NOTICE OF INTENT

Filing Under the Massachusetts Wetlands Protection Act

Long Island Bridge Project

Boston, Massachusetts

Submitted to:

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

Prepared for:

City of Boston Public Works Department
1 City Hall Square, Room 714
Boston, MA 02201

Prepared by:

TRC Environmental Corporation
650 Suffolk Street
Lowell, MA 01854

STV Inc.
One Financial Center, 3rd Floor
Boston, MA 02111

April 2018

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ACRONYM LIST

BCC	Boston Conservation Commission
BPWD	City of Boston Public Works Department
CMR	Code of Massachusetts Regulations
MassDEP	Massachusetts Department of Environmental Protection
FEMA	Federal Emergency Management Agency
LSCSF	Land Subject to Coastal Storm Flowage
MassDEP	Massachusetts Department of Environmental Protection
MassGIS	Massachusetts Geographic Information System
NHESP	Natural Heritage and Endangered Species Program
NOI	Notice of Intent
OOC	Order of Conditions
Project	Long Island Bridge Project
TRC	TRC Environmental Corporation
VE	Velocity Zone
WPA	Massachusetts Wetlands Protection Act

WPA FORM 3 - NOTICE OF INTENT

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

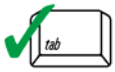
Provided by MassDEP:

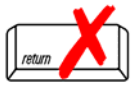
MassDEP File Number

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):

Long Island Bridge — a. Street Address
Boston — b. City/Town
02128 — c. Zip Code

Latitude and Longitude:
42°18'37.76"N — d. Latitude
70°58'35.94"W — e. Longitude

0107066000 — f. Assessors Map/Plat Number
g. Parcel /Lot Number

2. Applicant:

Para — a. First Name
Jayasinghe — b. Last Name
City of Boston Public Works Department — c. Organization
One City Hall Plaza, Room 710 — d. Street Address
Boston — e. City/Town
MA — f. State
02201 — g. Zip Code
617.635.4968 — h. Phone Number
i. Fax Number
para.jayasinghe@boston.gov — j. Email Address

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

a. First Name
b. Last Name
City of Boston — c. Organization
One City Hall Plaza — d. Street Address
Boston — e. City/Town
MA — f. State
02201 — g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Samuel — a. First Name
Moffett — b. Last Name
TRC Environmental — c. Company
650 Suffolk Street — d. Street Address
Lowell — e. City/Town
MA — f. State
01854 — g. Zip Code
978.656.3647 — h. Phone Number
i. Fax Number
smoffett@trcsolutions.com — j. Email address

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

Exempt — a. Total Fee Paid
Exempt — b. State Fee Paid
Exempt — c. City/Town Fee Paid

A. General Information (continued)

6. General Project Description:

This project involves the rebuilding of Long Island Bridge between Moon Island and Long Island. The project includes placing new bridge spans ontop of the existing piers, improving the existing stormwater system and removing Pier 15.

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

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

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

1. ☐ Yes ☒ No

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

2. Limited Project Type

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

8. Property recorded at the Registry of Deeds for:

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

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.

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)	

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)

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	40 (1. square feet); None (2. cubic yards dredged)	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☒ Coastal Beaches	120 (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	**30** (1. linear feet)	
g. ☐ Rocky Intertidal Shores	340 (Coastal Bank) (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	118 (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

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 Notice of Intent – 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://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/online_viewer.htm.

   a. ☒ Yes ☐ No

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

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

   August 1, 2017
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.C, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.1.d, 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).*

   1c. Submit Supplemental Information for Endangered Species Review*

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

      (a) within wetland Resource Area _____ percentage/acreage

      (b) outside Resource Area _____ percentage/acreage

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

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

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

   (b) ☒ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see http://www.mass.gov/dfwele/dfw/nhesp/nhesp.htm, regulatory review tab). 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.

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

(c) ☒ MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_fee_schedule.htm). Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

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

(d) ☐ Vegetation cover type map of site

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

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

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

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

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

a. ☐ Not applicable – project is in inland resource area only

b. ☒ Yes ☐ No If yes, include proof of mailing or hand delivery of NOI to either:

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

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
1213 Purchase Street – 3rd Floor
New Bedford, MA 02740-6694

North Shore - Hull to New Hampshire:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930

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. 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.

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.

Long Island Bridge
a. Plan Title

STV
b. Prepared By

Nikole Bulger
c. Signed and Stamped by

April 30, 2018
d. Final Revision Date

1" = 80'
e. Scale

f. Additional Plan or Document Title

g. Date

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

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

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

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

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

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

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

F. Signatures and Submittal Requirements

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

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

1. Signature of Applicant — 2. Date: 4/30/2018

3. Signature of Property Owner (if different) — 4. Date

5. Signature of Representative (if any) — 6. Date: 4/30/2018

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.

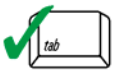
FILING FEE DOCUMENTATION

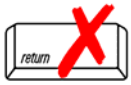
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

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

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





A. Applicant Information

1. Location of Project:

Long Island Bridge	Boston
a. Street Address	b. City/Town
Exempt	Exempt
c. Check number	d. Fee amount

2. Applicant Mailing Address:

Para		Jayasinghe
a. First Name		b. Last Name
City of Boston Public Works Department		
c. Organization		
One City Hall Plaza		
d. Mailing Address		
Boston	MA	02201
e. City/Town	f. State	g. Zip Code
617.635.4968		para.jayasinghe@boston.gov
h. Phone Number	i. Fax Number	j. Email Address

3. Property Owner (if different):

a. First Name		b. Last Name
City of Boston		
c. Organization		
One City Hall Plaza		
d. Mailing Address		
Boston	MA	02201
e. City/Town	f. State	g. Zip Code
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

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

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

C. Submittal Requirements

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

Department of Environmental Protection
Box 4062
Boston, MA 02211

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

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

NOTIFICATION TO ABUTTERS

Notification to Abutters under the Massachusetts Wetlands Protection Act

In accordance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, you are hereby notified of the following pubic hearing on the matter described below.

A. The name of the applicant is: City of Boston Public Works Department

B. The address of the lot where the activity is proposed is:

Long Island Bridge, Long Island, Boston Harbor

C. The work proposed is in the jurisdiction of the Massachusetts Wetlands Protection Act is as follows:

Boston Public Works Department proposes to rebuild the Long Island Bridge. The bridge will span between Long Island and Moon Island.

D. Copies of the Notice of Intents may be examined at: Boston City Hall, One City Hall Plaza in the Conservation Commission office between the hours of 8:30 AM and 5:00 PM Monday through Friday.

E. Copies of the Notice of Intents may be obtained from the applicant's representative TRC Environmental, by calling Samuel Moffett at TRC Environmental (978) 970-5600 between the hours of 8:30 AM and 5:00 PM, Monday – Friday.

F. The Public Hearing will be held on **May 16, 2018** at 6:00 PM in Boston City Hall, Piemonte Room, Boston, MA (call to confirm).

NOTES:

1. 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**.
2. Notice of the public hearing, including its date, time, and place, will be posted in the **Boston City Hall** not less than forty-eight (48) hours in advance.
3. You also may contact the **Boston Conservation Commission** or the Department of Environmental Protection Northeast Regional Office for more information about this application. To contact the Boston Conservation Commission, please call **Amelia Croteau, Executive Secretary** at 617.635.3850.

Boston Abutters						
Parcel ID	**Address**	**Property Type**	**Classification Code**	**Lot Size**	**Owner**	**Owner Mailing Address**
107066000	LONG ISLAND BOSTON MA 02128	Exempt	979 (Exempt Property Type / HOSPITAL (EXEMPT)	7,269,095 sq ft	City of Boston	LONG ISLAND EAST BOSTON MA 02128

ATTACHMENT A – NARRATIVE

1.0 Introduction

The City of Boston closed the Long Island Bridge in 2014 for public safety reasons, and rapidly removed the original bridge superstructure in 2015 with the support of all relevant federal, state, and local permitting agencies. Mayor Walsh has committed to replace the superstructure of the Long Island Bridge (Project) and reopen the bridge quickly to restore access to the treatment center on Long Island. TRC Environmental Corporation (TRC) has prepared this Notice of Intent (NOI) for the Project on behalf of the City of Boston Public Works Department (BPWD).

The Project team and BPWD worked hard to develop a design and construction approach that avoids impacts to the environment while still supporting the City's goal of providing Opioid addiction treatment services to the public. Despite this effort, the Project will require limited work within coastal resource areas that are protected under the Massachusetts Wetlands Protection Act (WPA). Therefore, this NOI is being filed by BPWD pursuant to the WPA and its implementing regulations (310 CMR 10.00).

With this submittal, BPWD is seeking authorization from the Boston Conservation Commission (BCC) and the Massachusetts Department of Environmental Protection (MassDEP) to rebuild the Long Island Bridge. The original Long Island Bridge was carefully demolished by controlled detonation in 2015 under an Order of Conditions (OOC) MassDEP File #006-1417. Per General Condition 12 of the OOC, a Request for a Certificate of Compliance (WPA Form 8A) was filed with the BCC on June 8, 2016. This NOI covers the replacement of the bridge superstructure, on the existing piers from the original bridge.

In an OOC issued for the Project, the BCC may include requirements to protect the coastal wetland areas under its jurisdiction; these will be incorporated into the contract specifications that will govern the construction approach used by the Contractor selected by the City of Boston to complete the Project.

The following narrative discusses the existing conditions at the Project site, the coastal resource areas present in the Project area, the Project description, and proposed mitigation measures.

2.0 Existing Conditions

The Project area includes:

1. A proposed construction laydown area at Dry Dock 4, located in the Seaport District;
2. The approaches to the Long Island Bridge on Moon Island and Long Island; and
3. The area of Boston Harbor near the Long Island Bridge.

The Long Island Bridge area is characterized by coastal and estuarine habitats that are typically found along the coastline of Massachusetts. There are no freshwater wetland resource areas in any portion of the Project area.

Coastal resource areas subject to regulation under the WPA that occur within the Project area are described in the following sections.

2.1 Areas Subject to Regulation

2.1.1 Land Under Ocean

Land Under Ocean in the Project area begins at the mean low water line and extends seaward per 310 CMR 10.25(2). The Land Under Ocean in the Project area underlies Boston Harbor, a tidally influenced natural harbor and estuary of Massachusetts Bay.

When the Long Island Bridge superstructure was demolished in 2015, the bridge piers were left in place. These existing piers are embedded in the Land Under Ocean substrate. The construction of the new Long Island Bridge superstructure will use the existing piers and therefore will not permanently impact Land Under Ocean.

2.1.2 Coastal Beach

As defined by 310 CMR 10.27(2), Coastal Beach begins at the mean low water line (elevation -5.16 feet, NAVD88) and extends landward to the bottom of a Coastal Bank. The landward limit of Coastal Beach was identified based on aerial photo interpretation, field verification, and a review of the topographic survey. In some cases, the landward limit of Coastal Beach coincides with the mean high water line. Based on field observations and desktop mapping, the Coastal Beach at Long Island includes areas that may be suitable for shellfish (**Attachment B**, Figure 2). The remains of numerous mollusk species, including razor clams (*Ensis directus*), Atlantic surf clams (*Spisula solidissima*), slipper snail (*Crepidula fornicata*), blue mussels (*Mytilus edilus*), and littleneck clams (*Mya arenaria*) were observed along the beaches of Long Island. Therefore, we presume the Coastal Beach also includes Land Containing Shellfish as defined by 310 CMR 10.34. Typical seaweed species, including rockweed (*Fucus* sp.), Irish moss (*Laminaria digitata*), and sea lettuce (*Ulva* sp.) were also observed during low tide on the Coastal Beach.

The bridge installation will temporarily alter 120 square-feet of Coastal Beach and Land Containing Shellfish during the installation of six temporary pipe piles. These pipe piles will support temporary staging structures that will be incorporated to facilitate efficient and safe erection of the bridge approach span at the Long Island end of the bridge.

2.1.3 Coastal Bank

There is Coastal Bank on Long Island where the proposed Long Island Bridge will meet land. Coastal Bank at the site is an elevated landform other than coastal dune, which lies at the seaward face of Coastal Beaches, as defined by 310 CMR 10.30(2). Coastal Bank was delineated, based on review of topographic survey contour data, MassDEP policy 92-1, and verification in the field. There is a single, steep Coastal Bank (presumed to be steeper than 4:1) on the Long Island

end of the bridge. The top of the Coastal Bank at the site was flagged at the first significant break in slope. Portions of the Coastal Bank have been altered by a rip-rap revetment. In addition, one of the piers (Pier 15) of the original bridge is located on the Coastal Bank. Dominant species on the Coastal Bank include staghorn sumac (*Rhus glabra*), eastern red cedar (*Juniperus virginiana*), sweet gale (*Myrica gale*), and multiflora rose (*Rosa multiflora*).

There will be approximately 30 linear feet of temporary impact to Coastal Bank for work at Pier 15 during bridge superstructure construction.

2.1.4 Land Subject to Coastal Storm Flowage

Portions of the work area are located in Land Subject to Coastal Storm Flowage (LSCSF) (310 CMR 10.04), which includes those areas subject to 100-year storm surge. The Federal Emergency Management Area (FEMA) mapping indicates that portions of the work area on Long Island fall within a velocity zone (VE) with a base flood elevation of 19 feet (NAVD88). FEMA mapping is provided in **Attachment B**, Figure 3.

There will be 118 square-feet of temporary alteration of LSCSF for the installation of six temporary pipe piles during bridge installation.

2.1.5 Other Resources

A review of available Massachusetts Geographic Information System (MassGIS) mapping indicates that there are no Outstanding Resource Waters or Areas of Critical Environmental Concern in the Project area (**Attachment B**, Figure 2).

Based on review of the 2017 Massachusetts Natural Heritage & Endangered Species Program's (NHESP) MassGIS-based database, a portion of the waters between Moon Island and Long Island are located within Priority and Estimated Habitats (PH1342, EH975) (**Attachment B**, Figure 2). Therefore, a copy of this NOI has been submitted to NHESP for their review.

3.0 Project Description

The proposed work involves the replacement of the Long Island Bridge superstructure. The new superstructure will have generally the same vertical, lateral, and horizontal dimensions as the prior bridge superstructure, and will feature elements that will improve the Stormwater performance of the bridge compared to the conditions associated with the original superstructure.

3.1 General Bridge Installation

Bridge materials will be assembled into bridge spans onshore at the Dry Dock 4 site in the Seaport District and then moved laterally onto a barge (**Attachment B**, Figure 4). The spans will then be

floated by barge across Boston Harbor to the Project area. The projected tide cycle will be closely monitored to float each bridge span into place during the hours surrounding high tide. Installation around high tide should prevent the barge from touching the ocean bottom (Land Under Ocean). While positioning the bridge spans into place, spuds will be used to control the lateral movement of the barge. The use of spuds in this type of work is a typical construction practice and was used during the original bridge's demolition.

Once the interior bridge spans are in place, the end bridge spans will also be transported by barge. The end bridge spans will be lifted on top of the other spans already in place, and will be extended across these spaces by cranes and mechanical engineering. The end bridge spans will then be anchored onto the abutments.

As depicted in **Attachment C**, Span 12 will be erected with a cantilever system extending into Span 13. Two temporary supports will be installed between existing Piers 13 and 14, each consisting of pipe piles and steel framing at the bridge level. The pipe piles will be installed from a barge that will need to be supported by spuds to allow for pile installation. Pier 15 will also be used as a temporary support and may require modifications for temporary use. One portion of Span 13 is expected to be floated into place. The remaining portions of Span 13 and Span 14 will be erected by a crane that uses the temporary supports. Temporary supports will be removed and Pier 15 will be abandoned/removed to existing grade after span erection.

3.1.1 Sequence of Construction

Construction of the new Long Island Bridge is anticipated to be performed in the following sequence for the typical spans that comprise the proposed structure (note that all demolition and similar debris that may be generated by the Contractor during completion of the below steps will be captured in containment systems deployed at each pier and at the Long Island abutment; no debris will be allowed to enter the water or other areas subject to WPA jurisdiction):

1. Install temporary work platforms and containment at existing piers, attaching to the sides of the piers only.
2. Demolish existing concrete pedestals on existing piers.
3. Core through existing piers as needed for installation of post-tensioning of piers.
4. Remove the existing 2-foot deep granite pier caps and demolish concrete up to 2-foot as required for installation of new pier caps.
5. Construct new pier caps, including post-tensioning, anchorages for the proposed structure, and required concrete bents.
6. Perform any masonry repairs and repointing to existing piers. This may be ongoing during superstructure construction activities.
7. Install temporary shoring and framing required for approach span installation.
8. Assemble steel framing for typical approach spans offsite, including girders, floorbeams, stringers, and bracing.
9. For girder Spans B and C, float in east portion of a typical 3-span unit and set on temporary

shoring. Adjust framing elevation and alignment using jacks to achieve proper alignment.
10. Float in west portion of a typical 3-span unit and set on temporary shoring. Adjust framing elevation and alignment using jacks to achieve proper alignment.
11. Set strand jacks at the cantilevered ends of the previously installed segments of the 3-span units.
12. Float in the center portion of a typical 3-span unit and hoist into place using strand jacks.
13. Splice the subassemblies together to complete the 3-span girder.
14. Install bearings and delta frame components at each pier.
15. Repeat steps 7 through 14 for remaining multi-span units except as required for Spans 1, 13 and 14 as described above.
16. Install main span through truss. This may be done before, during, or after girder span erection.
17. Install all utilities and drainage components to be located under the bridge deck.
18. Pour the concrete bridge deck and sidewalks in sequence, and install remaining components, including railings and lighting.

For construction of the main span through truss, please note that the truss will be assembled off-site and then floated to its final location without temporary shoring. The truss will be jacked into place as required for final alignment and bearing installation.

4.0 Potential Impacts and Mitigation Measures

By design and intention, the Long Island Bridge superstructure replacement will require limited temporary impacts to Land Under Ocean, Coastal Beach, Coastal Bank, and LSCSF in Boston. Approximately 40 square-feet of Land Under Ocean, 120 square-feet of Coastal Beach, and 340 square-feet of Coastal Bank in Boston will be temporarily disturbed during the rebuild of Long Island Bridge. Potential (minor) secondary impacts associated with Project construction could also include:

- Noise impacts to fish and marine mammals,
- Turbidity,
- Impact to fish and shellfish, and
- Impact to fisheries habitat on the ocean bottom, and intertidal areas.

However, given the small impact areas and proposed minimization and mitigation measures, such impacts are minimal. The proposed work in Coastal Beach includes pipe piles and placement of spuds; these impacts are both temporary and minimal to resource areas that will restore naturally following construction. Noise concerns for fish are minor as ships and barges cross the navigational channel within the Project area and noise generated in the areas outside the navigational channel will be short-term.

The following mitigation measures and adaptive management are proposed as part of the Project.

4.1 WPA Resource Areas and Buffer Zone

Coastal Bank

The impacts to Coastal Bank include the removal/abandonment of Pier 15. Once the pier is removed, the area will be rough graded to adjacent contours using surrounding and native material. The approximately 340 square-feet of temporary work proposed within Coastal Bank is associated with restoration of the resource to surrounding conditions. Approximately 30 linear feet of temporary impact to Coastal Bank is proposed. The footprint of this work has been minimized to the area associated with the existing pier; no additional work space or area around the pier is required. If possible, the removal/abandonment of Pier 15 will be conducted during the hours surrounding low tide to eliminate/minimize the potential for turbidity in the water.

Coastal Beach

There are no permanent impacts to Coastal Beach associated with the Project. Placement of the pipe piles will temporarily disturb approximately 120 square-feet of Coastal Beach. Once the end bridge span has been anchored to the existing abutment, the pipe piles will be removed. As the pipe piles occupy such a small footprint, the area temporarily disturbed will naturally be restored by the removal and influence of the tide cycle.

Land Under Ocean

Similar to Coastal Beach, the placement of the pipe piles will temporarily disturb approximately 40 square-feet of Land Under Ocean. As the footprint is minimal, the restoration measure is to allow the area to restore naturally instead of a more invasive approach to create a benthic community similar to the ones directly adjacent to the disturbance area. It is also important to note that on-going benthic surveys are being performed to note pre- and post-construction conditions as part of the Long Island Bridge demolition project.

Turbidity: There will be unavoidable disturbance of ocean bottom as the pipe piles are driven. The ocean bottom in this area is largely sands and gravel due to the high energy tidal flow through the bridge area. Any associated turbidity will be short-lived and quickly settle-out. Turbidity curtains in this setting are likely unnecessary. However, such materials will be available for use if unforeseen levels of turbidity are encountered.

Land Subject to Coastal Storm Flowage

As the Project is located along the western tip of Long Island, the boundary of LSCSF is 19 feet above mean sea level. The pipe piles will temporarily disturb 118 square-feet of LSCSF. The placement of pipe piles is not anticipated to adversely affect the capacity of the Project area to

handle wave action or the velocity zone of the floodplain. As such, no mitigation is proposed for the minimal temporary impacts to LSCSF.

100-foot Buffer Zone

Within the 100-foot Buffer Zone of Coastal Bank, approximately 7,767 square-feet of temporary disturbance will occur due to work within the existing roadway. Approximately 537 square-feet of permanent impact will occur due to changing the existing surface cover from pervious to impervious because of the sidewalk, minor roadway edge alignment, or lighting load cabinet concrete pad. The infiltration system and water quality structure will enhance the existing conditions and treatment of runoff in the area.

