPE WORK WITHIN BUILDING, AND FOR DESIGN AND DETAILS OF THE PROPOSED GARAGE GAS/SAND TRAP MANHOLES.
20. THE RIM ELEVATIONS OF ALL UTILITY STRUCTURES WITHIN THE LIMITS OF WORK SHALL BE ADJUSTED TO FINISHED GRADE.
21. CONTRACTOR TO SAWCUT EXISTING PAVEMENT WITHIN STREET FOR PROPOSED UTILITY TRENCHES.
22. ALL PROPOSED SEWER CONNECTIONS MUST BE MADE WATERTIGHT.
23. REFER TO STRUCTURAL DRAWINGS FOR RETAINING WALL DESIGN AND DETAILS.
24. AN AS-BUILT PLAN STAMPED BY A LICENSED SURVEYOR WITH AUTOCAD FILE FORMATTED TO BWSC SPECIFICATIONS MUST BE SUBMITTED TO THE BWSC AT THE END OF CONSTRUCTION.



*PROCEDURE DESCRIBED HEREIN IS APPLICABLE ONLY IF CURB IS TO BE SET AFTER BASE AND/OR BINDER COURSES ARE IN PLACE. OTHERWISE CEMENT CONCRETE WILL BE ELIMINATED AND GRAVEL BROUGHT UP TO BOTTOM OF BASE COURSE. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHODS, SEE SPECIFICATIONS.

VERTICAL GRANITE CURB
(NOT TO SCALE)

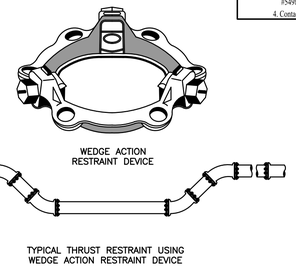


NOTES:

1.) CONTROL JOINTS TO BE PROVIDED EVERY 5 FEET.

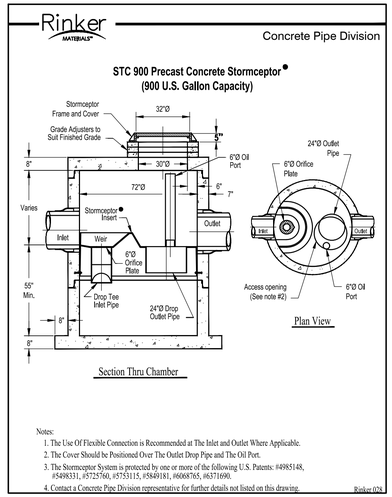
2.) EXPANSION JOINTS TO BE PROVIDED EVERY 30 FEET AND AT ALL POLES AND OTHER STRUCTURES.

CEMENT CONCRETE SIDEWALK
(NOT TO SCALE)



TYPICAL THRUST RESTRAINT USING WEDGE ACTION RESTRAINT DEVICE

BWSC #A-01f
TYPICAL THRUST RESTRAINT WEDGE ACTION RESTRAINT TYPE JOINTS
(NOT TO SCALE)

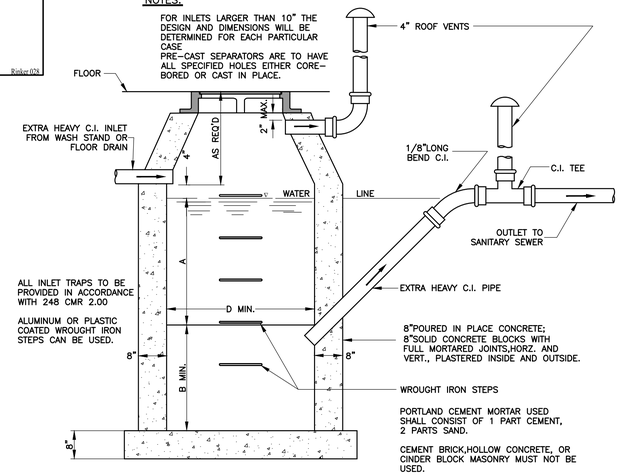


WATER QUALITY DEVICE STRUCTURE
(NOT TO SCALE)

INLET	D	A	B	INLET	D	A	B
4"	3'-6"ø	3'-0"	2'-6"	8"	5'-0"ø	6'-0"	5'-0"
5"	3'-6"ø	5'-0"	4'-0"		5'-6"x 5'-6"	4'-6"	4'-0"
	3'-6"x 3'-6"	4'-0"	3'-0"		6'-0"ø	4'-0"	3'-6"
	4'-0"	3'-8"	3'-0"		6'-0"x 6'-0"	3'-0"	2'-6"
	4'-0"x 4'-0"	3'-0"	2'-6"		6'-6"ø	3'-6"	3'-0"
	4'-6"	3'-0"	2'-6"		6'-6"x 6'-6"	3'-0"	2'-6"
6"	4'-0"ø	5'-0"	4'-6"	10"	5'-6"ø	7'-6"	6'-6"
	4'-0"x 4'-0"	4'-0"	3'-6"		6'-0"x 6'-0"	5'-6"	4'-6"
	4'-6"ø	4'-0"	3'-6"		6'-0"ø	6'-6"	5'-6"
	4'-6"x 4'-6"	3'-6"	3'-0"		6'-6"x 6'-6"	5'-0"	4'-0"
	5'-0"ø	3'-6"	3'-0"				
	5'-0"x 5'-0"	3'-0"	2'-6"				

NOTES:

FOR INLETS LARGER THAN 10" THE DESIGN AND DIMENSIONS WILL BE DETERMINED FOR EACH PARTICULAR CASE.
PRE-CAST SEPARATORS ARE TO HAVE ALL SPECIFIED HOLES EITHER CORE-BORED OR CAST IN PLACE.



ALL INLET TRAPS TO BE PROVIDED IN ACCORDANCE WITH 248 CMR 2.00

ALUMINUM OR PLASTIC COATED WROUGHT IRON STEPS CAN BE USED.

GENERAL CONSTRUCTION NOTES

BASIN TO BE LOCATED OUTSIDE OF BUILDING WHERE POSSIBLE,COVER TO HAVE A CENTER HOLE.

A TIGHT COVER MUST BE USED IF BASIN IS LOCATED INSIDE OF BUILDING.

OPENING SHALL BE NOT LESS THAN 24" DIA.

THE CATCH BASIN SHALL BE SO LOCATED AND CONSTRUCTED THAT SURFACE WATER SHALL BE EXCLUDED.

INLET PIPE SHALL BE AT LEAST FOUR INCHES ABOVE NORMAL WATER LINE.

WHERE SUBJECT TO FROST OR CRUSHING CONDITIONS, OUTLET SHALL BE AT LEAST THREE FEET BELOW THE SURFACE.

THE NEW CATCH BASIN MUST BE FILLED WITH CLEAN WATER BEFORE USING, AND AFTER BEING EMPTIED FOR PERIODIC CLEANING.

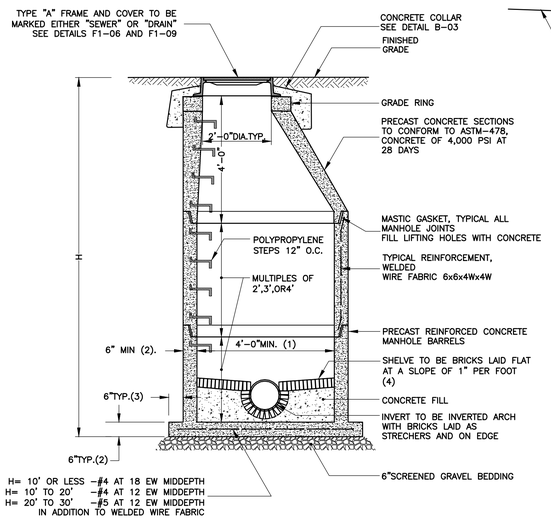
ALL OIL AND GASOLINE MUST BE REMOVED BEFORE CLEANING OUT THE BASIN, AND MUST NOT BE DISCHARGED INTO THE SEWER THROUGH OTHER FIXTURES.

SPECIFICATIONS FOR COVERING SPECIAL CASES OR CONDITIONS, SHALL BE APPROVED BY THE LOCAL AUTHORITIES, AND THE AUTHORITIES OF THE M.W.R.A.

WROUGHT IRON STEPS SHALL BE SPACED ABOUT 18" APART.

BOTH VENTS SHALL BE EXTENED INDEPENDENTLY 18" ABOVE THE ROOF, OR AS APPROVED BY THE LOCAL AUTHORITIES, AND THE AUTHORITIES OF THE M.W.R.A.
(Outlet pipe to be 45 degree angle)

BWSC #G-01
APPROVED OIL AND GREASE SEPARATOR DESIGN
(NOT TO SCALE)

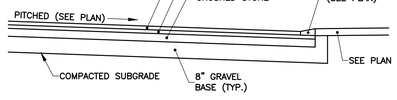


H= 10' OR LESS –#4 AT 18 EW MIDDEPTH
H= 10' TO 20' –#4 AT 12 EW MIDDEPTH
H= 20' TO 30' –#5 AT 12 EW MIDDEPTH
IN ADDITION TO WELDED WIRE FABRIC

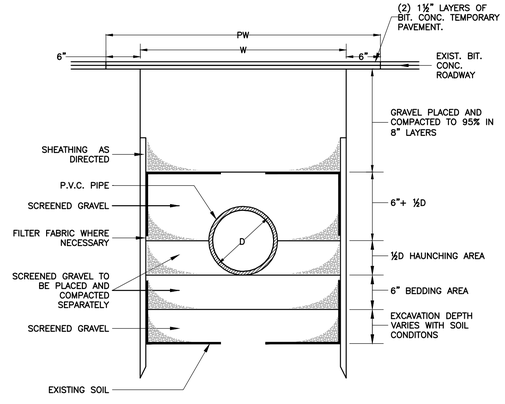
NOTES:

1. 5'-0"DIAMETER FOR ALL MANHOLE DEPTHS GREATER THAN 20 FEET OR WHEN ORDERED BY THE ENGINEER.
2. 6" MIN. WALL THICKNESS AND 7 INCH MIN. BASE THICKNESS WITH 5'-0" DIAMETER MANHOLES.
3. 6 INCH LIP OPTIONAL UNLESS OTHERWISE NOTED.
4. CONCRETE INVERT AND SHELF MAY BE SUBSTITUTED IN STORM DRAIN MANHOLES AS DIRECTED BY THE ENGINEER.