The pipe piles and spuds will be removed within a few days after they are dropped. Therefore, it is anticipated that the areas of Coastal Beach and Land Under Ocean that are temporarily disturbed will restore naturally after extraction from the seafloor.

4.2 MassDEP Stormwater Handbook Redevelopment Standard Compliance

The stormwater drainage system for the new bridge superstructure has been designed in compliance with the MassDEP Stormwater Handbook Redevelopment Standards. The Massachusetts Stormwater Standards have been incorporated in the WPA Regulations [310 CMR 10.05(6)(k)] and the Water Quality Certification Regulations [314 CMR 9.06(6)(a)]. For more detailed information concerning the stormwater improvements, please refer to the Stormwater Report and Checklist found in **Attachment D**.

ATTACHMENT B – FIGURES

N

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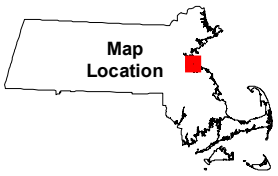
0 0.25 0.5 Miles

Massachusetts



TRC

Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

FIGURE 1
SITE LOCATION MAP
LONG ISLAND BRIDGE
BOSTON, MA

FIGURE 1	APRIL 2018

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NHESP Priority Habitats of Rare Species
NHESP Estimated Habitats of Rare Wildlife
Areas of Critical Environmental Concern
Outstanding Resource Waters
Town Boundary

Shellfish Suitability Areas
Blue Mussel
European Oyster
Razor Clam
Soft-shelled Clam

N

Source Data: MassGIS, 2018
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA,

NOTE: Not all datalayers appear in this view.

0 500 1,000 Feet

Massachusetts

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

FIGURE 2
RESOURCE MAP
LONG ISLAND BRIDGE
BOSTON, MA

FIGURE 2	APRIL 2018

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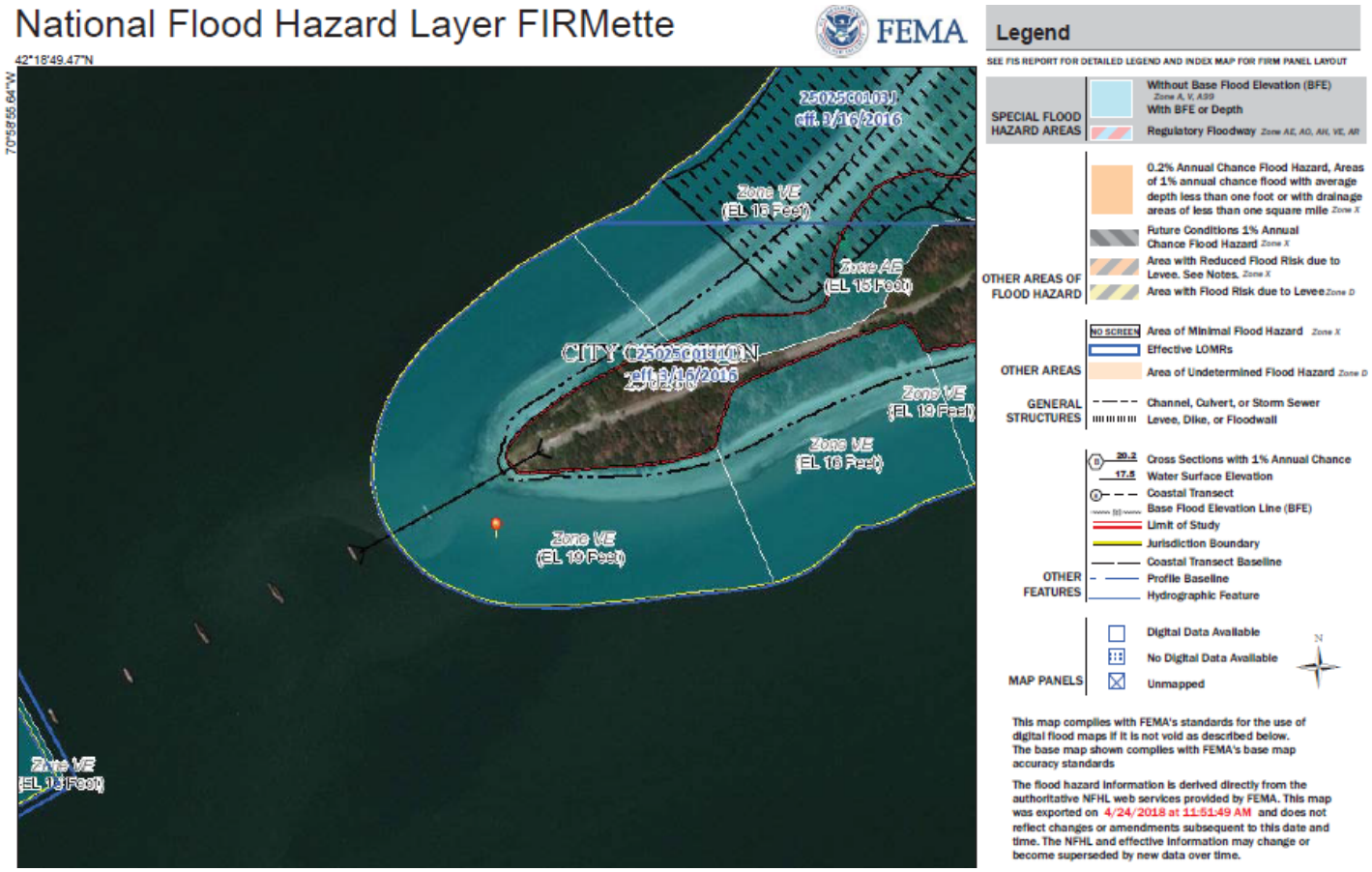

Flood Zone Designations

- AE: 1% Annual Chance of Flooding, with BFE
- VE: High Risk Coastal Area
- Town Boundary

Source Data: FEMA, 2018
Federal Emergency Management Agency,
National Flood Hazard Layer, 2018.
Service Layer Credits: Source: Esri,
DigitalGlobe, GeoEye, i-cubed, Earthstar
Geographics, CNES/Airbus DS, USDA, USGS,

N

Massachusetts

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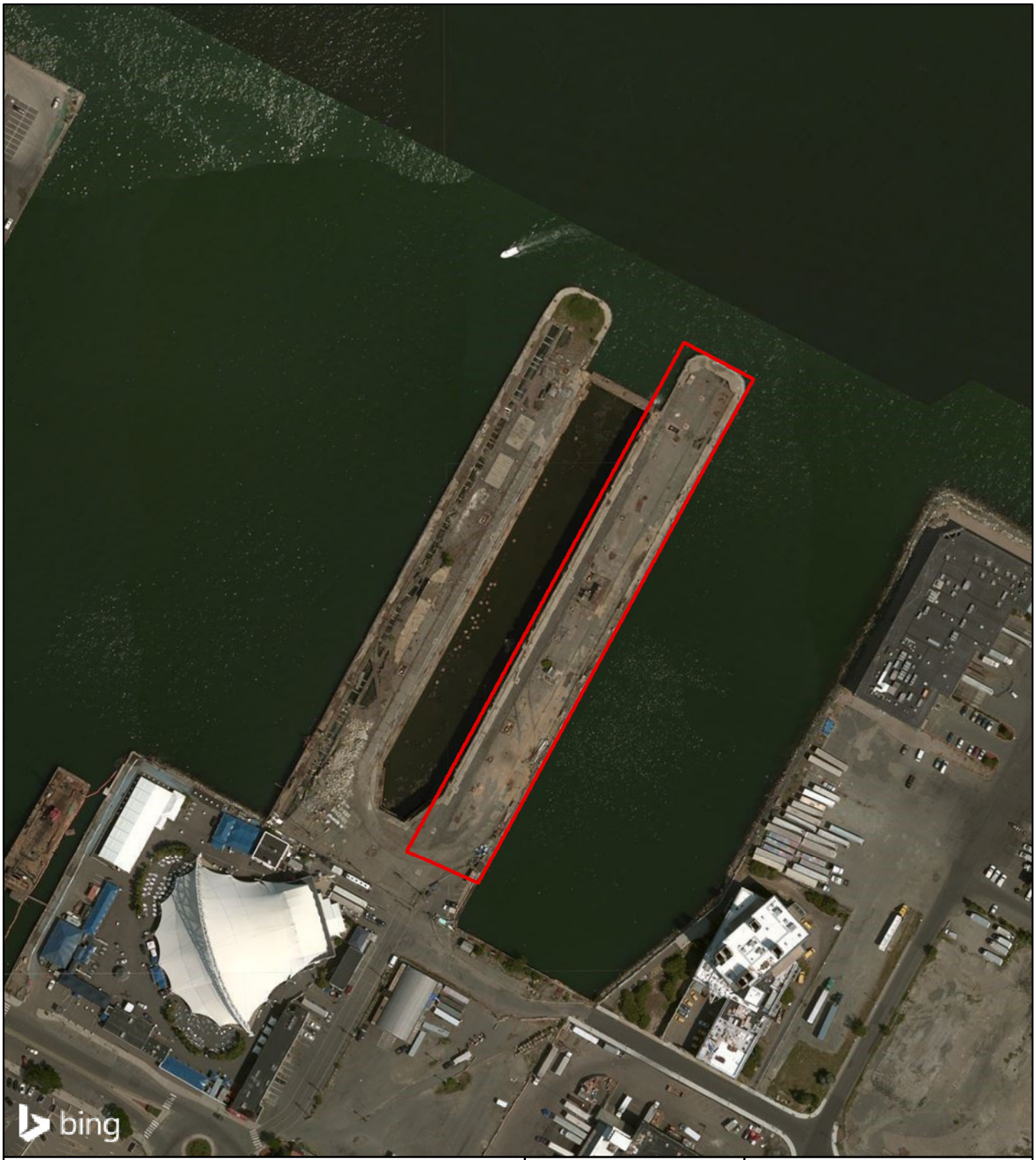
FIGURE 3
FLOOD HAZARD MAP
LONG ISLAND BRIDGE
BOSTON, MA

FIGURE 3	APRIL 2018

R:\Projects\GIS_2018\227633_LongIsland_MA\mxd\Fig3_FloodMap_LongIsland_2018_04_30.mxd



Potential Laydown Area

N

Service Layer Credits: © 2018 Microsoft Corporation © 2018 DigitalGlobe ©CNES (2018)

0 100 200 Feet

Massachusetts

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Lowell, MA 01854
978-970-5600

FIGURE 4
POTENTIAL LAYDOWN AREA
LONG ISLAND BRIDGE
BOSTON, MA

FIGURE 4	APRIL 2018

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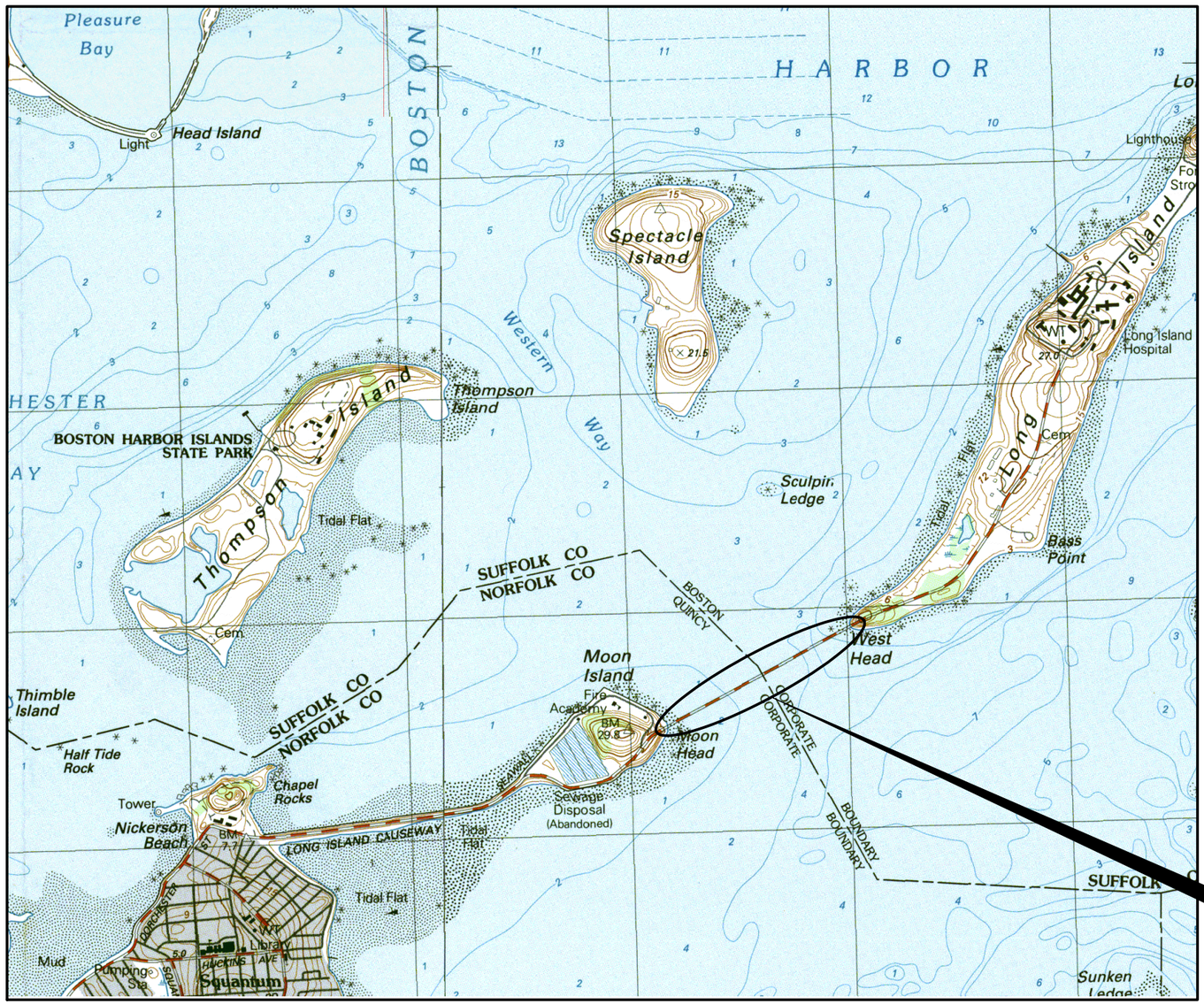
ATTACHMENT C – SITE PLANS



SCALE: 1" = 2000'±

STV 100 Years
ONE FINANCIAL CENTER,
3RD FLOOR,
BOSTON, MA 02111–2621

CITY OF BOSTON PUBLIC WORKS DEPARTMENT
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 1: LOCUS MAP

DATE: APRIL 30, 2018

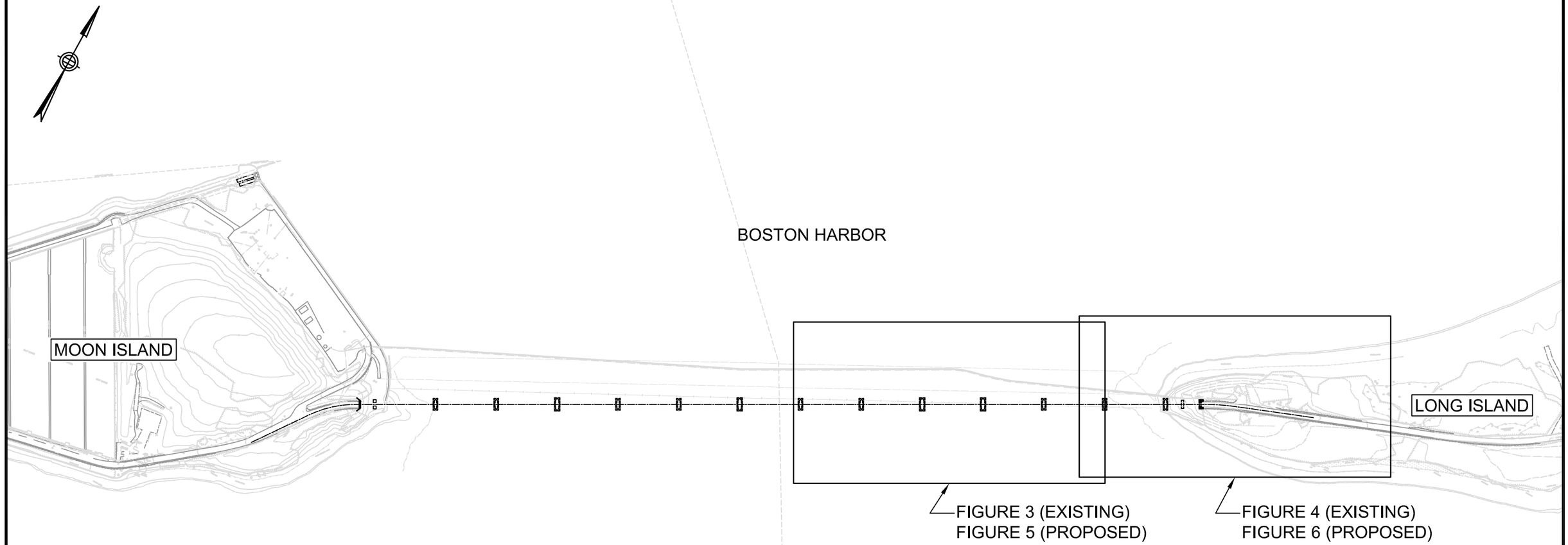


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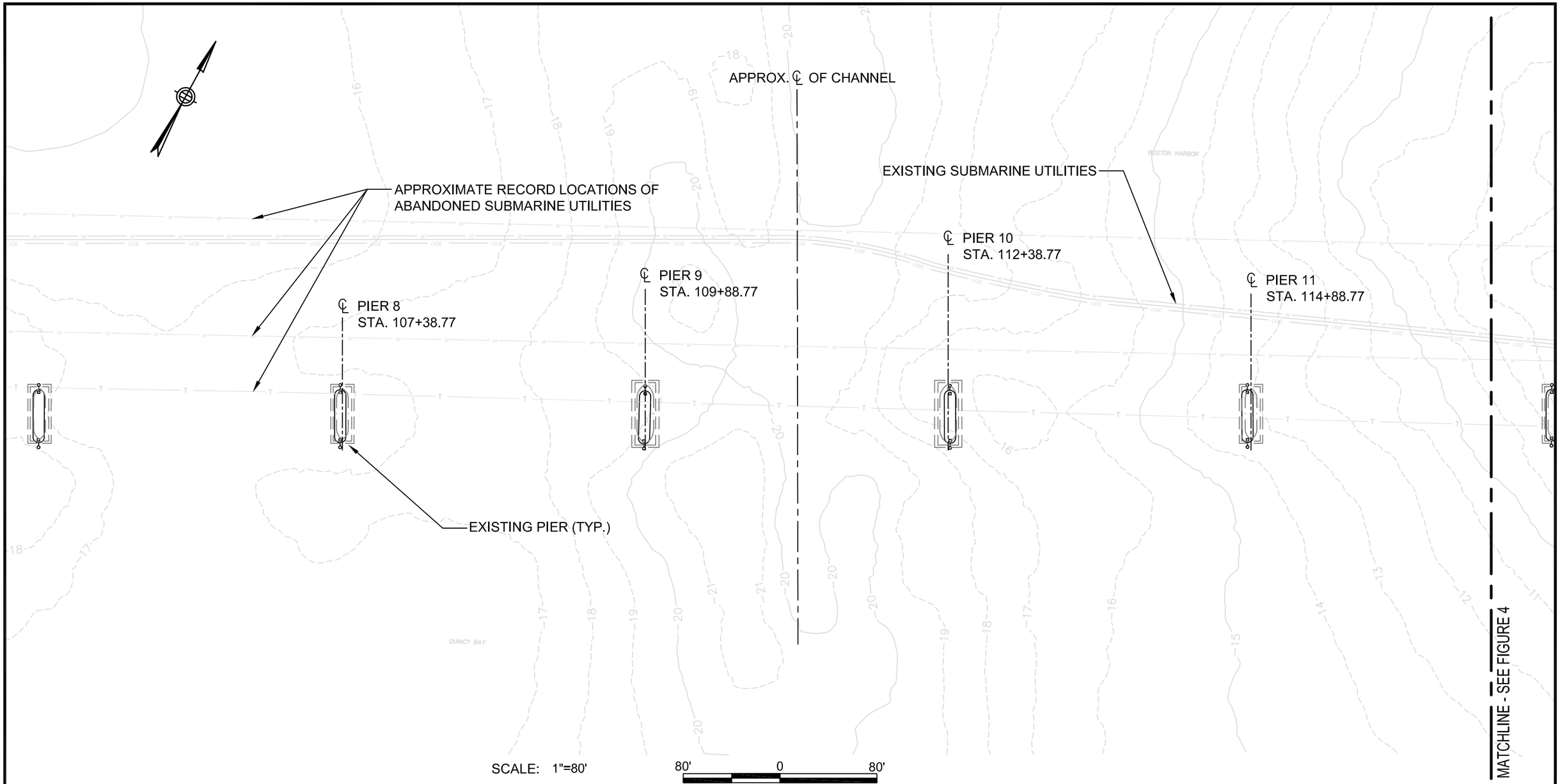
FIGURE 2: KEY PLAN

DATE: APRIL 30, 2018



STV 100 Years
ONE FINANCIAL CENTER,
3RD FLOOR,
BOSTON, MA 02111–2621

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FIGURE 3: EXISTING PLAN 1 OF 2