BWSC #B-02a
TYPICAL PRECAST CONCRETE MANHOLE
(NOT TO SCALE)



FULL DEPTH PAVEMENT SECTION
(NOT TO SCALE)

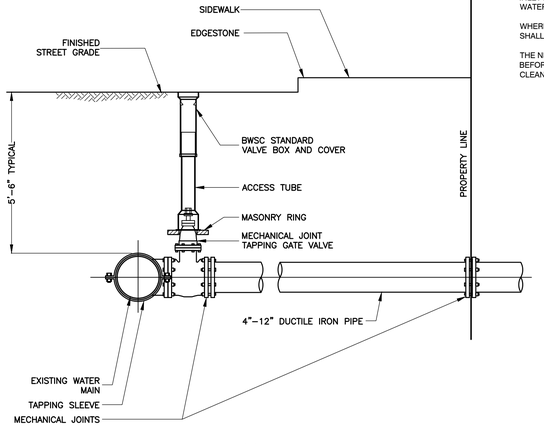


W = MAXIMUM TRENCH WIDTH
PW = MAXIMUM PAVING WIDTH = W+1'-0"
D = OUTSIDE DIAMETER
UNSHEATHED TRENCH: W = D+2' (3'-0"MIN.)
SHEATHED TRENCH: W = D+2'+ SHEATHING WIDTH:
4'-0"MIN. W/O WALERS
5'-0"MIN. W/WALERS
TRENCH BOX OR HYDRAULIC SHORING:
W = D+2'+ [WALL SHIELD WIDTH ± 8"] + 1' FOR TRENCH BOX

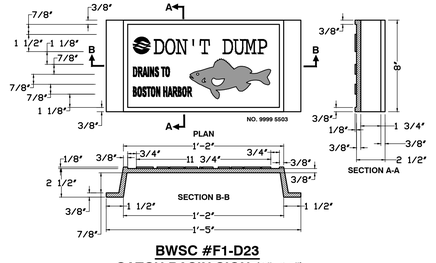
BWSC #B-09
TRENCH DETAIL FOR P.V.C. PIPE
(NOT TO SCALE)

NOTES:

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



BWSC #A-09
TYPICAL WATER PIPE CONNECTION WITH TAPPING SLEEVE AND GATE VALVE
(NOT TO SCALE)



BWSC #F1-D23
CATCH BASIN SIGN (8"x14")
(NOT TO SCALE)

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02110

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC

265 Franklin Street, 6th Floor Boston,
Massachusetts 02110

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
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COMMONWEALTH OF MASSACHUSETTS
KATHERINE A. CRUZ
CIVIL
No. 51984
REGISTERED PROFESSIONAL ENGINEER

11/10/2021

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE:	11/10/21	DESIGN BY:	EJR
SCALE:	AS NOTED	DRAWN BY:	EJR/JPP
APPRVD. BY:	KAC	CHECK BY:	FAK

SITE DETAILS

DWG: 23109SP7.dwg
LAYOUT: Details-1
SHEET: 7 OF 8

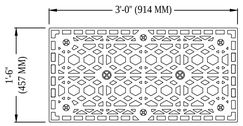
C5

PROJECT NO.: 23109

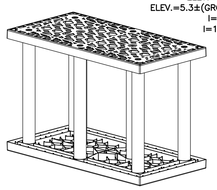
PLOT DATE: Nov 10, 2021 10:46 am
PATH: O:\Civil 3D Projects\23109 – Gate Residential – East Boston\DWG\

SYSTEM NAME	CHAMBER SIZE	# CHAMBERS	BOT. OF CHAMBER ELEVATION	TOP OF CHAMBER ELEVATION	BOTTOM OF STONE ELEVATION	TOP OF STONE ELEVATION	GROUNDWATER ELEVATION
INF. SYS. S1	24" STORMTANK 25	120	8.00	16.00	7.50	17.00	5.3±
INF. SYS. S2	18" STORMTANK 25	33	4.00	5.50	3.50	6.50	0.9±
INF. SYS. S3	24" STORMTANK 25	100	3.50	5.50	3.00	6.50	0.9±
INF. SYS. S4	24" STORMTANK 25	76	9.50	11.50	9.00	12.50	6.9±
INF. SYS. S5	24" STORMTANK 25	305	3.50	5.50	3.00	6.50	0.9±

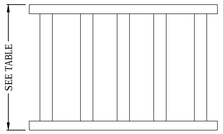
INFILTRATION SYSTEM TABLE



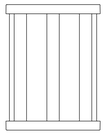
TOP



ISOMETRIC VIEW



FRONT



SIDE

STORMTANK MODULES				
DESCRIPTION	HEIGHT IN. (MM)	CAPACITY CF (CU. M.)	NOMINAL VOID RATIO	WEIGHT LBS. (KG)
ST-18	18 (457)	6.436 (0.18)	95.5%	22.7 (10)
ST-24	24 (610)	8.656 (0.25)	96.0%	26.3 (12)
~~ST-30~~	~~30 (762)~~	~~10.876 (0.31)~~	~~96.5%~~	~~29.5 (13)~~
~~ST-36~~	~~36 (914)~~	~~13.096 (0.37)~~	~~97.0%~~	~~33.1 (15)~~

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWING.
3. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY. THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION.
4. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.
5. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.CADdetails.com/info AND ENTER REFERENCE NUMBER 4907-008.

STORMTANK 25 CHAMBER DETAIL

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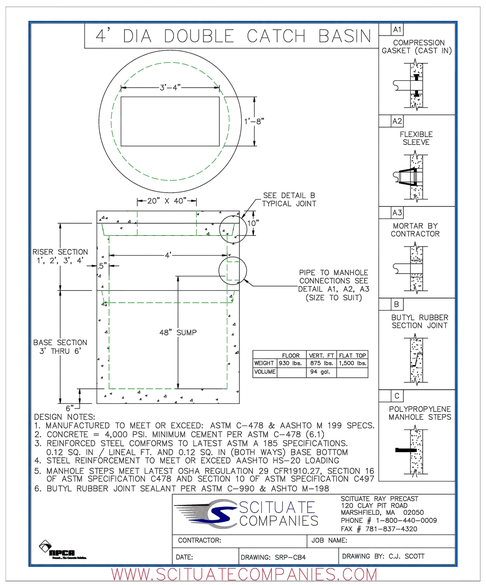

DOUBLE GRATE CATCH BASIN

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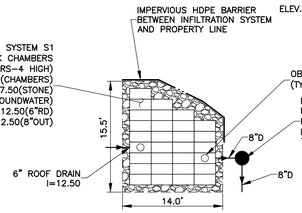

INFILTRATION SYSTEM S1

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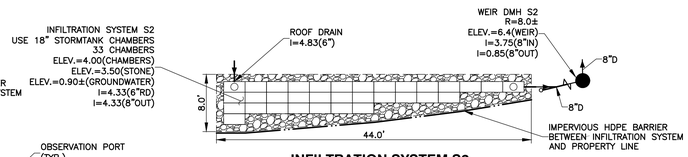

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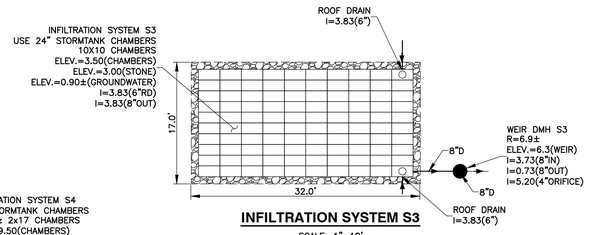

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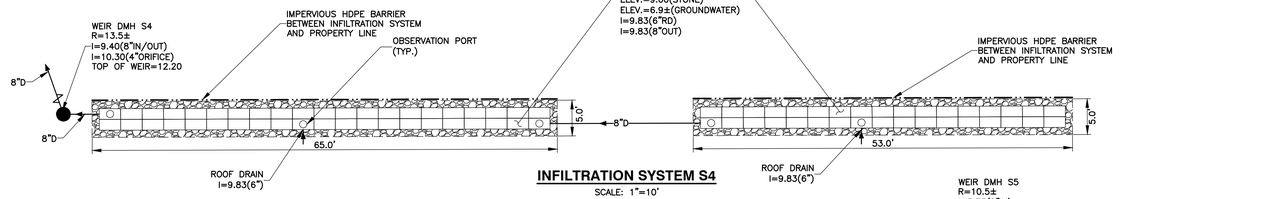

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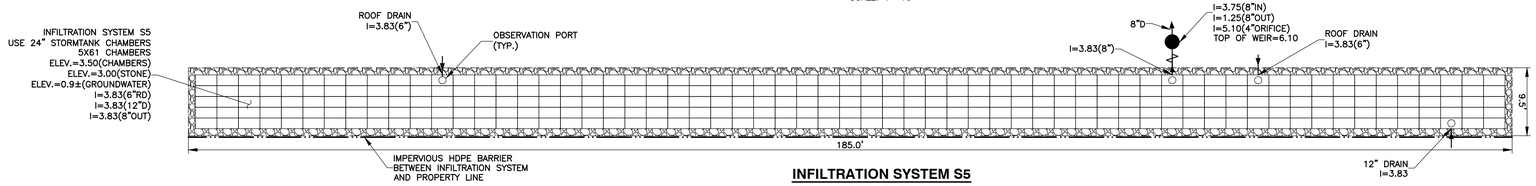