DATE: APRIL 30, 2018

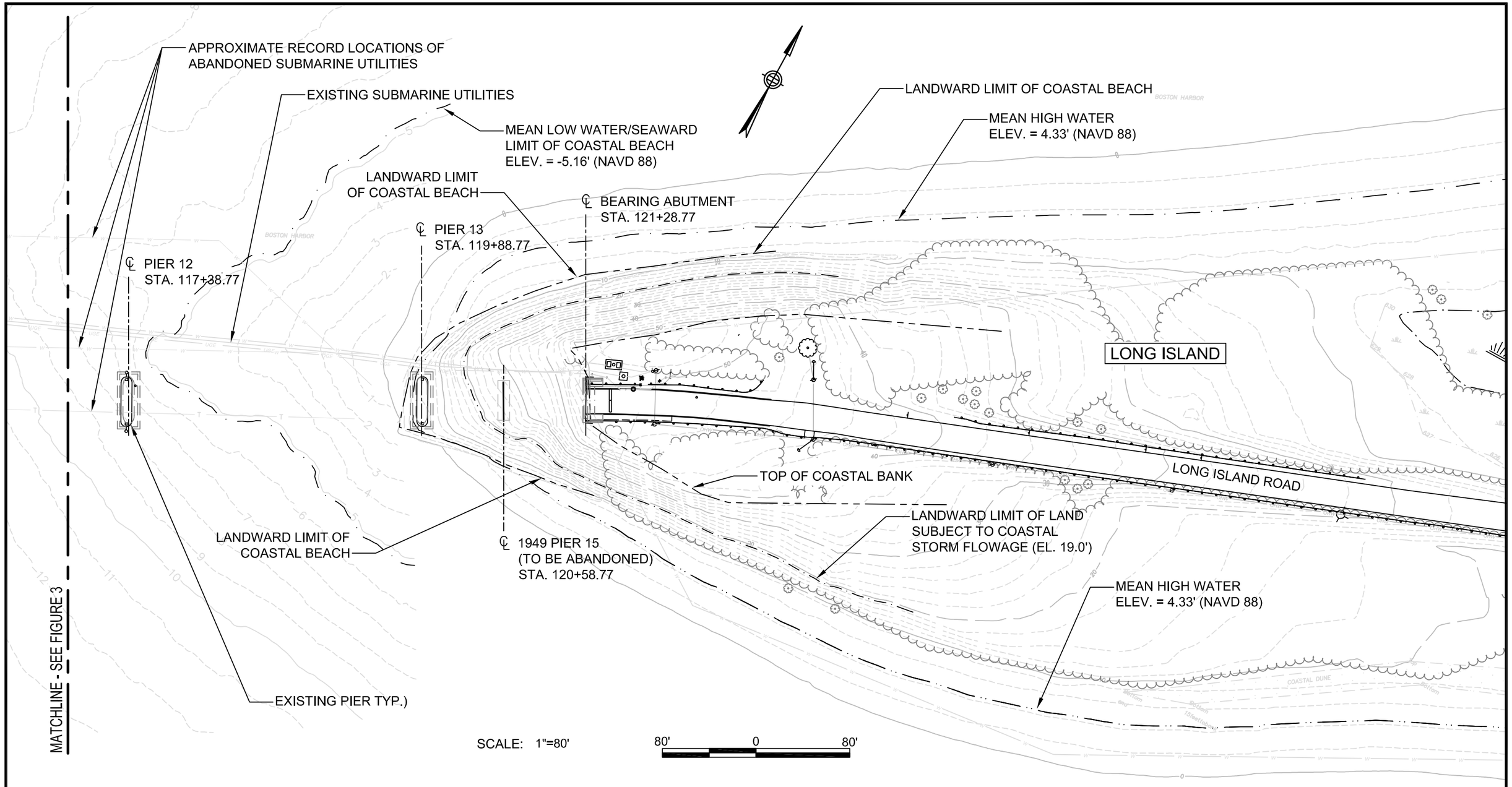

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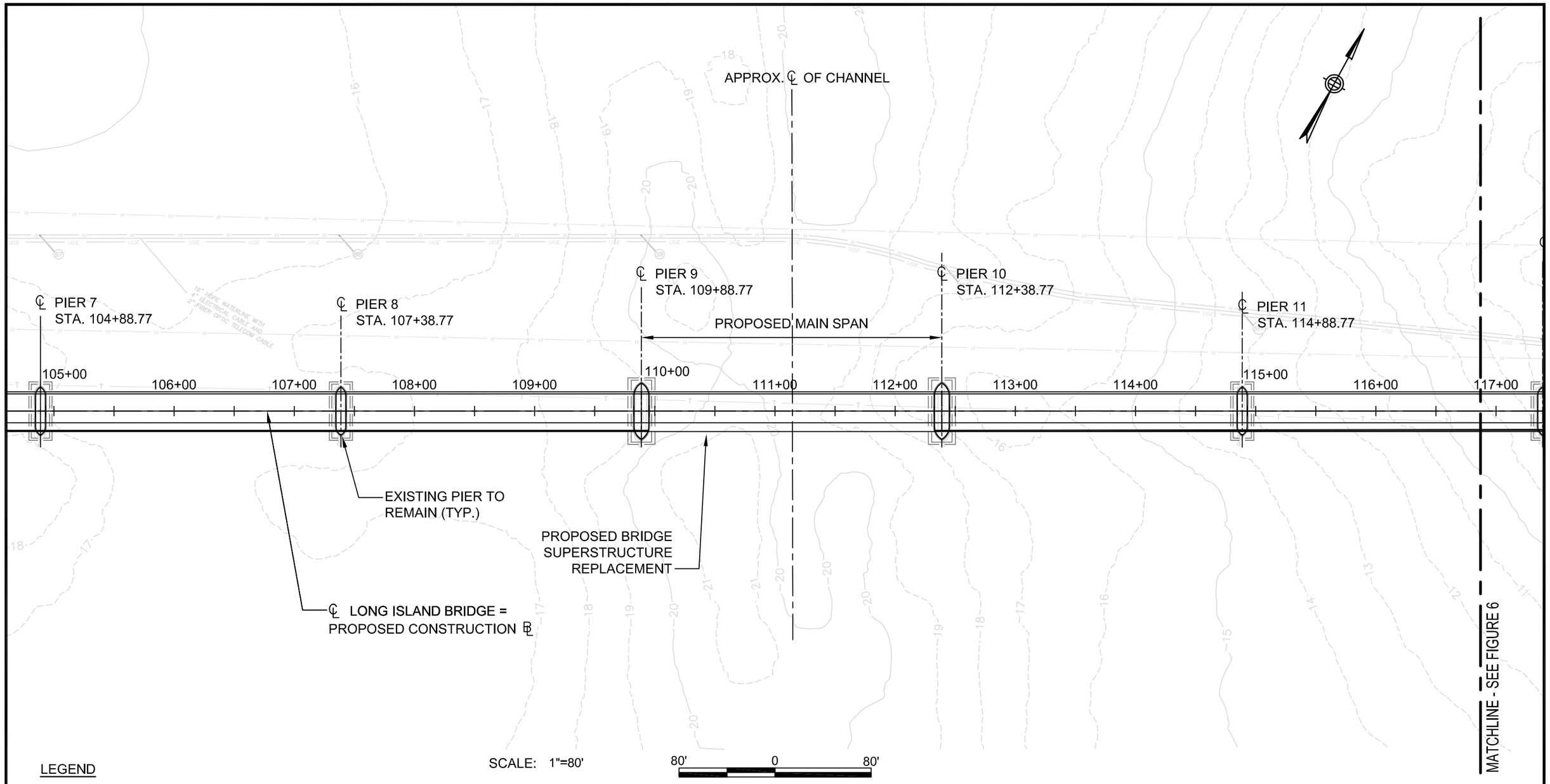
FIGURE 4: EXISTING PLAN 2 OF 2

DATE: APRIL 30, 2018



LEGEND

- TEMPORARY IMPACTS WITHIN LIMIT OF COASTAL STORM FLOWAGE (0 SF)
- PERMANENT IMPACTS WITHIN 100' BUFFER
- TEMPORARY IMPACTS WITHIN 100' BUFFER
- TEMPORARY IMPACTS WITHIN COASTAL BANK
- TEMPORARY IMPACTS WITHIN COASTAL BEACH
- TEMPORARY IMPACTS WITHIN LAND UNDER OCEAN

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LONG ISLAND BRIDGE
FIGURE 5: PROPOSED PLAN 1 OF 2

DATE: APRIL 30, 2018

LAND UNDER OCEAN

MEAN LOW WATER/ SEAWARD LIMIT OF COASTAL BEACH ELEV. = -5.16' (NAVD 88)

LANDWARD LIMIT OF COASTAL BEACH

MEAN HIGH WATER ELEV. = 4.33' (NAVD 88)

℄ BEARING ABUTMENT STA. 121+28.77

℄ PIER 12 STA. 117+38.77

℄ PIER 13 STA. 119+88.77

PROPOSED STORMWATER OVERFLOW OUTLET

PROPOSED WATER QUALITY STRUCTURE

PROPOSED SUBSURFACE INFILTRATION SYSTEM

LONG ISLAND

117+00 118+00 119+00 120+00 121+00 122+00 123+00 124+00 125+00 126+00

LONG ISLAND ROAD

PROPOSED LIMITS OF DISTURBANCE AND COMPOST FILTER TUBES

PROPOSED TEMP PIPE PILES (TYP) (6 WITHIN LSCSF IMPACTS)

℄ 1949 PIER 15 (TO BE ABANDONED) STA. 120+58.77

LANDWARD LIMIT OF LAND SUBJECT TO COASTAL STORM FLOWAGE (EL. 19.0')

MEAN HIGH WATER ELEV. = 4.33' (NAVD 88)

PROPOSED BRIDGE SUPERSTRUCTURE REPLACEMENT

TOP OF COASTAL BANK

℄ LONG ISLAND BRIDGE = PROPOSED CONSTRUCTION ℄

EXISTING PIER TO REMAIN (TYP.)

MATCHLINE - SEE FIGURE 5

SCALE: 1"=80'

80' 0 80'

LEGEND

- TEMPORARY IMPACTS WITHIN LAND SUBJECT TO COASTAL STORM FLOWAGE (118 SF)
- PERMANENT IMPACTS WITHIN 100' BUFFER (537 SF)
- TEMPORARY IMPACTS WITHIN 100' BUFFER (7767 SF)
- TEMPORARY IMPACTS WITHIN COASTAL BANK (340 SF)
- TEMPORARY IMPACTS WITHIN COASTAL BEACH (120 SF)
- TEMPORARY IMPACTS WITHIN LAND UNDER OCEAN (40 SF)

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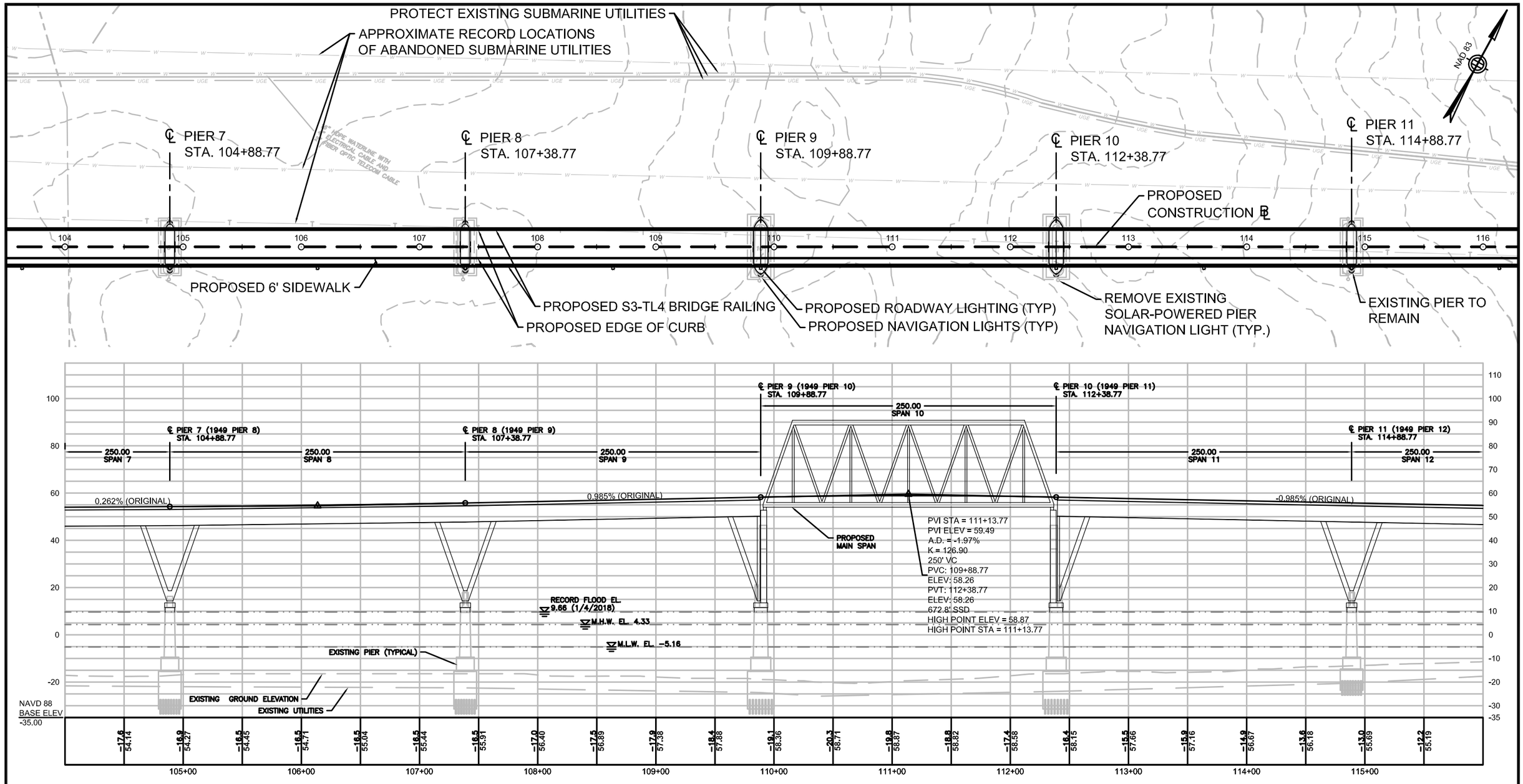
LONG ISLAND BRIDGE
FIGURE 6: PROPOSED PLAN 2 OF 2

DATE: APRIL 30, 2018



HORIZONTAL SCALE IN FEET

80 0 80 160

40 0 40 80

VERTICAL SCALE IN FEET

STV 100 Years

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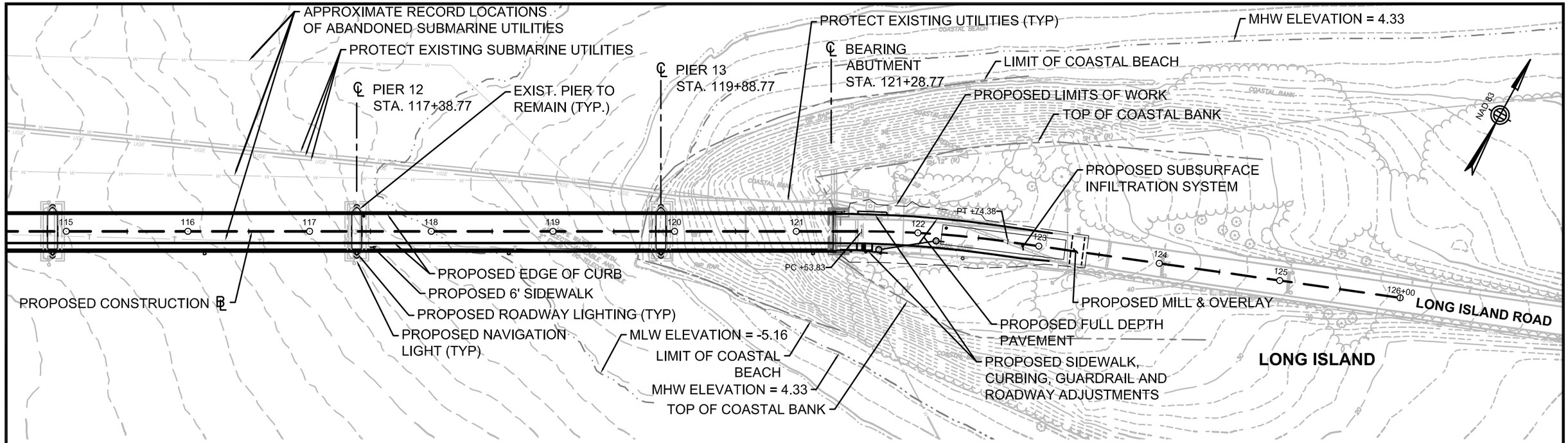
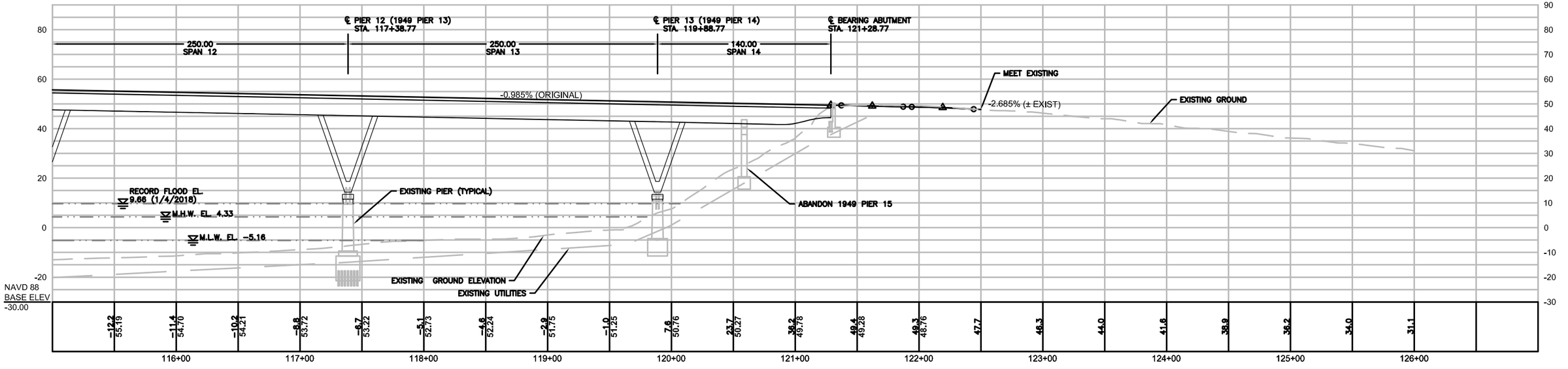
LONG ISLAND BRIDGE

FIGURE 7: PLAN AND PROFILE 1 OF 2

DATE: APRIL 30, 2018





HORIZONTAL SCALE IN FEET
80 0 80 160
40 0 40 80
VERTICAL SCALE IN FEET

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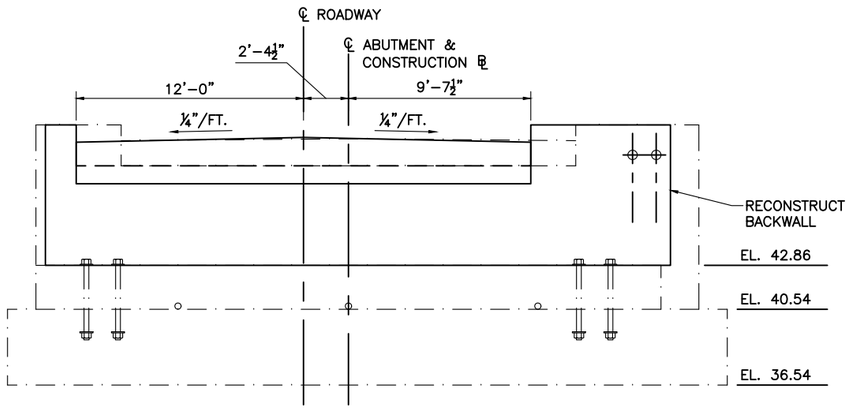
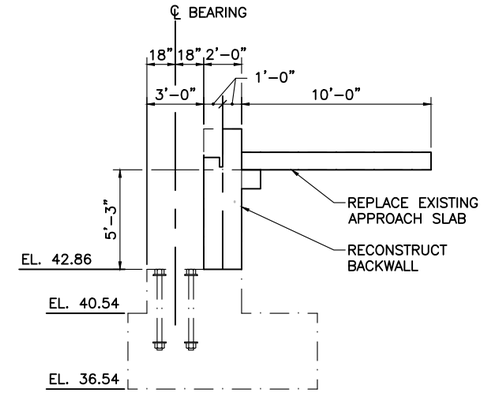
LONG ISLAND BRIDGE