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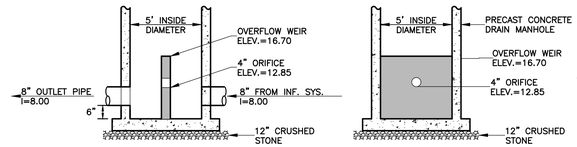
SCALE: 1"=10'



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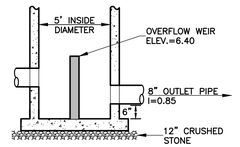

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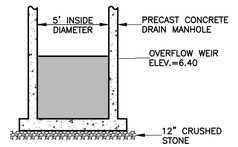

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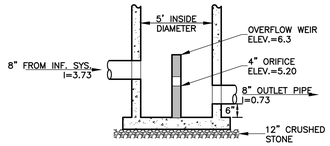

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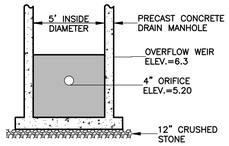

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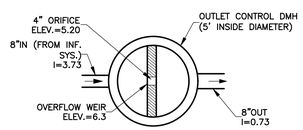
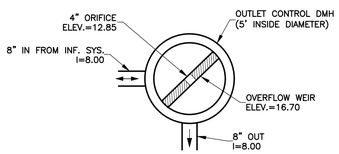


PLAN

INFILTRATION SYSTEM S3 WEIR OCM

NOT TO SCALE



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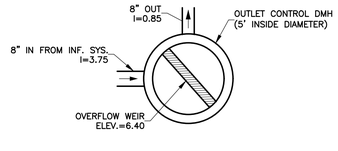

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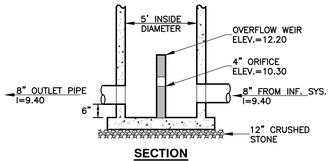

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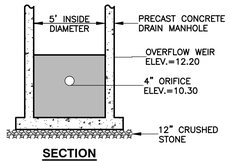

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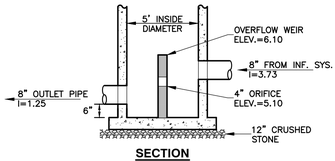

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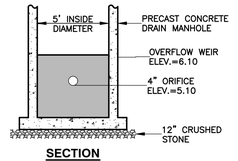

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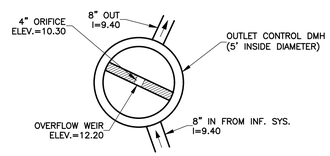

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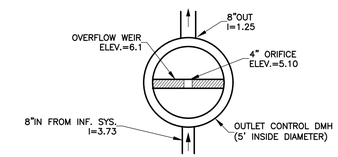

PLAN

INFILTRATION SYSTEM S5 WEIR OCM

NOT TO SCALE

PERMIT SITE PLAN

355 Bennington Street
Boston, Massachusetts 02110

ASSESSORS:

PARCEL ID
0104196100

PREPARED FOR:

GATE RESIDENTIAL PROPERTIES, LLC

265 Franklin Street, 6th Floor Boston, Massachusetts 02110

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM

COMMONWEALTH OF MASSACHUSETTS
KATHERINE A. CRUZ
CIVIL
No. 51984
REGISTERED PROFESSIONAL ENGINEER

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION
1	EJR	KAC	11/23/21	DOUBLE GRATE CB & WEIR DMH S2

DATE:	11/10/21
SCALE:	AS NOTED
APPRVD. BY:	KAC
DESIGN BY:	EJR
DRAWN BY:	EJR/JPP
CHECK BY:	FAK

SITE DETAILS

DWG: *23109SP8.dwg*
LAYOUT: *Details-2*
SHEET: 8 OF 8

C6

PROJECT NO.: 23109

PLOT DATE: Nov 23, 2021 10:02 am
PATH: G:\Civil 3D Projects\23109 - Gate Residential - East Boston\DWG\

ATTACHMENT E

CLIMATE RESILIENCY REPORT SUMMARY

Boston Planning & Development Agency
Climate Resiliency Report Summary

Submitted: 09/27/2021 14:19:43

A.1 - Project Information

Project Name:	355 Bennington Street			
Project Address:	355 Bennington Street Boston, MA 02128			
Filing Type:	Initial (PNF, EPNF, NPC or other substantial filing)			
Filing Contact:	Rob Eichelroth	413 - 419 Bremen Street LLC	reichelroth@gmail.com	5082439726
Is MEPA approval required?	No	MEPA date:		