FIGURE 8: PLAN AND PROFILE 2 OF 2

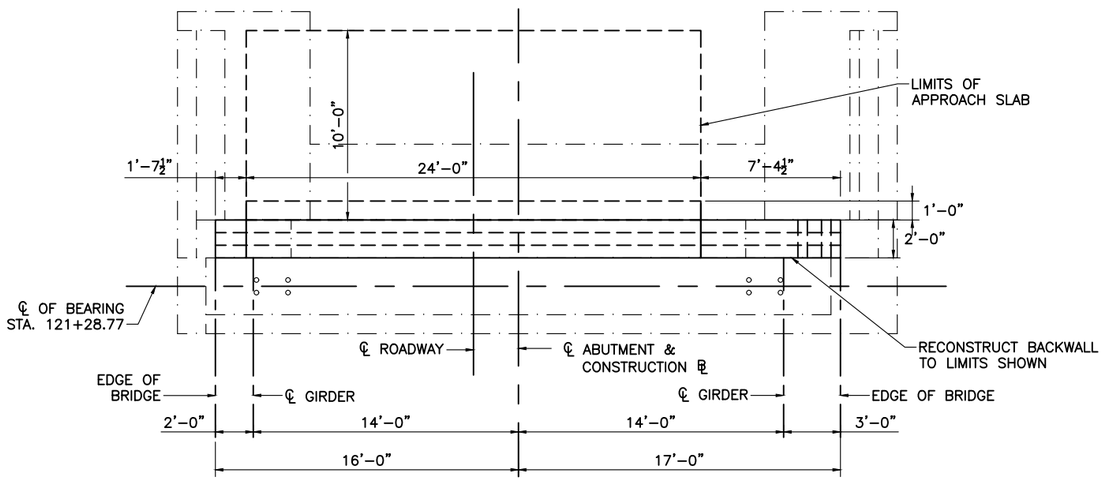
DATE: APRIL 30, 2018



EAST ABUTMENT ELEVATION



EAST ABUTMENT SECTION



EAST ABUTMENT PLAN

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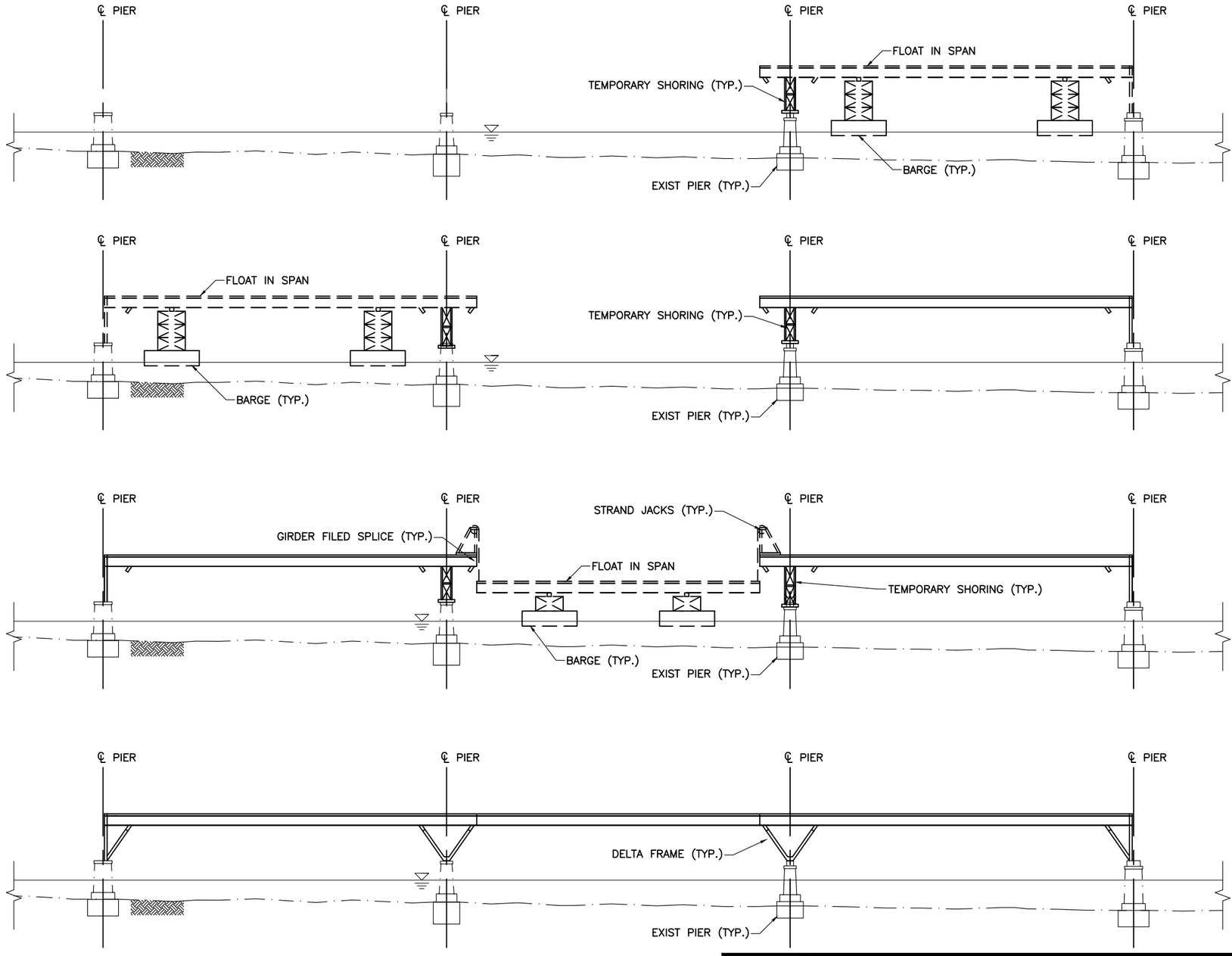
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE

FIGURE 9: EAST ABUTMENT DETAILS

DATE: APRIL 30, 2018



CONTINUOUS GIRDER STRUCTURE ERECTION
(GIRDER STRUCTURES B & C)
NOT TO SCALE

STV 100 Years
ONE FINANCIAL CENTER,
3RD FLOOR,
BOSTON, MA 02111-2621

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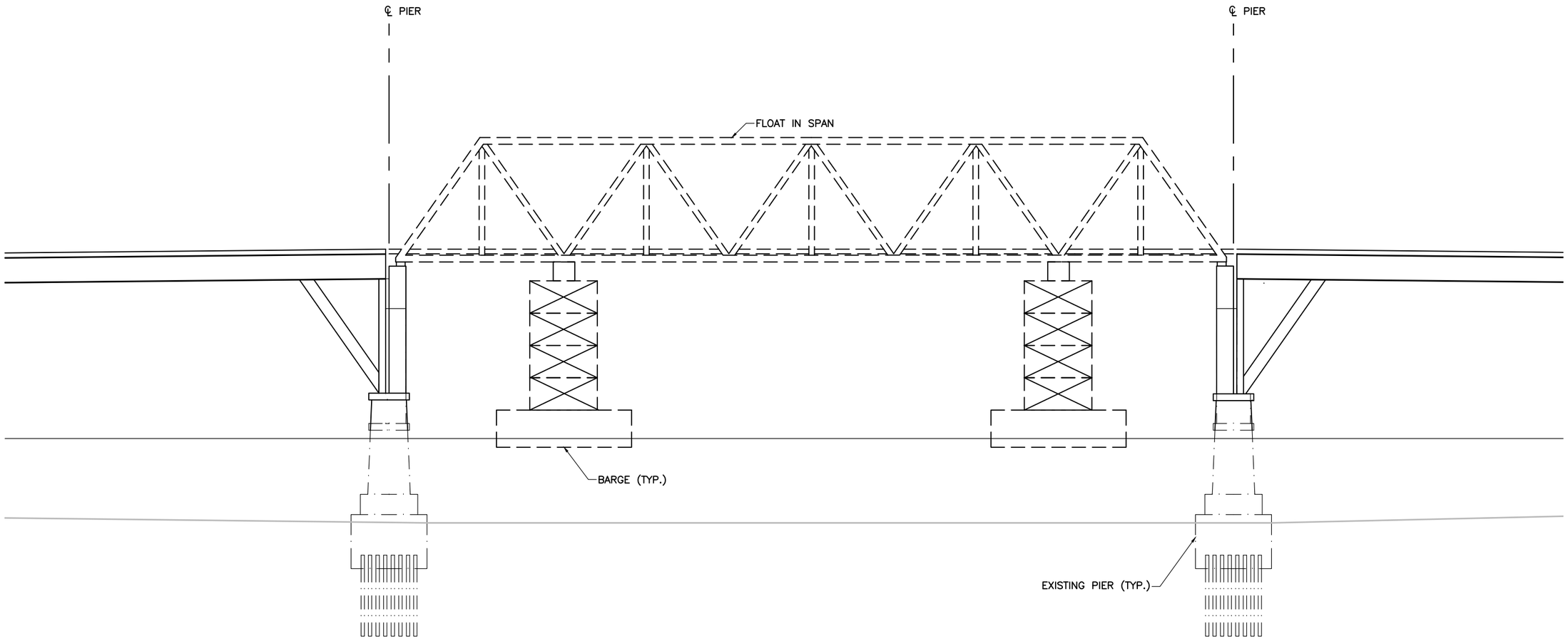
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE

FIGURE 10: GIRDER SPAN ERECTION

DATE: APRIL 30, 2018



THROUGH TRUSS ERECTION

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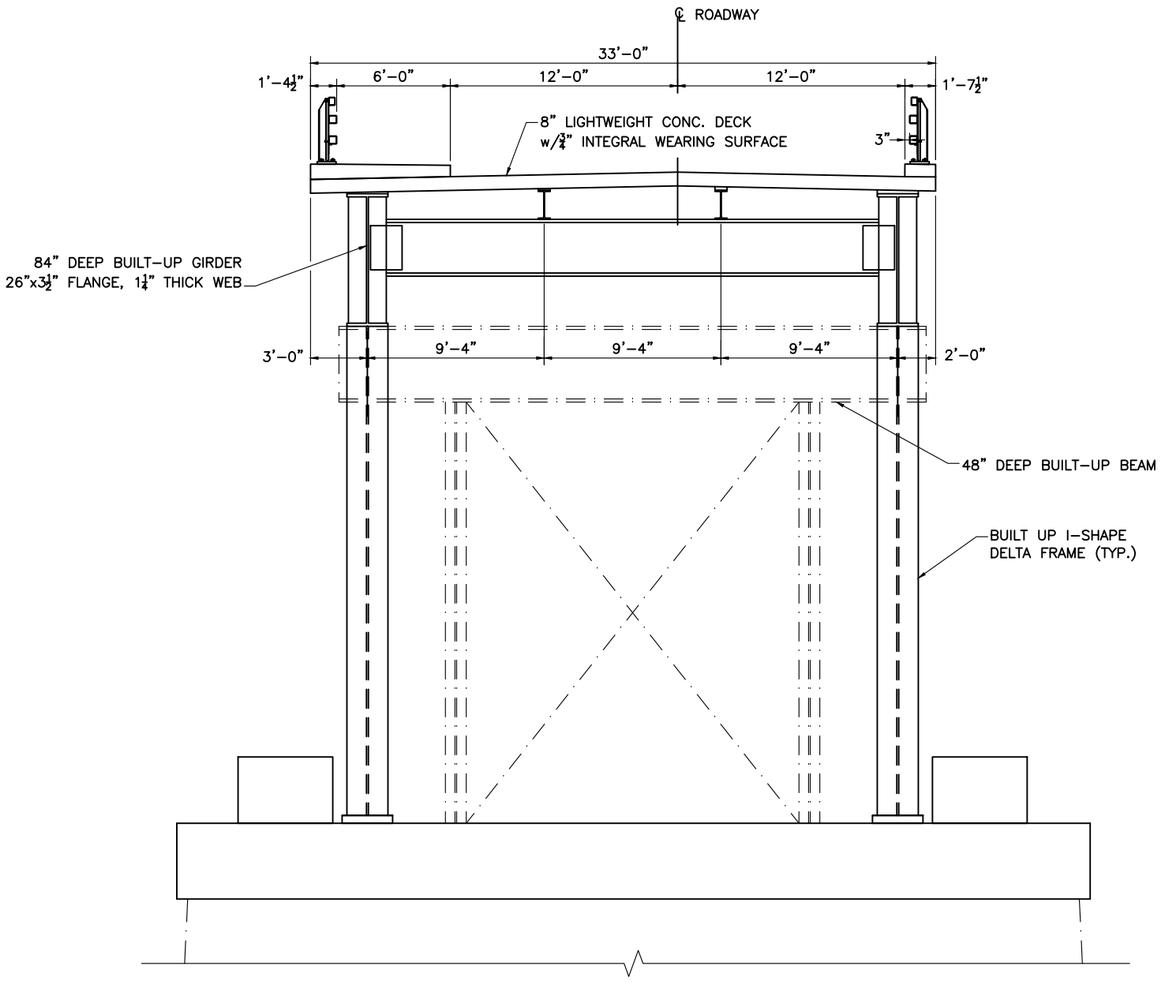
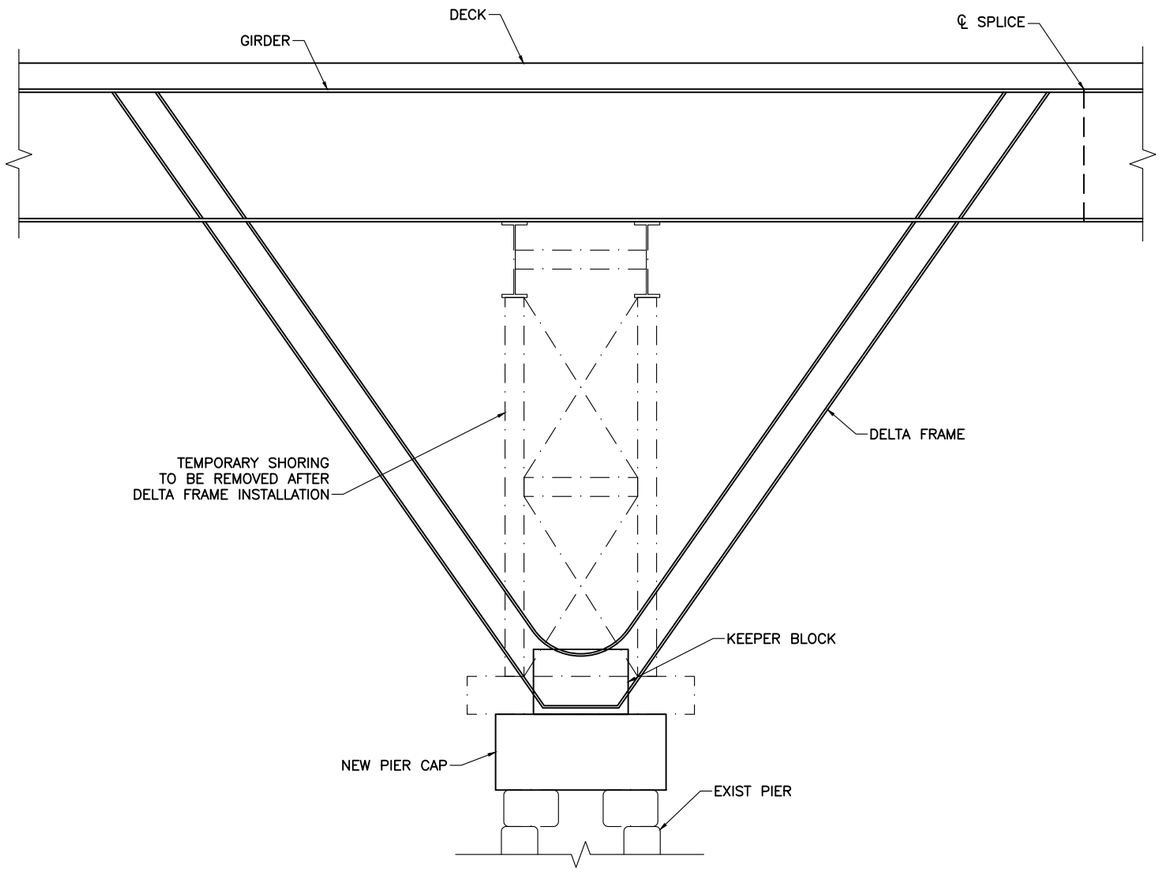
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE

FIGURE 11: MAIN SPAN ERECTION

DATE: APRIL 30, 2018



GIRDER SPAN SHORING – TRANSVERSE SECTION



GIRDER SPAN SHORING – ELEVATION

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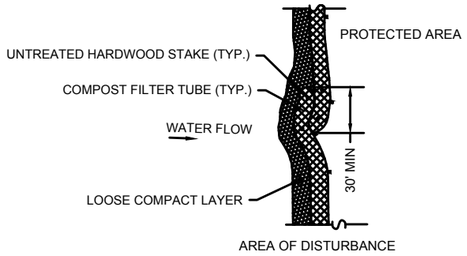
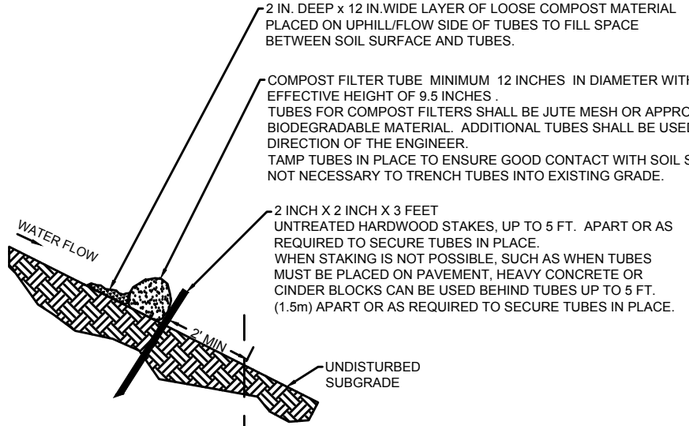
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE

FIGURE 12: DELTA FRAME ERECTION

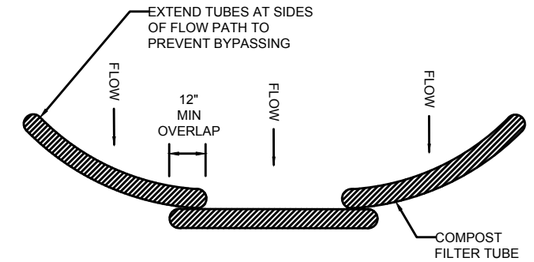
DATE: APRIL 30, 2018





NOTES:

1. THE CONTRACTOR SHALL INSPECT SILT SOCK REGULARLY AND WITHIN 12 HOURS AFTER ANY RAIN EVENT
2. THE CONTRACTOR SHALL MAINTAIN THE EROSION CONTROL SILT SOCK IN A FUNCTIONAL CONDITION AT ALL TIMES. REPAIR OR REPLACE SILT SOCK AS REQUIRED TO ENSURE THAT IT IS FUNCTIONING PROPERLY.
3. THE CONTRACTOR SHALL REMOVE SEDIMENTS COLLECTED AT THE BASE OF THE SILT SOCK WHEN THEY REACH 1/3 OF THE EXPOSED HEIGHT OF THE SILT SOCK, OR AS DIRECTED BY THE ENGINEER.
4. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
5. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
6. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
7. CONFIGURE TUBES AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN-OFF.

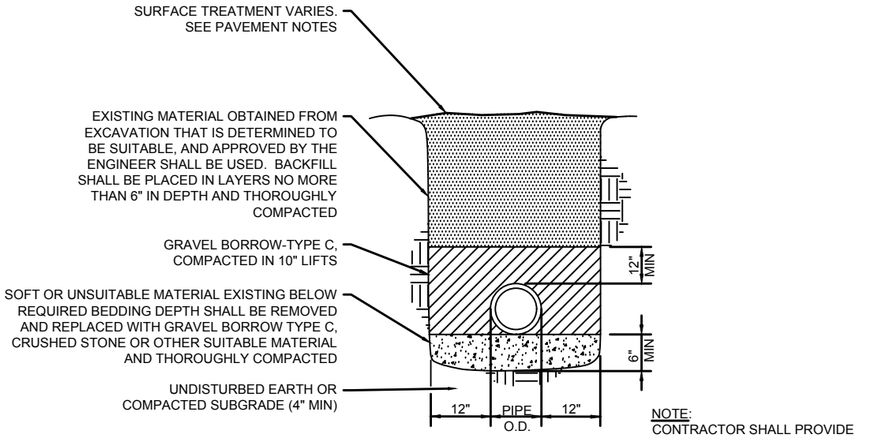


NOTE:

1. COMPOST FILTER TUBE TO BE INSTALLED AND MAINTAINED PER MANUFACTURER'S INSTRUCTIONS

COMPOST FILTER TUBES PLAN VIEW

N.T.S.



NOTE:
CONTRACTOR SHALL PROVIDE SHEETING, TRENCH BOX OR SLOPED WALLS IN ACCORDANCE WITH APPLICABLE SAFETY REGULATIONS.

UTILITY TRENCH

N.T.S.