A.2 - Project Team

Owner / Developer:	413 - 419 Bremen Street LLC
Architect:	Arrowstreet Inc.
Engineer:	Petersen Engineering Inc. (MEP)/Hancock Associates (Civil)
Sustainability / LEED:	Arrowstreet Inc./Thornton Tomasetti
Permitting:	Fort Point Associates, Inc. (A Tetra Tech Company)
Construction Management:	TBD

A.3 - Project Description and Design Conditions

List the principal Building Uses:	Residential and Retail
List the First Floor Uses:	Residential and Retail
List any Critical Site Infrastructure and or Building Uses:	not applicable

Site and Building:

Site Area (SF):	50932	Building Area (SF):	162296
Building Height (Ft):	69	Building Height (Stories):	6
Existing Site Elevation – Low (Ft BCB):	11.84 BCB, 5.38 NAVD88	Existing Site Elevation – High (Ft BCB):	29.49 BCB, 23.03 NAVD88
Proposed Site Elevation – Low (Ft BCB):	9.36 BCB, 2.9 NAVD88	Proposed Site Elevation – High (Ft BCB):	29.49 BCB, 23.03 NAVD88
Proposed First Floor Elevation (Ft BCB):	21.46 BCB, 15 NAVD88	Below grade spaces/levels (#):	1

Article 37 Green Building:

LEED Version - Rating System:	Multifamily Midrise v4.1	LEED Certification:	Yes

Boston Planning & Development Agency
Climate Resiliency Report Summary

Proposed LEED rating:	Gold	Proposed LEED point score (Pts.):	60

Building Envelope:

When reporting R values, differentiate between R discontinuous and R continuous. For example, use "R13" to show R13 discontinuous and use R10c.i. to show R10 continuous. When reporting U value, report total assembly U value including supports and structural elements.

Roof:	R19c.i. + R40	Exposed Floor :	R30
Foundation Wall:	R15c.i.	Slab Edge (at or below grade):	R8.4c.i.

Vertical Above-grade Assemblies (%'s are of total vertical area and together should total 100%):

Area of Opaque Curtain Wall & Spandrel Assembly:	0%	Wall & Spandrel Assembly Value:	N/A
Area of Framed & Insulated / Standard Wall:	68.6%	Wall Value:	R8.4c.i. + R23
Area of Vision Window:	24.6%	Window Glazing Assembly Value:	0.27
		Window Glazing SHGC:	0.21
Area of Doors:	6.8%	Door Assembly Value :	0.77

Energy Loads and Performance

For this filing – describe how energy loads & performance were determined	Annual energy usage and peak loads were determined using Carrier HAP modeling based on preliminary floor plans and elevations.		
Annual Electric (kWh):	2088148	Peak Electric (kW):	610
Annual Heating (MMbtu/hr):	1019	Peak Heating (MMbtu):	2.4
Annual Cooling (Tons/hr):	1019	Peak Cooling (Tons):	186
Energy Use - Below ASHRAE 90.1 - 2013 (%):	36	Have the local utilities reviewed the building energy performance?:	No
Energy Use - Below Mass. Code (%):	29	Energy Use Intensity (kBtu/SF):	37.1

Back-up / Emergency Power System

Electrical Generation Output (kW):		Number of Power Units:	
System Type (kW):		Fuel Source:	

Emergency and Critical System Loads (in the event of a service interruption)

Electric (kW):		Heating (MMbtu/hr):	
		Cooling (Tons/hr):	

B – Greenhouse Gas Reduction and Net Zero / Net Positive Carbon Building Performance

Reducing greenhouse gas emissions is critical to avoiding more extreme climate change conditions. To achieve the City's goal of carbon-neutrality by 2050 the performance of new buildings will need to progressively improve to carbon net zero and net positive.

B.1 – GHG Emissions - Design Conditions

For this filing - Annual Building GHG Emissions (Tons): 712

For this filing - describe how building energy performance has been integrated into project planning, design, and engineering and any supporting analysis or modeling:

An ASHRAE 90.1 Energy Model (see EPNF Appendix F) was performed in order to qualify the energy use of the Project with all electric heating, cooling and domestic hot water systems relative to a baseline building with gas-fueled systems. The Project demonstrates a 36% reduction in energy use compared to a baseline building.

Describe building specific passive energy efficiency measures including orientation, massing, building envelop, and systems:

The building envelope includes 2" of continuous insulation and high-performance glazing that is operable and double pane Low-E coated. Residential units have large operable windows in all living rooms and bedrooms, and most units have accessible balconies or Juliette balconies for increased natural ventilation.

Describe building specific active energy efficiency measures including high performance equipment, controls, fixtures, and systems:

The Project will include all-electric efficient heating and cooling and domestic hot water systems, LED light fixtures in common areas, low-flow plumbing fixtures, and Energy Star appliances for kitchen and laundry.

Describe building specific load reduction strategies including on-site renewable energy, clean energy, and storage systems:

Domestic hot water, heating, cooling and plug loads are the predominant energy use loads. The focus was on reducing loads on these ends to achieve the maximum return on investment for the Project. Strategies include low-flow fixtures, an optimize envelope, and Energy Star appliances. The Project Owner will consider photovoltaic systems (PV), potentially through a Power Purchase Agreement, for installation.