STV 100 Years
ONE FINANCIAL CENTER,
3RD FLOOR,
BOSTON, MA 02111–2621

CITY OF BOSTON PUBLIC WORKS DEPARTMENT
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE

FIGURE 13: CIVIL DETAILS

DATE: APRIL 30, 2018

ATTACHMENT D – SITE PHOTOGRAPHS

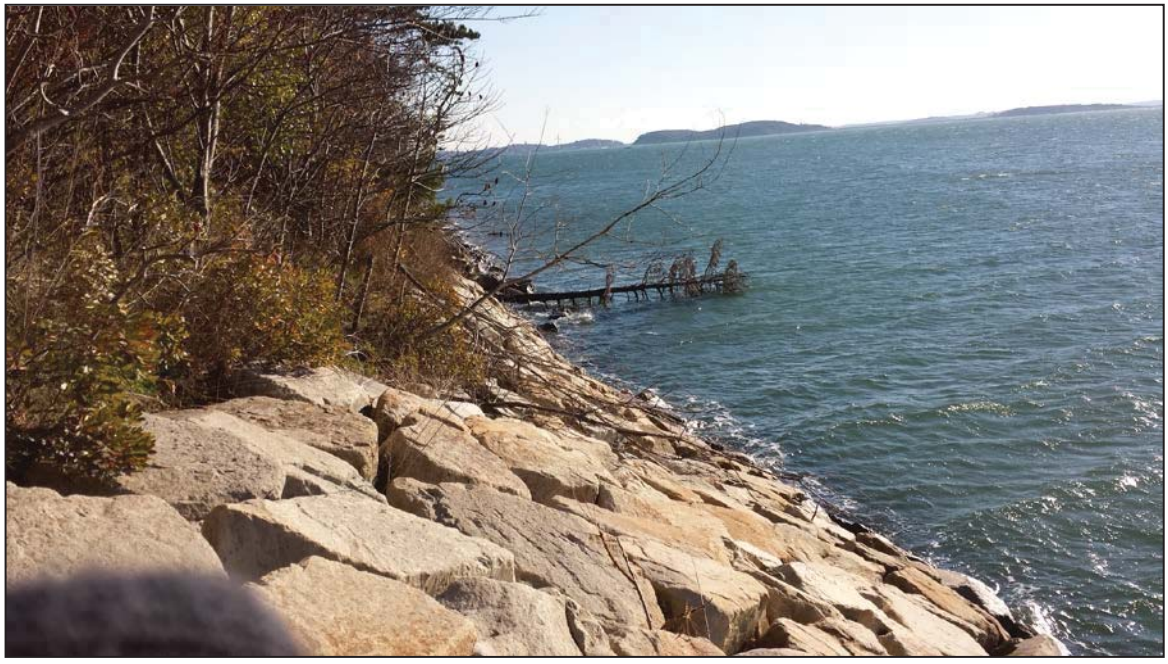


Photo 1: View east of the coastal bank and submerged coastal beach on the southern side of the Long Island Bridge on Long Island in Boston, MA.

Photo 2: View northeast of the coastal bank and coastal beach on the northern side of the Long Island Bridge approach on Long Island in Boston, MA.

ATTACHMENT E – STORMWATER REPORT

Long Island Bridge Superstructure Replacement

Boston, Massachusetts

Stormwater Management Report

April 2018

City of Boston
Public Works Department

STV Incorporated
One Financial Center, 3rd Floor
Boston, MA 02111

TABLE OF CONTENTS

INTRODUCTION

This Stormwater Management Report addresses the replacement of the superstructure of the Long Island Bridge crossing Quincy Bay and Boston Harbor between Moon Island in Quincy, Massachusetts and Long Island in Boston, Massachusetts. Originally constructed around 1950, the bridge superstructure was determined to be structurally deficient in 2014 and was removed in 2015 to address public safety concerns. The City of Boston Public Works Department proposes to replace the bridge superstructure to reestablish the vehicular connection to Long Island and its existing facilities. The replacement superstructure has been design to mimic the original bridge superstructure width, length, and profile. For purposes of this stormwater analysis, the original bridge configuration represents the existing conditions. The existing and proposed surface area of the bridge is approximately 2.6 acres.

The original bridge stormwater management system consisted of bridge scuppers at approximately 50-foot intervals along the entire length of the bridge directly outleting to the water below. The proposed design similarly collects the runoff in bridge scuppers but then routes the runoff through a closed drainage system back to each island where it can be routed through proprietary water quality structures before outleting to the tidal waters. On Long Island, runoff will also be routed through a subsurface infiltration system prior to discharge. As a redevelopment, the project improves existing conditions; fully complies with Massachusetts Stormwater Standards 1, 8, 9, and 10; and complies with Standards 2, 3, and the pretreatment and structural Best Management Practices (BMP) requirements of Standards 4-6 to the maximum extent practicable.

The proposed stormwater management system was designed in accordance with the Massachusetts Department of Environmental Protection (DEP) Stormwater Management Policy.

METHODOLOGY

Drainage watersheds in the site vicinity were determined based on the proposed bridge plans. Soil characteristics at the site were determined from an onsite soil boring performed in March 2015 (see Soil Boring Log BP-117c in the Appendix).

Watersheds were analyzed for original (existing) and proposed conditions during the 2-, 10-, and 25 Type III, 24-hour storm events. The 1-inch water quality volume event was also analyzed.

HydroCAD computer software was used to generate hydrographs and for hydrograph routings. HydroCAD software is based on the Soil Conservation Service (SCS) Technical Release 20 and SCS Technical Release 55. The Northeast Regional Climate Center Extreme Precipitation Analysis (http://precip.eas.cornell.edu) was used to determine the depth of rainfall for each storm event (see Appendix).

- 2-year 3.28 inches/hour
- 10-year 4.88 inches/hour
- 25-year 6.14 inches/hour
- 100-year 8.68 inches/hour

Based on the aforementioned site-specific soil data, the soils within the Long Island portion of the project area were assumed to be Hydrologic Soil Group A Loamy Sand.

EXISTING CONDITIONS

Originally, stormwater runoff from the bridge flowed directly through bridge scuppers to the Quincy Bay/Boston Harbor waters. This configuration did not provide any treatment prior to discharge. Table 1 displays the area contributing to the watershed, which represents the entire original bridge.

Table 1: Existing catchment area (acres)

Design Point	Impervious (CN=98)	Landscape (CN=69)	Total Area (acres)	Composite CN
DP 1 Boston Harbor/ Quincy Bay	2.61	0.00	2.61	98

PROPOSED CONDITIONS

The proposed stormwater management system includes the following components:

- A closed drainage system consisting of bridge scuppers and bridge drainage piping to accommodate the runoff from the bridge surface areas during a 25-year storm event.
- Proprietary water quality structures designed to provide at least eighty percent removal of Total Suspended Solids (TSS) from the bridge runoff prior to discharge to Boston Harbor/Quincy Bay.
- A subsurface infiltration system designed to recharge runoff directed to Long Island to the maximum extent practicable, with an overflow pipe designed to outlet at Pier 12.

Table 2 displays the properties for the tributary areas contributing to the Boston Harbor/Quincy Bay Design Point DP 1 identified in the Existing Conditions section. The runoff from the bridge is collected in two separate closed drainage systems: one directed to Moon Island in Quincy and one directed to Long Island in Boston. This report details only the Long Island closed drainage system.

Table 2: Proposed catchment areas (acres)

Design Point	Impervious (CN=98)	Landscape (CN=69)	Total Area (acres)	Composite CN
DP 1A Long Island	0.77	0.00	0.77	98
DP 1B Moon Island	1.84	0.00	1.84	98
DP 1 TOTAL	2.61	0.00	2.61	98

Although runoff from the original bridge discharged directly into the water without treatment, the City of Boston proposes to improve water quality by fully collecting and treating the runoff from the replaced bridge superstructure. The runoff from the center of the truss span to each abutment will be collected and routed back to a proprietary water quality structure (one behind each abutment) prior to discharge back to Boston Harbor/Quincy Bay. Runoff directed to Long Island will additionally be directed to a subsurface infiltration system with an overflow outleting at Pier 12.

The proposed water quality structures were designed in accordance with the Massachusetts DEP Stormwater Management Policy. Please see the stormwater management standard section for details.

STORMWATER MANAGEMENT STANDARDS

Standard 1: No Untreated Discharges or Erosion to Wetlands

Fully met. Runoff from the bridge will be treated through the use of a proprietary water quality structures.

Standard 2: Peak Rate Attenuation

Not applicable. Runoff from the site enters land subject to coastal storm flowage.

Standard 3: Stormwater Recharge

Met to the maximum extent practicable. Stormwater recharge is achieved for the runoff directed toward Long Island only. The Required Recharge Volume for this portion of the closed drainage system is calculated based on Hydrologic Soil Group A to be Rv = 0.6" x 33,495 SF = 1,675 CF. The Long Island subsurface infiltration system was conservatively sized using the simple dynamic method and an infiltration rate of 2.41 inches per hour per the Rawl's Rate for Loamy Sand. The volume of storage calculated during a 2-year storm event is 2,804 CF, which exceeds the Required Recharge Volume for the impervious surface area that is routed to Long Island

prior to discharge. The full HydroCAD results are provided in the Appendix, which also shows that the subsurface infiltration system will drain in less than 72 hours.

Standard 4: Water Quality

Met to the maximum extent practicable. The project is located in a critical area so a one-inch water quality volume (WQV) is required.

- Required WQV: 1" x 33,495 SF = 2791 CF

Eighty percent TSS removal prior to infiltration on Long Island is achieved prior to infiltration by the proprietary water quality structure. Design and maintenance information for the proposed Stormceptor is provided in the Appendix. The Long-Term Pollution Plan is described in this document.

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

This standard does not apply to this site.

Standard 6: Critical Areas

Met to the maximum extent practicable. The original bridge discharged runoff directly to the watershed without treatment. The proposed project captures and treats runoff, and recharges stormwater to the maximum extent practicable on Long Island.

Standard 7: Redevelopment

Fully met. The proposed Project to replace the Long Island Bridge superstructure is a redevelopment. As required, Standards 1, 8, and 9 are fully met; and Standards 2 through 6 are either not applicable or are met to the maximum extent practicable.

Standard 8: Construction Period Controls

Fully met. Construction Period Pollution Prevention and Erosion and Sedimentation Controls are generally shown on Figures 5 and 6 of the Notice of Intent filing. A complete Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan requires additional information regarding the contractor's means and methods and so will be developed and submitted before land disturbance begins.

Standard 9: Operation and Maintenance Plan

Fully met. The City of Boston will operate and maintain the stormwater management system. Operation and maintenance will include maintaining the proprietary water quality structure per the manufacturer's specifications, cleaning bridge scuppers, and repairing or cleaning stormwater management system pipes as needed. The Post-Construction Operation and Maintenance Plan is outlined in this Stormwater Report.

Standard 10: Prohibition of Illicit Discharges

The proposed stormwater management system is limited to the immediate site area and is not anticipated to provide the opportunity for permanent illicit discharges. As required, an Illicit Discharge Compliance Statement will be submitted prior to the discharge of stormwater to post-construction BMPs.

LONG-TERM POLLUTION PREVENTION PLAN &
POST-CONSTRUCTION OPERATION AND MAINTENANCE PLAN

The proposed stormwater management system and good housekeeping activities include the following items. Drainage system component locations are as shown on Figure 6 of the Notice of Intent filing:

Snow Removal

- Salt shall be used for de-icing, and shall be applied as minimally as possible to maintain safe pedestrian travel [as needed]

Bridge Scuppers

- Inspect at least two times per year (remove sediment as needed) [spring, fall, additionally as needed]
- Keep scupper grates free of snow and ice [as needed]
- Keep scupper grates free of litter, leaves, and debris [as needed]

Proprietary Water Quality Structure

- Inspect every six months for first year, annually thereafter [spring]
- Inspect unit immediately after any fuel, oil or chemical spill [as needed]
- Clean unit once sediment depth reaches 15% of storage capacity [as needed]

Subsurface Infiltration System

- Inspect every six months and after every major storm event (1" or greater rainfall during a 24-hour period).
- Clean accumulated sediment using a vacuum truck [as needed]

The proposed stormwater management system owner, party responsible for operation and maintenance, and emergency contact will be

Public Works Department
City of Boston
One City Hall Plaza
Boston, MA

The annual closed drainage system maintenance cost is currently estimated at $3,000.

APPENDIX

- Massachusetts Department of Environmental Protection Checklist for Stormwater Report
- Soil Boring Log
- Northeast Regional Climate Center Extreme Precipitation Analysis
- HydroCAD Results
- TSS Removal Table
- Water Quality Structure Design and Maintenance Information
- Operation and Maintenance Log

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.

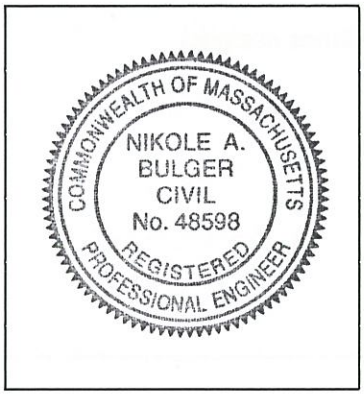
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Nikole A. K. Bulger 4/30/18
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): _____

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.

massDOT Highway

Hager GeoScience, Inc.
596 Main St.
Woburn, MA 01801

Phone: (781) 935-8111
Fax: (781) 935-2717
E Mail: jhager@hagergeoscience.com

Boring No. BP-117C OW#2
Scale 1" = 5'

City/Town: Moon Island | Bridge: Long Island Bridge B-16-368 | Project File No: CIP-14-91 | Contract No: 215005S03

Project: Long Island Bridge Boring | Date & Time Started: 3/21/2015 (7:00am) | Total Hours:

Groundwater Depth: NA | Date & Time Completed: 3/25/2015(12:00am) | 25.5

Coordinates: N 2938676.7 E 797803.46 | Driller's Name: Rich Lenord | Helper's Name: Matt D.

Ground Elevation: 49.5 | Inspector's Name: M. Domaracki | Inspector's Company: New England Boring Contractors

Sample Number	Depth Range (Feet)	Blow Counts per 6 Inches Coring Times Minute Per Foot	Recovery Inches	Field Description	Strata Changes
	CHANGED LOCATION				
S1A S1B	5'-7'	9-21-25-33	14"	Dry, dense, brown, SAND, trace gravel	
S2A S2B	10'-11'6"	33-48-72-X	13"	Moist, very dense, brown, SAND and SILT, trace gravel	
S3A S3B	15'-15'6"	110-10-X-X	3"	Wet, very dense, brown, SAND, some silt, trace gravel	
S4A S4B	20'-21'6"	33-47-73-X	16"	Wet, very dense, brown, SAND, some silt, trace gravel	
S5A S5B	25'-26'	44-76-X-X	9"	Wet, very dense, brown, SAND, some silt, trace gravel	
S6A S6B	30'-32'	31-63-42-40	24"	Wet, very dense, brown, SAND, some silt, trace gravel	

5' 10' 15' 20' 25' 30'

Notes: BP-117 was attempted at the planned location. Refusal was met at a depth of 12.7' and the expected cause was rebar. Project Engineer approved relocating the location 20 ft back on the center line of the roadway. The new location is BP-117C.

Protective Device - Stand: Box:
Well Depth: Solid Pipe:
Stick Up Pipe: Screen Pipe:

Penetration Resistance (N) Guide:

Cohesionless Soils (Sands, Gravels)		Cohesive Soils (Silts, Clays)	
Relative Density	Penetration Resistance	Consistency	Penetration Resistance
Very Loose	0 - 4	Very Soft	0 - 2
Loose	4 - 10	Soft	2 - 4
Medium Dense	10 - 30	Medium Stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very Dense	Over 50	Very Stiff	15 - 30
N=Sum of Second and Third 6" Blow Counts		Hard	Over 30

Terms Used for Second Entry of Descriptions: and = 40-50%, some = 10-40%, trace = 10% or less

Type of Drill Rig: Mobile Drill 53
Casing Type: Size: Depth:
Hammer Weight: Fall:
Signs: Cones: Arrow-Board:
Sampler Type: SS Size: 2"
Automatic Hammer Weight:
Safety Hammer Weight: 140lbs
Donut Hammer Weight: Fall: 30"
Core Barrel Type: NQ Size: 2"

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	Massachusetts
Location	
Longitude	70.975 degrees West
Latitude	42.311 degrees North
Elevation	0 feet
Date/Time	Mon, 30 Apr 2018 04:34:17 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.70	0.87	1.11	**1yr**	0.75	1.05	1.29	1.64	2.11	2.73	3.02	**1yr**	2.42	2.91	3.33	4.01	4.71	**1yr**
2yr	0.35	0.54	0.68	0.89	1.12	1.42	**2yr**	0.97	1.30	1.64	2.07	2.60	3.28	3.64	**2yr**	2.90	3.50	4.01	4.76	5.39	**2yr**
5yr	0.42	0.66	0.82	1.10	1.41	1.79	**5yr**	1.22	1.63	2.08	2.62	3.29	4.11	4.62	**5yr**	3.64	4.44	5.07	6.00	6.72	**5yr**
10yr	0.48	0.75	0.95	1.29	1.67	2.14	**10yr**	1.44	1.94	2.50	3.14	3.92	4.88	5.53	**10yr**	4.32	5.32	6.05	7.15	7.95	**10yr**
25yr	0.56	0.89	1.14	1.57	2.09	2.71	**25yr**	1.81	2.44	3.17	3.99	4.97	6.14	7.03	**25yr**	5.43	6.76	7.66	9.03	9.93	**25yr**
50yr	0.64	1.03	1.32	1.85	2.49	3.25	**50yr**	2.15	2.91	3.80	4.78	5.94	7.30	8.44	**50yr**	6.46	8.11	9.15	10.78	11.75	**50yr**
100yr	0.73	1.19	1.53	2.17	2.96	3.89	**100yr**	2.56	3.47	4.56	5.73	7.09	8.68	10.13	**100yr**	7.68	9.74	10.95	12.87	13.92	**100yr**
200yr	0.85	1.38	1.79	2.56	3.53	4.65	**200yr**	3.05	4.13	5.46	6.86	8.47	10.33	12.17	**200yr**	9.14	11.70	13.10	15.37	16.49	**200yr**
500yr	1.03	1.69	2.20	3.18	4.45	5.90	**500yr**	3.84	5.21	6.94	8.71	10.72	13.01	15.51	**500yr**	11.51	14.92	16.62	19.45	20.66	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.25	0.39	0.48	0.64	0.79	0.87	**1yr**	0.68	0.85	1.17	1.44	1.80	2.55	2.62	**1yr**	2.26	2.52	2.80	3.32	4.36	**1yr**
2yr	0.34	0.52	0.64	0.86	1.07	1.27	**2yr**	0.92	1.25	1.47	1.95	2.53	3.15	3.52	**2yr**	2.79	3.38	3.87	4.60	5.22	**2yr**
5yr	0.40	0.61	0.76	1.04	1.32	1.53	**5yr**	1.14	1.50	1.75	2.27	2.93	3.81	4.24	**5yr**	3.37	4.08	4.67	5.51	6.22	**5yr**

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
10yr	0.44	0.68	0.84	1.18	1.52	1.76	**10yr**	1.31	1.72	2.00	2.56	3.28	4.38	4.87	**10yr**	3.88	4.68	5.37	6.30	7.09	**10yr**
25yr	0.51	0.78	0.97	1.38	1.82	2.10	**25yr**	1.57	2.05	2.37	2.98	3.81	5.26	5.85	**25yr**	4.66	5.63	6.48	7.55	8.43	**25yr**
50yr	0.57	0.87	1.08	1.56	2.10	2.42	**50yr**	1.81	2.36	2.69	3.36	4.27	6.08	6.72	**50yr**	5.38	6.46	7.48	8.64	9.62	**50yr**
100yr	0.65	0.98	1.22	1.77	2.42	2.76	**100yr**	2.09	2.70	3.04	3.79	4.78	7.02	7.71	**100yr**	6.21	7.41	8.65	9.88	10.98	**100yr**
200yr	0.73	1.10	1.39	2.02	2.81	3.16	**200yr**	2.43	3.09	3.46	4.26	5.36	8.11	8.87	**200yr**	7.18	8.53	10.04	11.28	12.56	**200yr**
500yr	0.86	1.28	1.65	2.40	3.41	3.78	**500yr**	2.94	3.70	4.08	4.97	6.24	9.88	10.68	**500yr**	8.75	10.27	12.23	13.48	15.02	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.31	0.47	0.58	0.78	0.96	1.13	**1yr**	0.83	1.10	1.32	1.78	2.29	2.90	3.29	**1yr**	2.57	3.16	3.57	4.32	5.04	**1yr**
2yr	0.37	0.56	0.69	0.94	1.16	1.37	**2yr**	1.00	1.34	1.59	2.10	2.72	3.40	3.80	**2yr**	3.01	3.65	4.19	4.97	5.59	**2yr**
5yr	0.46	0.71	0.88	1.20	1.53	1.80	**5yr**	1.32	1.76	2.09	2.71	3.46	4.42	5.00	**5yr**	3.91	4.81	5.50	6.50	7.26	**5yr**
10yr	0.56	0.86	1.07	1.49	1.93	2.22	**10yr**	1.66	2.17	2.58	3.29	4.16	5.43	6.20	**10yr**	4.80	5.96	6.79	7.99	8.85	**10yr**
25yr	0.73	1.11	1.39	1.98	2.60	2.93	**25yr**	2.25	2.86	3.43	4.27	5.32	7.11	8.22	**25yr**	6.30	7.91	8.97	10.52	11.50	**25yr**
50yr	0.89	1.36	1.69	2.43	3.27	3.62	**50yr**	2.82	3.54	4.26	5.21	6.41	8.73	10.20	**50yr**	7.72	9.81	11.08	12.95	14.01	**50yr**
100yr	1.10	1.66	2.08	3.00	4.11	4.47	**100yr**	3.55	4.37	5.30	6.35	7.72	10.69	12.65	**100yr**	9.46	12.17	13.67	15.96	17.10	**100yr**
200yr	1.34	2.02	2.56	3.71	5.17	5.53	**200yr**	4.46	5.40	6.60	7.73	9.29	13.09	15.72	**200yr**	11.58	15.11	16.83	19.68	20.87	**200yr**
500yr	1.76	2.62	3.37	4.90	6.97	7.31	**500yr**	6.02	7.14	8.84	10.04	11.89	17.08	20.94	**500yr**	15.12	20.13	22.16	25.94	27.19	**500yr**

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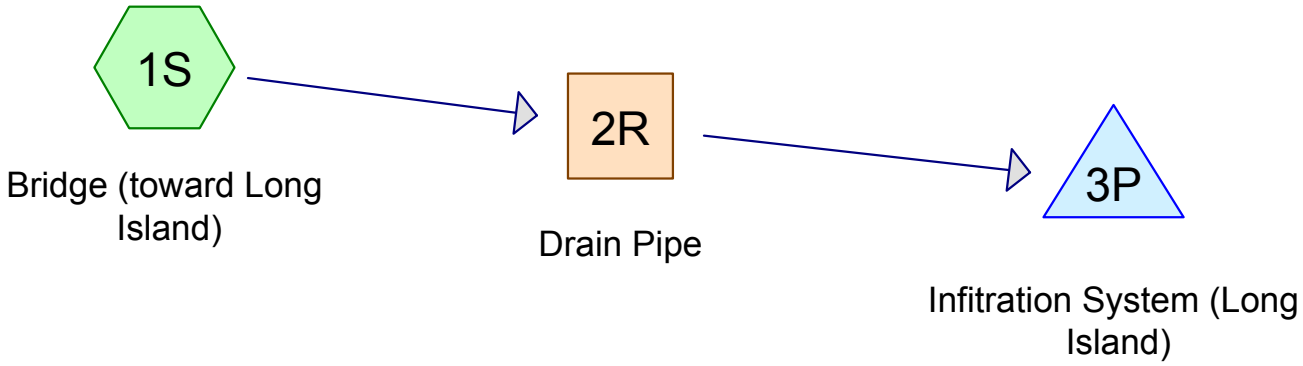


Subcat Reach Pond Link

Routing Diagram for LongIslandBridge
Prepared by STV Incorporated, Printed 4/30/2018

Summary for Subcatchment 1S: Bridge (toward Long Island)

Runoff = 2.54 cfs @ 12.07 hrs, Volume= 0.195 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.28"

Area (sf)	CN	Description
33,495	98	Paved roads w/curbs & sewers, HSG D
33,495		100.00% Impervious Area

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

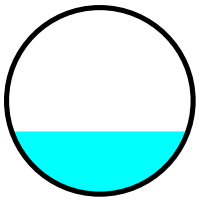
Summary for Reach 2R: Drain Pipe

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 3.05" for 2-Year event
Inflow = 2.54 cfs @ 12.07 hrs, Volume= 0.195 af
Outflow = 2.34 cfs @ 12.15 hrs, Volume= 0.195 af, Atten= 8%, Lag= 4.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.50 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 1.42 fps, Avg. Travel Time= 9.4 min

Peak Storage= 416 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 9.66 cfs

18.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 800.0' Slope= 0.0050 '/'
Inlet Invert= 47.00', Outlet Invert= 43.00'



Summary for Pond 3P: Infitration System (Long Island)

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 3.05" for 2-Year event
Inflow = 2.34 cfs @ 12.15 hrs, Volume= 0.195 af
Outflow = 0.96 cfs @ 12.38 hrs, Volume= 0.195 af, Atten= 59%, Lag= 13.9 min
Discarded = 0.09 cfs @ 9.46 hrs, Volume= 0.148 af
Primary = 0.87 cfs @ 12.38 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 41.50' @ 12.38 hrs Surf.Area= 1,624 sf Storage= 2,852 cf

Plug-Flow detention time= 174.5 min calculated for 0.195 af (100% of inflow)
Center-of-Mass det. time= 174.4 min (938.5 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.00'	1,411 cf	**16.00'W x 101.50'L x 3.54'H Field A** 5,752 cf Overall - 2,224 cf Embedded = 3,528 cf x 40.0% Voids
#2A	39.50'	2,224 cf	**Cultec R-330XLHD** x 42 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		3,635 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	41.00'	**15.0" Round Culvert** L= 479.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.00' / 38.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.09 cfs @ 9.46 hrs HW=39.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.87 cfs @ 12.38 hrs HW=41.50' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.87 cfs @ 1.90 fps)

Summary for Subcatchment 1S: Bridge (toward Long Island)

Runoff = 3.80 cfs @ 12.07 hrs, Volume= 0.298 af, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.88"

Area (sf)	CN	Description
33,495	98	Paved roads w/curbs & sewers, HSG D
33,495		100.00% Impervious Area

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

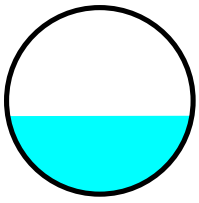
Summary for Reach 2R: Drain Pipe

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 4.64" for 10-Year event
Inflow = 3.80 cfs @ 12.07 hrs, Volume= 0.298 af
Outflow = 3.54 cfs @ 12.14 hrs, Volume= 0.298 af, Atten= 7%, Lag= 4.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.04 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 1.61 fps, Avg. Travel Time= 8.3 min

Peak Storage= 562 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 9.66 cfs

18.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 800.0' Slope= 0.0050 '/'
Inlet Invert= 47.00', Outlet Invert= 43.00'



Summary for Pond 3P: Infitration System (Long Island)

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 4.64" for 10-Year event
Inflow = 3.54 cfs @ 12.14 hrs, Volume= 0.298 af
Outflow = 3.02 cfs @ 12.20 hrs, Volume= 0.298 af, Atten= 15%, Lag= 3.2 min
Discarded = 0.09 cfs @ 8.26 hrs, Volume= 0.172 af
Primary = 2.93 cfs @ 12.20 hrs, Volume= 0.125 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 42.02' @ 12.20 hrs Surf.Area= 1,624 sf Storage= 3,299 cf

Plug-Flow detention time= 143.1 min calculated for 0.297 af (100% of inflow)
Center-of-Mass det. time= 143.1 min (898.7 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.00'	1,411 cf	**16.00'W x 101.50'L x 3.54'H Field A** 5,752 cf Overall - 2,224 cf Embedded = 3,528 cf x 40.0% Voids
#2A	39.50'	2,224 cf	**Cultec R-330XLHD** x 42 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		3,635 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	41.00'	**15.0" Round Culvert** L= 479.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.00' / 38.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.09 cfs @ 8.26 hrs HW=39.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=2.93 cfs @ 12.20 hrs HW=42.02' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 2.93 cfs @ 2.72 fps)

Summary for Subcatchment 1S: Bridge (toward Long Island)

Runoff = 4.79 cfs @ 12.07 hrs, Volume= 0.378 af, Depth= 5.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.14"

Area (sf)	CN	Description
33,495	98	Paved roads w/curbs & sewers, HSG D
33,495		100.00% Impervious Area

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

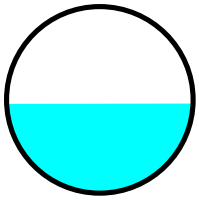
Summary for Reach 2R: Drain Pipe

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 5.90" for 25-Year event
Inflow = 4.79 cfs @ 12.07 hrs, Volume= 0.378 af
Outflow = 4.49 cfs @ 12.14 hrs, Volume= 0.378 af, Atten= 6%, Lag= 4.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.37 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 7.7 min

Peak Storage= 670 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.72'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 9.66 cfs

18.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 800.0' Slope= 0.0050 '/'
Inlet Invert= 47.00', Outlet Invert= 43.00'



Summary for Pond 3P: Infitration System (Long Island)

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 5.90" for 25-Year event
Inflow = 4.49 cfs @ 12.14 hrs, Volume= 0.378 af
Outflow = 3.98 cfs @ 12.18 hrs, Volume= 0.378 af, Atten= 11%, Lag= 2.7 min
Discarded = 0.09 cfs @ 7.23 hrs, Volume= 0.187 af
Primary = 3.89 cfs @ 12.18 hrs, Volume= 0.191 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 42.32' @ 12.18 hrs Surf.Area= 1,624 sf Storage= 3,492 cf

Plug-Flow detention time= 128.7 min calculated for 0.378 af (100% of inflow)
Center-of-Mass det. time= 128.7 min (880.2 - 751.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.00'	1,411 cf	**16.00'W x 101.50'L x 3.54'H Field A** 5,752 cf Overall - 2,224 cf Embedded = 3,528 cf x 40.0% Voids
#2A	39.50'	2,224 cf	**Cultec R-330XLHD** x 42 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		3,635 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	41.00'	**15.0" Round Culvert** L= 479.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.00' / 38.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.09 cfs @ 7.23 hrs HW=39.04' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=3.89 cfs @ 12.18 hrs HW=42.32' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 3.89 cfs @ 3.17 fps)

Summary for Pond 3P: Infitration System (Long Island)

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth > 1.57" for 2-Year event
Inflow = 2.34 cfs @ 12.15 hrs, Volume= 0.101 af
Outflow = 0.82 cfs @ 12.44 hrs, Volume= 0.042 af, Atten= 65%, Lag= 17.4 min
Discarded = 0.09 cfs @ 11.21 hrs, Volume= 0.014 af
Primary = 0.73 cfs @ 12.44 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 11.00-13.00 hrs, dt= 0.01 hrs
Peak Elev= 41.45' @ 12.44 hrs Surf.Area= 1,624 sf Storage= 2,804 cf

Plug-Flow detention time= 34.4 min calculated for 0.042 af (41% of inflow)
Center-of-Mass det. time= 15.4 min (744.4 - 729.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.00'	1,411 cf	**16.00'W x 101.50'L x 3.54'H Field A** 5,752 cf Overall - 2,224 cf Embedded = 3,528 cf x 40.0% Voids
#2A	39.50'	2,224 cf	**Cultec R-330XLHD** x 42 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		3,635 cf	Total Available Storage

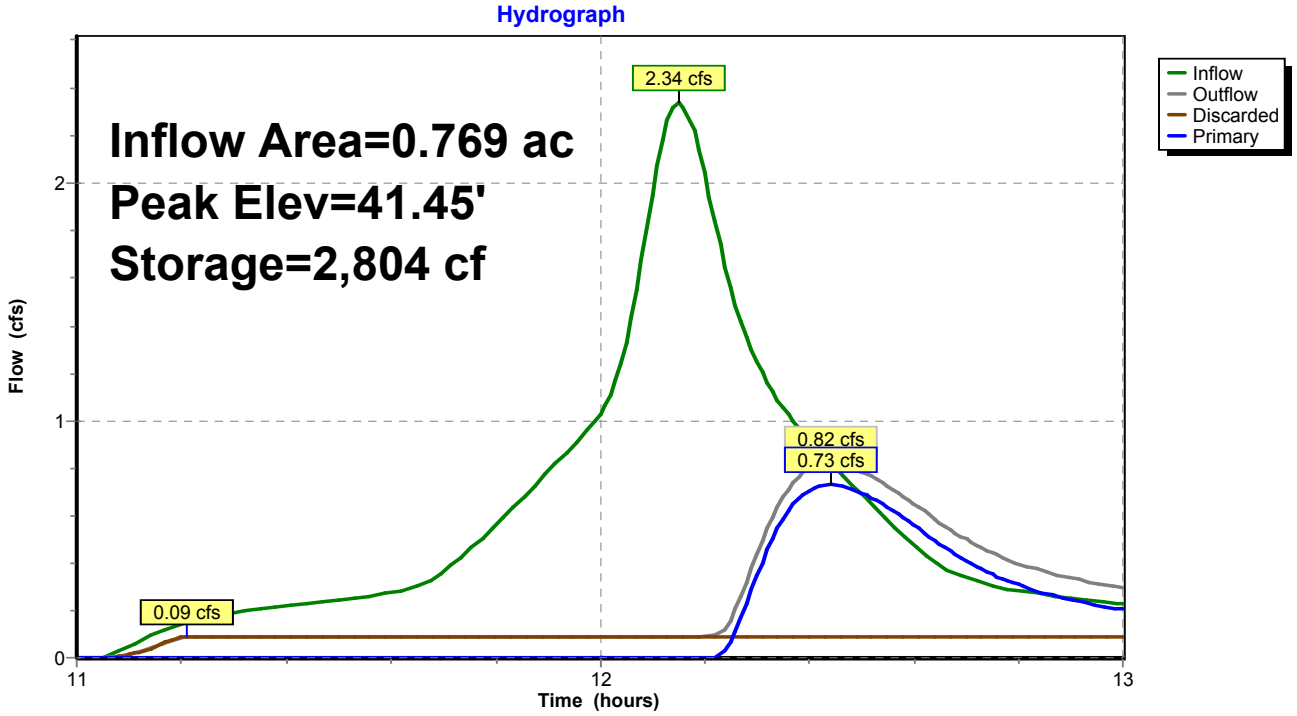
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	41.00'	**15.0" Round Culvert** L= 479.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.00' / 38.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.09 cfs @ 11.21 hrs HW=39.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.73 cfs @ 12.44 hrs HW=41.45' (Free Discharge)
2=Culvert (Barrel Controls 0.73 cfs @ 2.68 fps)

Pond 3P: Infitration System (Long Island)



Summary for Pond 3P: Infitration System (Long Island)

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 3.05" for 2-Year event
Inflow = 2.34 cfs @ 12.15 hrs, Volume= 0.195 af
Outflow = 0.96 cfs @ 12.38 hrs, Volume= 0.195 af, Atten= 59%, Lag= 13.9 min
Discarded = 0.09 cfs @ 9.46 hrs, Volume= 0.148 af
Primary = 0.87 cfs @ 12.38 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 41.50' @ 12.38 hrs Surf.Area= 1,624 sf Storage= 2,852 cf

Plug-Flow detention time= 174.5 min calculated for 0.195 af (100% of inflow)
Center-of-Mass det. time= 174.4 min (938.5 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.00'	1,411 cf	**16.00'W x 101.50'L x 3.54'H Field A** 5,752 cf Overall - 2,224 cf Embedded = 3,528 cf x 40.0% Voids
#2A	39.50'	2,224 cf	**Cultec R-330XLHD** x 42 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		3,635 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	41.00'	**15.0" Round Culvert** L= 479.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.00' / 38.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.09 cfs @ 9.46 hrs HW=39.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.87 cfs @ 12.38 hrs HW=41.50' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.87 cfs @ 1.90 fps)

Hydrograph for Pond 3P: Infitration System (Long Island)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	39.00	0.00	0.00	0.00
2.00	0.00	1	39.00	0.00	0.00	0.00
4.00	0.02	4	39.01	0.02	0.02	0.00
6.00	0.03	7	39.01	0.03	0.03	0.00
8.00	0.05	13	39.02	0.05	**0.05**	0.00
10.00	0.11	44	39.07	0.09	**0.09**	0.00
12.00	**1.02**	**1,165**	**40.12**	**0.09**	0.09	**0.00**
14.00	**0.14**	**2,450**	**41.14**	**0.16**	0.09	**0.07**
16.00	0.07	2,327	41.04	0.10	0.09	0.00
18.00	0.04	2,078	40.83	0.09	0.09	0.00
20.00	0.03	1,698	40.53	0.09	0.09	0.00
22.00	0.03	1,268	40.20	0.09	0.09	0.00
24.00	0.02	796	39.85	0.09	0.09	0.00
26.00	0.00	169	39.26	0.09	0.09	0.00
28.00	0.00	0	39.00	0.00	0.00	0.00
30.00	0.00	0	39.00	0.00	0.00	0.00
32.00	0.00	0	39.00	0.00	0.00	0.00
34.00	0.00	0	39.00	0.00	0.00	0.00
36.00	0.00	0	39.00	0.00	0.00	0.00
38.00	0.00	0	39.00	0.00	0.00	0.00
40.00	0.00	0	39.00	0.00	0.00	0.00
42.00	0.00	0	39.00	0.00	0.00	0.00
44.00	0.00	0	39.00	0.00	0.00	0.00
46.00	0.00	0	39.00	0.00	0.00	0.00
48.00	0.00	0	39.00	0.00	0.00	0.00
50.00	0.00	0	39.00	0.00	0.00	0.00
52.00	0.00	0	39.00	0.00	0.00	0.00
54.00	0.00	0	39.00	0.00	0.00	0.00
56.00	0.00	0	39.00	0.00	0.00	0.00
58.00	0.00	0	39.00	0.00	0.00	0.00
60.00	0.00	0	39.00	0.00	0.00	0.00
62.00	0.00	0	39.00	0.00	0.00	0.00
64.00	0.00	0	39.00	0.00	0.00	0.00
66.00	0.00	0	39.00	0.00	0.00	0.00
68.00	0.00	0	39.00	0.00	0.00	0.00
70.00	0.00	0	39.00	0.00	0.00	0.00
72.00	0.00	0	39.00	0.00	0.00	0.00

Summary for Pond 3P: Infitration System (Long Island)

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 4.64" for 10-Year event
Inflow = 3.54 cfs @ 12.14 hrs, Volume= 0.298 af
Outflow = 3.02 cfs @ 12.20 hrs, Volume= 0.298 af, Atten= 15%, Lag= 3.2 min
Discarded = 0.09 cfs @ 8.26 hrs, Volume= 0.172 af
Primary = 2.93 cfs @ 12.20 hrs, Volume= 0.125 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 42.02' @ 12.20 hrs Surf.Area= 1,624 sf Storage= 3,299 cf

Plug-Flow detention time= 143.1 min calculated for 0.297 af (100% of inflow)
Center-of-Mass det. time= 143.1 min (898.7 - 755.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.00'	1,411 cf	**16.00'W x 101.50'L x 3.54'H Field A** 5,752 cf Overall - 2,224 cf Embedded = 3,528 cf x 40.0% Voids
#2A	39.50'	2,224 cf	**Cultec R-330XLHD** x 42 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		3,635 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	41.00'	**15.0" Round Culvert** L= 479.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.00' / 38.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.09 cfs @ 8.26 hrs HW=39.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=2.93 cfs @ 12.20 hrs HW=42.02' (Free Discharge)
└**2=Culvert** (Inlet Controls 2.93 cfs @ 2.72 fps)

Hydrograph for Pond 3P: Infitration System (Long Island)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	39.00	0.00	0.00	0.00
2.00	0.01	3	39.00	0.01	0.01	0.00
4.00	0.03	8	39.01	0.03	0.03	0.00
6.00	0.05	12	39.02	0.05	0.05	0.00
8.00	0.09	22	39.03	0.08	**0.08**	0.00
10.00	0.17	277	39.43	0.09	**0.09**	0.00
12.00	**1.59**	**2,370**	**41.07**	**0.11**	0.09	**0.02**
14.00	**0.20**	**2,515**	**41.19**	**0.22**	0.09	**0.13**
16.00	0.11	2,405	41.10	0.12	0.09	0.03
18.00	0.06	2,276	40.99	0.09	0.09	0.00
20.00	0.05	2,029	40.79	0.09	0.09	0.00
22.00	0.04	1,707	40.54	0.09	0.09	0.00
24.00	0.03	1,324	40.25	0.09	0.09	0.00
26.00	0.00	706	39.78	0.09	0.09	0.00
28.00	0.00	54	39.08	0.09	0.09	0.00
30.00	0.00	0	39.00	0.00	0.00	0.00
32.00	0.00	0	39.00	0.00	0.00	0.00
34.00	0.00	0	39.00	0.00	0.00	0.00
36.00	0.00	0	39.00	0.00	0.00	0.00
38.00	0.00	0	39.00	0.00	0.00	0.00
40.00	0.00	0	39.00	0.00	0.00	0.00
42.00	0.00	0	39.00	0.00	0.00	0.00
44.00	0.00	0	39.00	0.00	0.00	0.00
46.00	0.00	0	39.00	0.00	0.00	0.00
48.00	0.00	0	39.00	0.00	0.00	0.00
50.00	0.00	0	39.00	0.00	0.00	0.00
52.00	0.00	0	39.00	0.00	0.00	0.00
54.00	0.00	0	39.00	0.00	0.00	0.00
56.00	0.00	0	39.00	0.00	0.00	0.00
58.00	0.00	0	39.00	0.00	0.00	0.00
60.00	0.00	0	39.00	0.00	0.00	0.00
62.00	0.00	0	39.00	0.00	0.00	0.00
64.00	0.00	0	39.00	0.00	0.00	0.00
66.00	0.00	0	39.00	0.00	0.00	0.00
68.00	0.00	0	39.00	0.00	0.00	0.00
70.00	0.00	0	39.00	0.00	0.00	0.00
72.00	0.00	0	39.00	0.00	0.00	0.00

Summary for Pond 3P: Infitration System (Long Island)

Inflow Area = 0.769 ac,100.00% Impervious, Inflow Depth = 5.90" for 25-Year event
Inflow = 4.49 cfs @ 12.14 hrs, Volume= 0.378 af
Outflow = 3.98 cfs @ 12.18 hrs, Volume= 0.378 af, Atten= 11%, Lag= 2.7 min
Discarded = 0.09 cfs @ 7.23 hrs, Volume= 0.187 af
Primary = 3.89 cfs @ 12.18 hrs, Volume= 0.191 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 42.32' @ 12.18 hrs Surf.Area= 1,624 sf Storage= 3,492 cf

Plug-Flow detention time= 128.7 min calculated for 0.378 af (100% of inflow)
Center-of-Mass det. time= 128.7 min (880.2 - 751.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	39.00'	1,411 cf	**16.00'W x 101.50'L x 3.54'H Field A** 5,752 cf Overall - 2,224 cf Embedded = 3,528 cf x 40.0% Voids
#2A	39.50'	2,224 cf	**Cultec R-330XLHD** x 42 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		3,635 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	41.00'	**15.0" Round Culvert** L= 479.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 41.00' / 38.60' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.09 cfs @ 7.23 hrs HW=39.04' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=3.89 cfs @ 12.18 hrs HW=42.32' (Free Discharge)
2=Culvert (Inlet Controls 3.89 cfs @ 3.17 fps)