Describe any area or district scale emission reduction strategies including renewable energy, central energy plants, distributed energy systems, and smart grid infrastructure:

N/A

Describe any energy efficiency assistance or support provided or to be provided to the project:

The Project Owner and the Project Team will pursue energy efficiency incentives from the Utility companies.

B.2 - GHG Reduction - Adaptation Strategies

Describe how the building and its systems will evolve to further reduce GHG emissions and achieve annual carbon net zero and net positive performance (e.g. added efficiency measures, renewable energy, energy storage, etc.) and the timeline for meeting that goal (by 2050):

The Project goal is to minimize the building loads such that future upgrades do not involve cost-prohibitive strategies such as added insulation or a major retrofit to reduce loads. The building is targeting an EUI that a portion can be offset by a potential PV system.

C - Extreme Heat Events

Annual average temperature in Boston increased by about 2˚F in the past hundred years and will continue to rise due to climate change. By the end of the century, the average annual temperature could be 56° (compared to 46° now) and the number of days above 90° (currently about 10 a year) could rise to 90.

C.1 – Extreme Heat - Design Conditions

Temperature Range - Low (Deg.):	7	Temperature Range - High (Deg.):	91
Annual Heating Degree Days:	5512	Annual Cooling Degree Days	776

What Extreme Heat Event characteristics will be / have been used for project planning

Days - Above 90° (#):	9	Days - Above 100° (#):	2
Number of Heatwaves / Year (#):	3	Average Duration of Heatwave (Days):	3

Describe all building and site measures to reduce heat-island effect at the site and in the surrounding area:

Given the urban location, the site has limited open area. Vegetated landscape will be used as much as possible, and the remaining hardscape will have paving materials with an initial solar reflectance value of at least 0.33. The low-sloped roofing material will have an initial SRI greater than 82 and an aged SRI greater than 64 to reduce the heat-island effect at the site and in the surrounding areas.

C.2 - Extreme Heat – Adaptation Strategies

Describe how the building and its systems will be adapted to efficiently manage future higher average temperatures, higher extreme temperatures, additional annual heatwaves, and longer heatwaves:

The Project design parameters will be optimized for both heating and cooling, with consideration to projected extreme heat temperatures. Strategies include continuous insulation, insulated operable windows with Low-E coating and optimum solar heat gain coefficient (SHGC), natural ventilation strategies, and added cooling capacity by using higher design temperatures.

Describe all mechanical and non-mechanical strategies that will support building functionality and use during extended interruptions of utility services and infrastructure including proposed and future adaptations:

A high-performance building envelope will allow indoor temperature to change gradually, while operable windows and balconies promote natural ventilation.

Potable water for drinking, food preparation, sinks, and sanitary systems will be maintained.

D - Extreme Precipitation Events

From 1958 to 2010, there was a 70 percent increase in the amount of precipitation that fell on the days with the heaviest precipitation. Currently, the 10-Year, 24-Hour Design Storm precipitation level is 5.25". There is a significant probability that this will increase to at least 6" by the end of the century. Additionally, fewer, larger storms are likely to be accompanied by more frequent droughts.

D.1 – Extreme Precipitation - Design Conditions

What is the project design precipitation level? (In. / 24 Hours)	5.25

Describe all building and site measures for reducing storm water run-off:

Under existing conditions, the 355 Bennington Street site is occupied by a large 1-story commercial/industrial building and associated paved and densely compacted gravel areas. The existing site is void of any landscaping or significant pervious area. Stormwater under existing conditions is uncontrolled and untreated – the existing site does not provide a stormwater management system or a known connection to the Boston Water and Sewer Commission's combined storm sewers in Bennington Street and Bremen Street.

The proposed redevelopment of 355 Bennington Street will incorporate a stormwater management system designed to mitigate runoff volume and peak rates, in comparison to existing conditions, to the maximum extent practicable per the MassDEP's Stormwater Management Regulations. The stormwater management strategies for the project will include subsurface infiltration systems, landscaped areas, and pervious pavers to the maximum extent practicable.

D.2 - Extreme Precipitation - Adaptation Strategies

Describe how site and building systems will be adapted to efficiently accommodate future more significant rain events (e.g. rainwater harvesting, on-site storm water retention, bio swales, green roofs):

Refer to Section D.1 above. The proposed redevelopment of 355 Bennington Street will incorporate a stormwater management system to reduce peak rates of site runoff to the maximum extent practicable.

E – Sea Level Rise and Storms

Boston Planning & Development Agency
Climate Resiliency Report Summary

Under any plausible greenhouse gas emissions scenario, the sea level in Boston will continue to rise throughout the century. This will increase the number of buildings in Boston susceptible to coastal flooding and the likely frequency of flooding for those already in the floodplain.