Hydrograph for Pond 3P: Infitration System (Long Island)

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	39.00	0.00	0.00	0.00
2.00	0.02	5	39.01	0.02	0.02	0.00
4.00	0.05	11	39.02	0.04	0.04	0.00
6.00	0.07	16	39.03	0.06	**0.06**	0.00
8.00	0.11	55	39.08	0.09	**0.09**	0.00
10.00	0.22	566	39.68	0.09	0.09	0.00
12.00	**2.04**	**2,997**	**41.65**	**1.47**	0.09	**1.38**
14.00	**0.25**	**2,555**	**41.23**	**0.27**	0.09	**0.18**
16.00	0.13	2,444	41.13	0.15	0.09	0.06
18.00	0.08	2,343	41.05	0.10	0.09	0.01
20.00	0.06	2,191	40.92	0.09	0.09	0.00
22.00	0.05	1,954	40.73	0.09	0.09	0.00
24.00	0.04	1,640	40.49	0.09	0.09	0.00
26.00	0.00	1,030	40.02	0.09	0.09	0.00
28.00	0.00	377	39.54	0.09	0.09	0.00
30.00	0.00	0	39.00	0.00	0.00	0.00
32.00	0.00	0	39.00	0.00	0.00	0.00
34.00	0.00	0	39.00	0.00	0.00	0.00
36.00	0.00	0	39.00	0.00	0.00	0.00
38.00	0.00	0	39.00	0.00	0.00	0.00
40.00	0.00	0	39.00	0.00	0.00	0.00
42.00	0.00	0	39.00	0.00	0.00	0.00
44.00	0.00	0	39.00	0.00	0.00	0.00
46.00	0.00	0	39.00	0.00	0.00	0.00
48.00	0.00	0	39.00	0.00	0.00	0.00
50.00	0.00	0	39.00	0.00	0.00	0.00
52.00	0.00	0	39.00	0.00	0.00	0.00
54.00	0.00	0	39.00	0.00	0.00	0.00
56.00	0.00	0	39.00	0.00	0.00	0.00
58.00	0.00	0	39.00	0.00	0.00	0.00
60.00	0.00	0	39.00	0.00	0.00	0.00
62.00	0.00	0	39.00	0.00	0.00	0.00
64.00	0.00	0	39.00	0.00	0.00	0.00
66.00	0.00	0	39.00	0.00	0.00	0.00
68.00	0.00	0	39.00	0.00	0.00	0.00
70.00	0.00	0	39.00	0.00	0.00	0.00
72.00	0.00	0	39.00	0.00	0.00	0.00

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: Long Island, Boston, MA

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)
Proprietary Water Quality Structure	0.80	**1.00**	0.80	0.20

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Long Island Bridge

Prepared By: STV Incorporated

Date: 4/30/18

*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

Detailed Stormceptor Sizing Report – LI

Project Information & Location			
Project Name	LIB	**Project Number**	4017224
City	Boston	**State/ Province**	Massachusetts
Country	United States of America	**Date**	4/30/2018
Designer Information		**EOR Information (optional)**	
Name	NIKOLE BULGER	**Name**	
Company	STV INCORPORATED	**Company**	
Phone #	617-482-7298	**Phone #**	
Email	NIKOLE.BULGER@STVINC.COM	**Email**	

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	LI
Recommended Stormceptor Model	STC 900
Target TSS Removal (%)	71.0
TSS Removal (%) Provided	76
PSD	NJDEP
Rainfall Station	BOSTON WSFO AP

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	70
STC 900	76
STC 1200	76
STC 1800	75
STC 2400	78
STC 3600	78
STC 4800	81
STC 6000	81
STC 7200	83
STC 11000	85
STC 13000	85
STC 16000	87
StormceptorMAX	Custom

Stormceptor
The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology
Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:
• Site parameters
• Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
• Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
• TSS load
• Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Massachusetts	**Total Number of Rainfall Events**	10040
Rainfall Station Name	BOSTON WSFO AP	**Total Rainfall (in)**	2457.1
Station ID #	0770	**Average Annual Rainfall (in)**	42.4
Coordinates	42°21'38"N, 71°0'38"W	**Total Evaporation (in)**	239.7
Elevation (ft)	20	**Total Infiltration (in)**	0.0
Years of Rainfall Data	58	**Total Rainfall that is Runoff (in)**	2217.4

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (acres)	0.77
Imperviousness %	100.0

Water Quality Objective	
TSS Removal (%)	71.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Design Details	
Stormceptor Inlet Invert Elev (ft)	
Stormceptor Outlet Invert Elev (ft)	
Stormceptor Rim Elev (ft)	
Normal Water Level Elevation (ft)	
Pipe Diameter (in)	
Pipe Material	
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

NJDEP		
Particle Diameter (microns)	Distribution %	Specific Gravity
2.0	5.0	2.65
5.0	5.0	2.65
8.0	10.0	2.65
20.0	15.0	2.65
50.0	10.0	2.65
75.0	5.0	2.65
100.0	10.0	2.65
150.0	15.0	2.65
250.0	15.0	2.65
500.0	5.0	2.65
1000.0	5.0	2.65

Site Name	LI

Site Details

Drainage Area

Total Area (acres)	0.77
Imperviousness %	100.0

Surface Characteristics

Width (ft)	366.00
Slope %	2
Impervious Depression Storage (in)	0.02
Pervious Depression Storage (in)	0.2
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (in/hr)	2.44
Min. Infiltration Rate (in/hr)	0.4
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (in/day)	0.1

Dry Weather Flow

Dry Weather Flow (cfs)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	

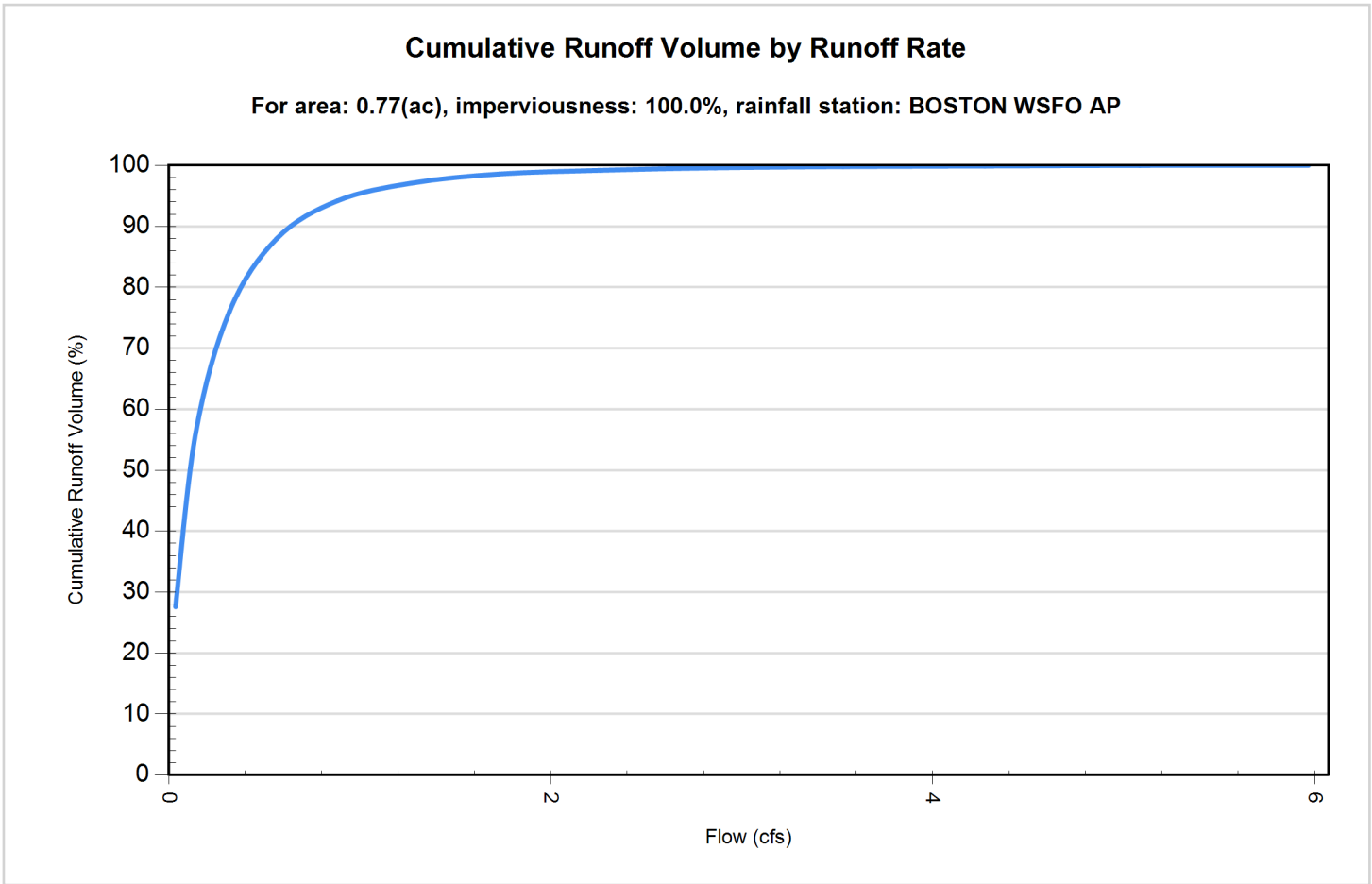
Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

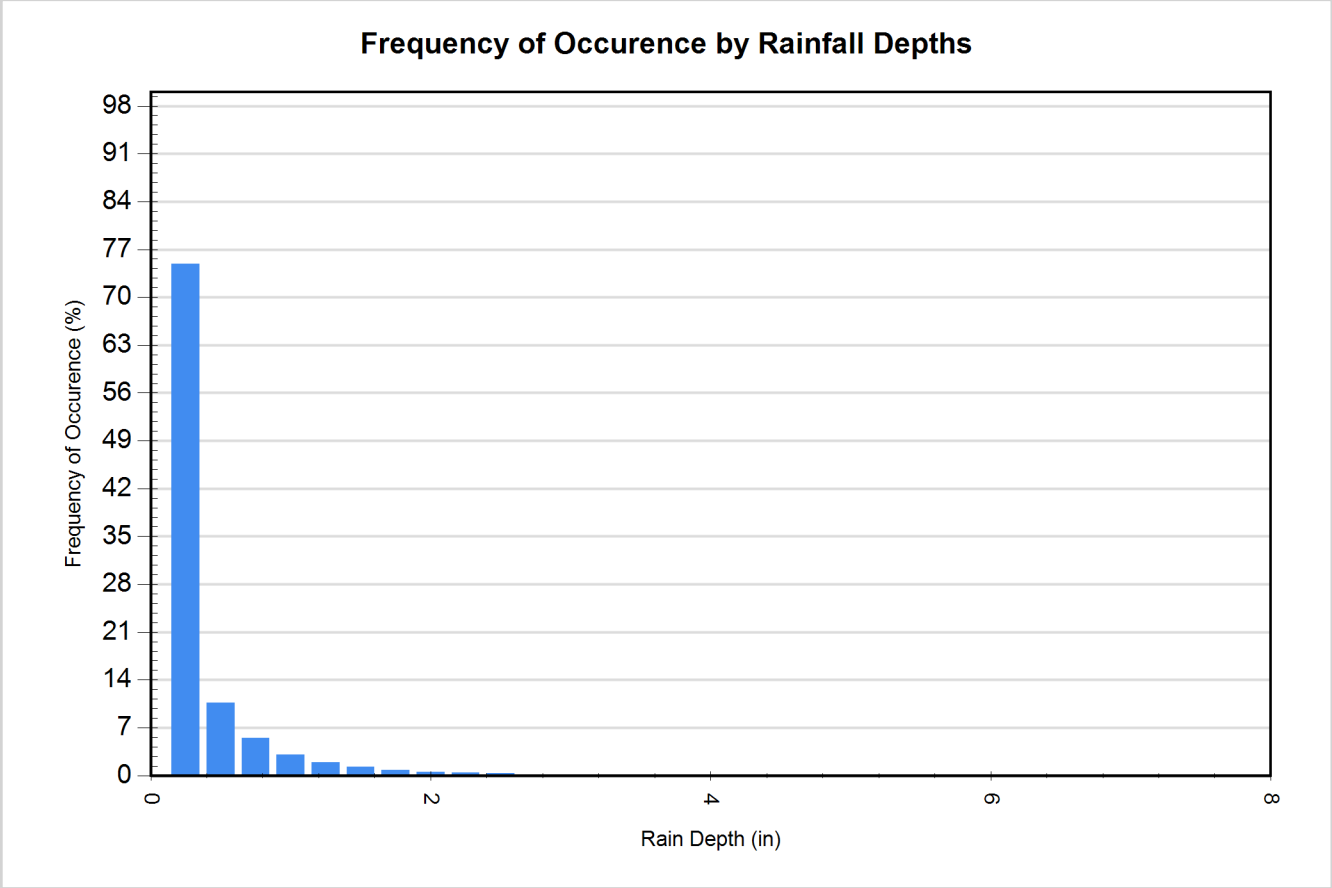
TSS Availability Parameters

Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (cfs)	Runoff Volume (ft³)	Volume Over (ft³)	Cumulative Runoff Volume (%)
0.035	1768598	4648228	27.6
0.141	3603439	2812336	56.2
0.318	4880622	1535365	76.1
0.565	5645755	769247	88.0
0.883	6042516	372692	94.2
1.271	6231078	183960	97.1
1.730	6322069	93004	98.6
2.260	6366472	48593	99.2
2.860	6392458	22605	99.6
3.531	6404397	10662	99.8
4.273	6410484	4571	99.9
5.085	6413982	1070	100.0
5.968	6414778	275	100.0



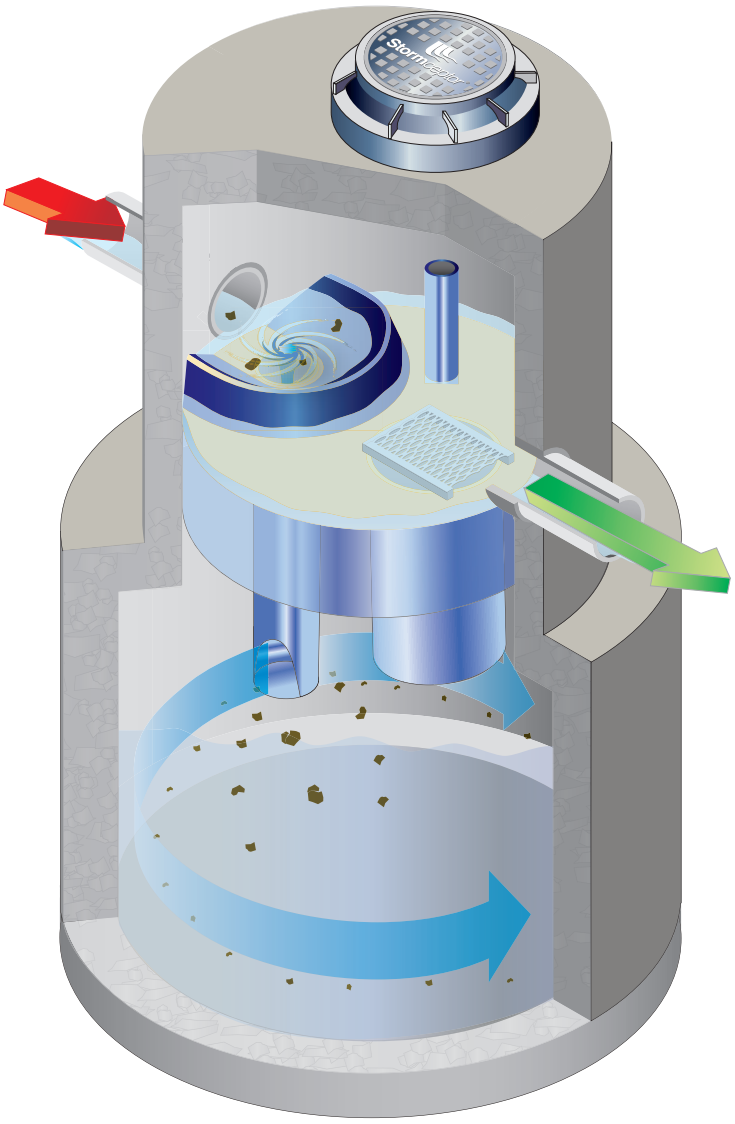
Rainfall Event Analysis				
Rainfall Depth (in)	**No. of Events**	**Percentage of Total Events (%)**	**Total Volume (in)**	**Percentage of Annual Volume (%)**
0.25	7519	74.9	454	18.5
0.50	1075	10.7	395	16.1
0.75	548	5.5	340	13.9
1.00	315	3.1	274	11.2
1.25	192	1.9	216	8.8
1.50	127	1.3	176	7.2
1.75	84	0.8	136	5.5
2.00	52	0.5	97	3.9
2.25	38	0.4	81	3.3
2.50	28	0.3	67	2.7
2.75	14	0.1	37	1.5
3.00	15	0.1	43	1.7
3.25	4	0.0	12	0.5
3.50	5	0.0	17	0.7
3.75	4	0.0	15	0.6
4.00	2	0.0	8	0.3
4.25	5	0.0	21	0.8
4.50	1	0.0	4	0.2
4.75	1	0.0	5	0.2
5.00	4	0.0	20	0.8
5.25	1	0.0	5	0.2
5.50	0	0.0	0	0.0
5.75	3	0.0	17	0.7
6.00	0	0.0	0	0.0
6.25	2	0.0	12	0.5
6.50	0	0.0	0	0.0
6.75	0	0.0	0	0.0
7.00	0	0.0	0	0.0
7.25	1	0.0	7	0.3
7.50	0	0.0	0	0.0
7.75	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

Stormceptor®

Owner's Manual



Stormceptor is protected by one or more of the following patents:

Canadian Patent No. 2,137,942
Canadian Patent No. 2,175,277
Canadian Patent No. 2,180,305
Canadian Patent No. 2,180,338
Canadian Patent No. 2,206,338
Canadian Patent No. 2,327,768
U.S. Patent No. 5,753,115
U.S. Patent No. 5,849,181
U.S. Patent No. 6,068,765
U.S. Patent No. 6,371,690
U.S. Patent No. 7,582,216
U.S. Patent No. 7,666,303
Australia Patent No. 693.164
Australia Patent No. 707,133
Australia Patent No. 729,096
Australia Patent No. 779,401
Australia Patent No. 2008,279,378
Australia Patent No. 2008,288,900
Indonesia Patent No. 0007058
Japan Patent No. 3581233
Japan Patent No. 9-11476
Korean Patent No. 0519212
Malaysia Patent No. 118987
New Zealand Patent No. 314,646
New Zealand Patent No. 583,008
New Zealand Patent No. 583,583
South African Patent No. 2010/00682
South African Patent No. 2010/01796
Other Patents Pending

Table of Contents

Congratulations!

Your selection of a Stormceptor® means that you have chosen the most recognized and efficient stormwater oil/sediment separator available for protecting the environment. Stormceptor is a pollution control device often referred to as a “Hydrodynamic Separator (HDS)” or an “Oil Grit Separator (OGS)”, engineered to remove and retain pollutants from stormwater runoff to protect our lakes, rivers and streams from the harmful effects of non-point source pollution.

1 – Stormceptor Overview

Stormceptor is a patented stormwater quality structure most often utilized as a treatment component of the underground storm drain network for stormwater pollution prevention. Stormceptor is designed to remove sediment, total suspended solids (TSS), other pollutants attached to sediment, hydrocarbons and free oil from stormwater runoff. Collectively the Stormceptor provides spill protection and prevents non-point source pollution from entering downstream waterways.

Key benefits of Stormceptor include:

- Removes sediment, suspended solids, debris, nutrients, heavy metals, and hydrocarbons (oil and grease) from runoff and snowmelt.
- Will not scour or re-suspend trapped pollutants.
- Provides sediment and oil storage.
- Provides spill control for accidents, commercial and industrial developments.
- Easy to inspect and maintain (vacuum truck).
- “STORMCEPTOR” is *clearly* marked on the access cover (excluding inlet designs).
- Relatively small footprint.
- 3rd Party tested and independently verified.
- Dedicated team of experts available to provide support.

Model Types:

- STC (Standard)
- STF (Fiberglass)
- EOS (Extended Oil Storage)
- OSR (Oil and Sand Removal)
- MAX (Custom designed unit, specific to site)

Configuration Types:

- Inlet unit (accommodates inlet flow entry, and multi-pipe entry)
- In-Line (accommodates multi-pipe entry)
- Submerged Unit (accommodates the site’s tailwater conditions)
- Series Unit (combines treatment in two systems)

Please Maintain Your Stormceptor

To ensure long-term environmental protection through continued performance as originally designed for your site, **Stormceptor must be maintained**, as any stormwater treatment practice does. The need for maintenance is determined through inspection of the Stormceptor. Procedures for inspection are provided within this document. Maintenance of the Stormceptor is performed from the surface via vacuum truck.

If you require information about Stormceptor, or assistance in finding resources to facilitate inspections or maintenance of your Stormceptor please call your local Stormceptor Licensee or Imbrium® Systems.

2 – Stormceptor Operation & Components

Stormceptor is a flexibly designed underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention using patented flow separation technology.