Is any portion of the site in a FEMA Special Flood Hazard Area?	Yes	What Zone:	AE
What is the current FEMA SFHA Zone Base Flood Elevation for the site (Ft BCB)?			16.46 BCB, 10 NAVD88
Is any portion of the site in the BPDA Sea Level Rise Flood Hazard Area (see SLR-FHA online map)?	Yes		

If you answered YES to either of the above questions, please complete the following questions.
Otherwise you have completed the questionnaire; thank you!

E.1 – Sea Level Rise and Storms – Design Conditions

Proposed projects should identify immediate and future adaptation strategies for managing the flooding scenario represented by the Sea Level Rise Flood Hazard Area (SLR-FHA), which includes 3.2' of sea level rise above 2013 tide levels, an additional 2.5" to account for subsidence, and the 1% Annual Chance Flood. A. er using the SLR-FHA to identify a project's Sea Level Rise Base Flood Elevation, proponents should calculate the Sea Level Rise Design Flood Elevation by adding 12" of freeboard for buildings, and 24" of freeboard for critical facilities and infrastructure and any ground floor residential units.

What is the Sea Level Rise - Base Flood Elevation for the site (Ft BCB)?	19.46 BCB, 13 NAVD88		
What is the Sea Level Rise - Design Flood Elevation for the site (Ft BCB)?	Retail 20.46 BCB, 14 NAVD88 Residential 21.46 BCB, 15 NAVD88	First Floor Elevation (Ft BCB):	21.46 BCB, 15 NAVD88
What are the Site Elevations at Building (Ft BCB)?	Between 9.36 and 29.49 BCB Between 2.9 and 23.03 NAVD88	What is the Accessible Route Elevation (Ft BCB)?	20.46 and 21.46 BCB 14 and 15 NAVD88

Describe site design strategies for adapting to sea level rise including building access during flood events, elevated site areas, hard and soft barriers, wave / velocity breaks, storm water systems, utility services, etc.:

All inhabited space (residential, entry, amenities, etc.) will be elevated to 21.46 BCB (15 NAVD88), which is 2'-0" freeboard above the Sea Level Rise – Base Flood Elevation.

Describe how the proposed Building Design Flood Elevation will be achieved including dry / wet flood proofing, critical systems protection, utility service protection, temporary flood barriers, waste and drain water back flow prevention, etc.:

Mechanical systems will be located at or above the first floor, which is 21.46 BCB (15NAVD88). The project will also provide water-tight utility conduits, as well as stormwater and wastewater back flow prevention to any plumbing fixtures located below the Flood Elevation.

Describe how occupants might shelter in place during a flooding event including any emergency power, water, and waste water provisions and the expected availability of any such measures:

Occupants will be able to remain in their residences during these events; all inhabited areas are raised well above the anticipated flood level.

Describe any strategies that would support rapid recovery after a weather event:

If the adjacent roadways remain un-altered, occupants will be able to resume normal activities post-weather event. The Ground Floor and main entry of the building will be elevated 2'-0" above the Sea Level Rise – Base Flood Elevation.

E.2 – Sea Level Rise and Storms – Adaptation Strategies

Describe future site design and or infrastructure adaptation strategies for responding to sea level rise including future elevating of site areas and access routes, barriers, wave / velocity breaks, storm water systems, utility services, etc.:

The main building entry, amenity spaces, ground floor units and all critical equipment inside the building are located 2'-0" above the Sea Level Rise – Base Flood Elevation. The retail area is located 1'-0" above the Sea Level Rise – Base Flood Elevation. Additionally, the Proponent has elevated all entrance/egress points to the building above the FIRM Zone AE Elevation (El.) 10 NAVD88 (16.5 BCB) plus the maximum additional freeboard (between one to two feet of freeboard from west to east along the access easement) while maintaining a connection to the public realm. Two of these entrance/egress points along the access easement provide connection the elevated main level of the building only and will be constructed of flood resilient materials to the maximum extent feasible. The entry into the parking garage is located at approximately 18.0' BCB (Elevation 11.6 NAVD88), and the parking garage level is located at or above 9.5' BCB (Elevation 3.0 NAVD88). The parking level is a built-in condition that responds to the site topography, which is higher in elevation along Bremen and Bennington Streets and lower in elevation along the Mary Ellen Welch Greenway. The Proponent anticipates incorporating engineered flood vents into the design of the parking level per National Flood Insurance Program (NFIP) standards. The Proponent continues to be in direct communication and collaboration with Climate Ready East Boston to complement their neighborhood-scale flood resilience interventions through sustainable and resilient design of the Project Site

Describe future building adaptation strategies for raising the Sea Level Rise Design Flood Elevation and further protecting critical systems, including permanent and temporary measures:

All critical equipment inside the building will be located at or above the Ground Floor, which is 2'-0" above the Sea Level Rise – Base Flood Elevation.

Thank you for completing the Boston Climate Change Checklist!

For questions or comments about this checklist or Climate Change best practices, please contact:
John.Dalzell@boston.gov