Stormceptor creates a non-turbulent treatment environment below the insert platform within the system. The insert diverts water into the lower chamber, allowing free oils and debris to rise, and sediment to settle under relatively low velocity conditions. These pollutants are trapped and stored below the insert and protected from large runoff events for later removal during the maintenance procedure.

With thousands of units operating worldwide, Stormceptor delivers reliable protection every day, in every storm. The patented Stormceptor design prohibits the scour and release of captured pollutants, ensuring superior water quality treatment and protection during even the most extreme storm events. Stormceptor's proven performance is backed by the longest record of lab and field verification in the industry.

Stormceptor Schematic and Component Functions

Below are schematics of two common Stormceptor configurations with key components identified and their functions briefly described.

Figure 1.

Inline Stormceptor

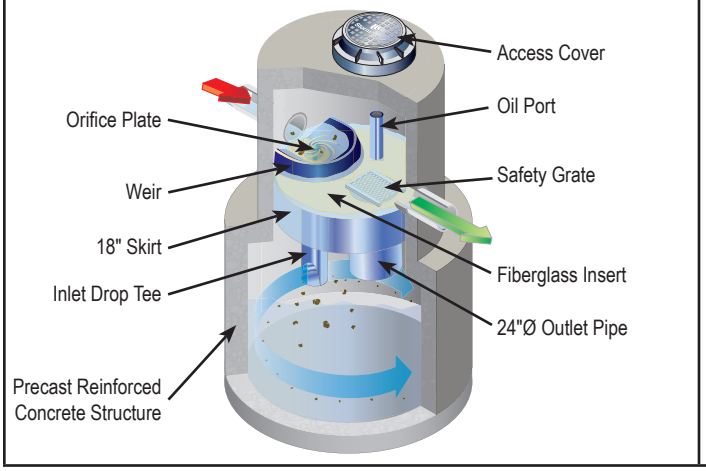
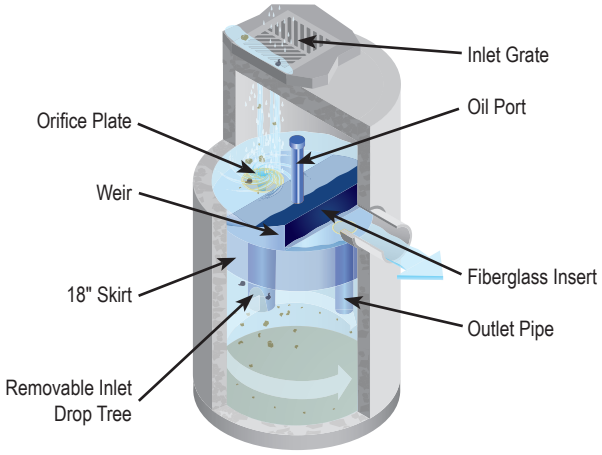


Figure 2.

Inlet Stormceptor



- **Manhole access cover** – provides access to the subsurface components
- **Precast reinforced concrete structure** – provides the vessel's watertight structural support
- **Fiberglass insert** – separates vessel into upper and lower chambers
- **Weir** – directs incoming stormwater and oil spills into the lower chamber
- **Orifice plate** – prevents scour of accumulated pollutants
- **Inlet drop tee** – conveys stormwater into the lower chamber
- **Fiberglass skirt** – provides double-wall containment of hydrocarbons
- **Outlet riser pipe** – conveys treated water to the upper chamber; primary vacuum line access port for sediment removal
- **Oil inspection port** – primary access for measuring oil depth and oil removal
- **Safety grate** – safety measure to cover riser pipe in the event of manned entry into vessel

3 – Stormceptor Identification

Stormceptor is available in both precast concrete and fiberglass vessels, with precast concrete often being the dominant material of construction.

In the Stormceptor, a patented, engineered fiberglass insert separates the structure into an upper chamber and lower chamber. The lower chamber will remain full of water, as this is where the pollutants are sequestered for later removal. Multiple Stormceptor model (STC, OSR, EOS, MAX and STF) configurations exist, each to be inspected and maintained in a similar fashion.

Each unit is easily identifiable as a Stormceptor by the trade name "Stormceptor" embossed on each access cover at the surface. To determine the location of "inlet" Stormceptor units with horizontal catch basin inlet, look down into the grate as the Stormceptor insert will be visible. The name "Stormceptor" is not embossed on inlet models due to the variability of inlet grates used/ approved across North America.

Once the location of the Stormceptor is determined, the model number may be identified by comparing the measured depth from the fiberglass insert level at the outlet pipe's invert (water level) to the bottom of the tank using **Table 1**.

In addition, starting in 1996 a metal serial number tag containing the model number has been affixed to the inside of the unit, on the fiberglass insert. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the unit using depth measurements, please contact your local Stormceptor Representative for assistance.

Sizes/Models

Typical general dimensions and capacities of the standard precast STC, EOS & OSR Stormceptor models in both USA and Canada/International (excluding South East Asia and Australia) are provided in **Tables 1 and 2**. Typical rim to invert measurements are provided later in this document. The total depth for cleaning will be the sum of the depth from outlet pipe invert (generally the water level) to rim (grade) and the depth from outlet pipe invert to the precast bottom of the unit. Note that depths and capacities may vary slightly between regions.

Table 1A. (US) Stormceptor Dimensions – Insert to Base of Structure

STC Model	Insert to Base (in.)
450	60
900	55
1200	71
1800	105
2400	94
3600	134
4800	128
6000	150
7200	134
11000*	128
13000*	150
16000*	134

EOS Model	Insert to Base (in.)
4-175	60
9-365	55
12-590	71
18-1000	105
24-1400	94
36-1700	134
48-2000	128
60-2500	150
72-3400	134
110-5000*	128
130-6000*	150
160-7800*	134

OSR Model	Insert to Base (in.)
65	60
140	55
250	94
390	128
560	134
780*	128
1125*	134

Typical STF m (in.)
1.5 (60)
1.5 (61)
1.8 (73)
2.9 (115)
2.3 (89)
3.2 (127)
2.9 (113)
3.5 (138)
3.3 (128)

Notes:

1. *Depth Below Pipe Inlet Invert to the Bottom of Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance.*

**Consist of two chamber structures in series.*

Table 1B. (CA & Int'l) Stormceptor Dimensions – Insert to Base of Structure

STC Model	Insert to Base (m)
300	1.5
750	1.5
1000	1.8
1500	2.8
2000	2.8
3000	3.7
4000	3.4
5000	4.0
6000	3.7
9000*	3.4
11000*	4.0
14000*	3.7

EOS Model	Insert to Base (m)
300	1.5
750	1.5
1000	1.8
2000	2.8
3000	3.7
4000	3.4
5000	4.0
6000	3.7
9000*	3.4
10000*	4.0
14000*	3.7

OSR Model	Insert to Base (m)
300	1.7
750	1.6
2000	2.6
4000	3.6
6000	3.7
9000*	3.6
14000*	3.7

Typical STF m (in.)
1.5 (60)
1.5 (61)
1.8 (73)
2.9 (115)
2.3 (89)
3.2 (127)
2.9 (113)
3.5 (138)
3.3 (128)

Notes:

1. *Depth Below Pipe Inlet Invert to the Bottom of Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance.*

**Consist of two chamber structures in series.*

Table 2A. (US) Storage Capacities

STC Model	Hydrocarbon Storage Capacity gal	Sediment Capacity ft^3	**EOS Model**	Hydrocarbon Storage Capacity gal	**OSR Model**	Hydrocarbon Storage Capacity gal	Sediment Capacity ft^3
450	86	46	**4-175**	175	**065**	115	46
900	251	89	**9-365**	365	**140**	233	58
1200	251	127	**12-590**	591			
1800	251	207	**18-1000**	1198			
2400	840	205	**24-1400**	1457	**250**	792	156
3600	840	373	**36-1700**	1773			
4800	909	543	**48-2000**	2005	**390**	1233	465
6000	909	687	**60-2500**	2514			
7200	1059	839	**72-3400**	3418	**560**	1384	690
11000*	2797	1089	**110-5000***	5023	**780***	2430	930
13000*	2797	1374	**130-6000***	6041			
16000*	3055	1677	**160-7800***	7850	**1125***	2689	1378

Notes:

1. *Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.*

**Consist of two chamber structures in series.*

Table 2B. (CA & Int'l) Storage Capacities

STC Model	Hydrocarbon Storage Capacity L	Sediment Capacity L	EOS Model	Hydrocarbon Storage Capacity L	OSR Model	Hydrocarbon Storage Capacity L	Sediment Capacity L
300	300	1450	**300**	662	**300**	300	1500
750	915	3000	**750**	1380	**750**	900	3000
1000	915	3800	**1000**	2235			
1500	915	6205					
2000	2890	7700	**2000**	5515	**2000**	2790	7700
3000	2890	11965	**3000**	6710			
4000	3360	16490	**4000**	7585	**4000**	4700	22200
5000	3360	20940	**5000**	9515			
6000	3930	26945	**6000**	12940	**6000**	5200	26900
9000*	10555	32980	**9000***	19010	**9000***	9300	33000
11000*	10555	37415	**10000***	22865			
14000*	11700	53890	**14000***	29715	**14000***	10500	53900

Notes:

1. *Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.*

**Consist of two chamber structures in series.*

4 – Stormceptor Inspection & Maintenance

Regular inspection and maintenance is a proven, cost-effective way to maximize water resource protection for all stormwater pollution control practices, and is required to insure proper functioning of the Stormceptor. Both inspection and maintenance of the Stormceptor is easily performed from the surface. Stormceptor's patented technology has no moving parts, simplifying the inspection and maintenance process.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

When is maintenance cleaning needed?

- For optimum performance, the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, which is approximately 15% of the unit's total storage capacity (see **Table 2**). The frequency should be adjusted based on historical inspection results due to variable site pollutant loading.

- Sediment removal is easier when removed on a regular basis at or prior to the recommended maintenance sediment depths, as sediment build-up can compact making removal more difficult.
- The unit should be cleaned out immediately after an oil, fuel or chemical spill.

What conditions can compromise Stormceptor performance?

- If construction sediment and debris is not removed prior to activating the Stormceptor unit, maintenance frequency may be reduced.
- If the system is not maintained regularly and fills with sediment and debris beyond the capacity as indicated in **Table 2**, pollutant removal efficiency may be reduced.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured.
- If debris clogs the inlet of the system, removal efficiency of sediment and hydrocarbons may be reduced.
- If a downstream blockage occurs, a backwater condition may occur for the Stormceptor and removal efficiency of sediment and hydrocarbons may be reduced.

What training is required?

The Stormceptor is to be inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. For typical inspection and maintenance activities, no specific supplemental training is required for the Stormceptor. Information provided within this Manual (provided to the site owner) contains sufficient guidance to maintain the system properly.

In unusual circumstances, such as if a damaged component needs replacement or some other condition requires manned entry into the vessel, confined space entry procedures must be followed. Only professional maintenance service providers trained in these procedures should enter the vessel. Service provider companies typically have personnel who are trained and certified in confined space entry procedures according to local, state, and federal standards.

What equipment is typically required for inspection?

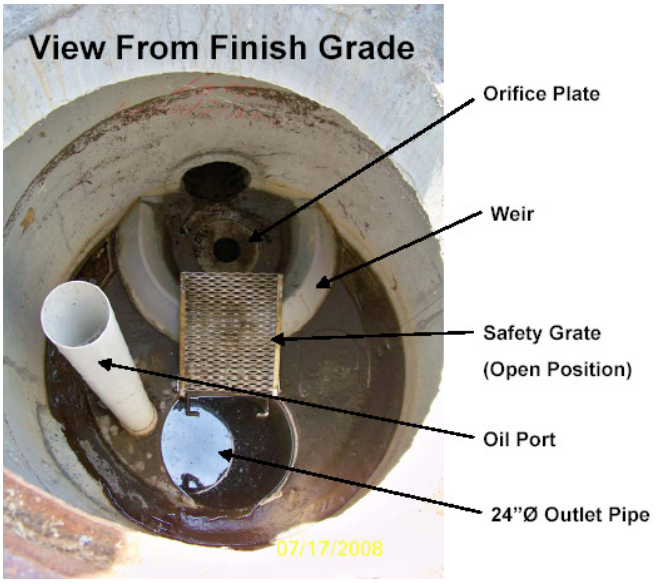
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

Recommended Stormceptor Inspection Procedure:

- Stormceptor is to be inspected from grade through a standard surface manhole access cover.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick.
- Oil depth is measured through the oil inspection port, either a 4-inch (100 mm) or 6-inch (150 mm) diameter port.
- Sediment depth can be measured through the oil inspection port or the 24-inch (610 mm) diameter outlet riser pipe.
- Inspections also involve a visual inspection of the internal components of the system.

Figure 3.

Figure 4.



What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, and safety harness for specially trained personnel if confined space entry is required

Recommended Stormceptor Maintenance Procedure

Maintenance of Stormceptor is performed using a vacuum truck.

No entry into the unit is required for maintenance. ***DO NOT ENTER THE STORMCEPTOR CHAMBER*** unless you have the proper personal safety equipment, have been trained and are qualified to enter a confined space, as identified by local Occupational Safety and Health Regulations (e.g. 29 CFR 1910.146 or Canada Occupational Safety and Health Regulations – SOR/86-304). Without the proper equipment, training and permit, entry into confined spaces can result in serious bodily harm and potentially death. Consult local, provincial, and/or state regulations to determine the requirements for confined space entry. Be aware, and take precaution that the Stormceptor fiberglass insert may be slippery. In addition, be aware that some units do not have a safety grate to cover the outlet riser pipe that leads to the submerged, lower chamber.

- Ideally maintenance should be conducted during dry weather conditions when no flow is entering the unit.
- Stormceptor is to be maintained through a standard surface manhole access cover.
- Insert the oil dipstick into the oil inspection port. If oil is present, pump off the oil layer into separate containment using a small pump and tubing.
- Maintenance cleaning of accumulated sediment is performed with a vacuum truck.
    - For 6-ft (1800 mm) diameter models and larger, the vacuum hose is inserted into the lower chamber via the 24-inch (610 mm) outlet riser pipe.
    - For 4-ft (1200 mm) diameter model, the removable drop tee is lifted out, and the vacuum hose is inserted into the lower chamber via the 12-inch (305 mm) drop tee hole.

Figure 5.

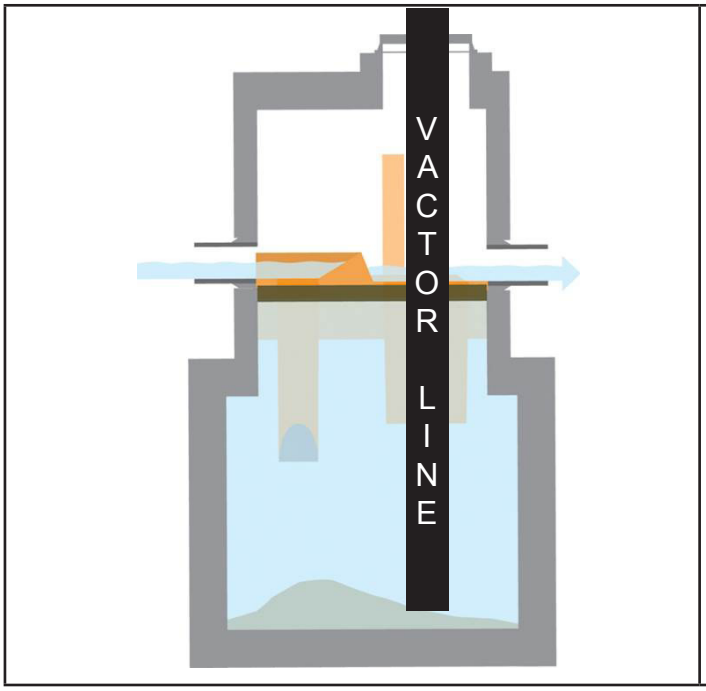
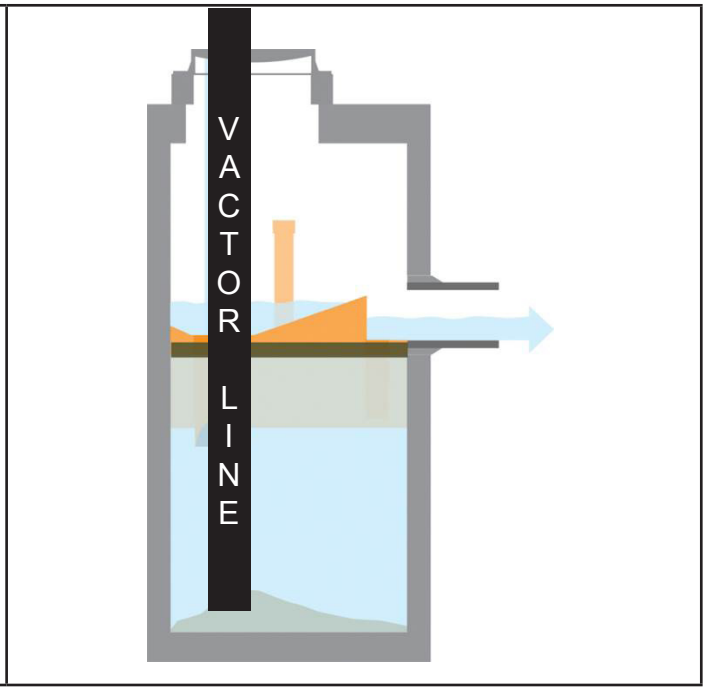


Figure 6.



- Using the vacuum hose, decant the water from the lower chamber into a separate containment tank or to the sanitary sewer, if permitted by the local regulating authority.
- Remove the sediment sludge from the bottom of the unit using the vacuum hose. For large Stormceptor units, a flexible hose is often connected to the primary vacuum line for ease of movement in the lower chamber.
- Units that have not been maintained regularly, have surpassed the maximum recommended sediment capacity, or contain damaged components may require manned entry by trained personnel using safe and proper confined space entry procedures.

Figure 7.

Figure 8.

A maintenance worker stationed at the above ground surface uses a vacuum hose to evacuate water, sediment, and debris from the system.

What is required for proper disposal?

The requirements for the disposal of material removed from Stormceptor units are similar to that of any other stormwater treatment Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. This could be site and pollutant dependent. In some cases, approval from the disposal facility operator/agency may be required.

What about oil spills?

Stormceptor is often implemented in areas where there is high potential for oil, fuel or other hydrocarbon or chemical spills. Stormceptor units should be cleaned immediately after a spill occurs by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required in the event of a spill.

What if I see an oil rainbow or sheen at the Stormceptor outlet?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a hydrocarbon rainbow or sheen can be seen at

very small oil concentrations (< 10 ppm). Stormceptor is effective at removing 95% of free oil, and the appearance of a sheen at the outlet with high influent oil concentrations does not mean that the unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

What factors affect the costs involved with inspection/maintenance?
The Vacuum Service Industry for stormwater drainage and sewer systems is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean Stormceptor units will vary. Inspection and maintenance costs are most often based on unit size, the number of units on a site, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations.

What factors predict maintenance frequency?
Maintenance frequency will vary with the amount of pollution on your site (number of hydrocarbon spills, amount of sediment, site activity and use, etc.). It is recommended that the frequency of maintenance be increased or reduced based on local conditions. If the sediment load is high from an unstable site or sediment loads transported from upstream catchments, maintenance may be required semi-annually. Conversely once a site has stabilized, maintenance may be required less frequently (for example: two to seven year, site and situation dependent). Maintenance should be performed immediately after an oil spill or once the sediment depth in Stormceptor reaches the value specified in **Table 3** based on the unit size.

Table 3A. (US) Recommended Sediment Depths Indicating Maintenance

STC Model	Maintenance Sediment depth (in)	EOS Model	Maintenance Sediment depth (in)	Oil Storage Depth (in)	OSR Model	Maintenance Sediment depth (in)
450	8	**4-175**	9	24	**065**	8
900	8	**9-365**	9	24	**140**	8
1200	10	**12-590**	11	39		
1800	15					
2400	12	**24-1400**	14	68	**250**	12
3600	17	**36-1700**	19	79		
4800	15	**48-2000**	16	68	**390**	17
6000	18	**60-2500**	20	79		
7200	15	**72-3400**	17	79	**560**	17
11000*	17	**110-5000***	16	68	**780***	17
13000*	20	**130-6000***	20	79		
16000*	17	**160-7800***	17	79	**1125***	17

Note:

1. *The values above are for typical standard units.*

**Per structure.*

Table 3B. (CA & Int'l) Recommended Sediment Depths Indicating Maintenance

STC Model	Maintenance Sediment depth (mm)	EOS Model	Maintenance Sediment depth (mm)	Oil Storage Depth (mm)	OSR Model	Maintenance Sediment depth (mm)
300	225	**300**	225	610	**300**	200
750	230	**750**	230	610	**750**	200
1000	275	**1000**	275	990		
1500	400					
2000	350	**2000**	350	1727	**2000**	300
3000	475	**3000**	475	2006		
4000	400	**4000**	400	1727	**4000**	375
5000	500	**5000**	500	2006		
6000	425	**6000**	425	2006	**6000**	375
9000*	400	**9000***	400	1727	**9000***	425
11000*	500	**10000***	500	2006		
14000*	425	**14000***	425	2006	**14000***	425

Note:

1. *The values above are for typical standard units.*

   **Per structure.*

Replacement parts

Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. Therefore, inspection and maintenance activities are generally focused on pollutant removal. However, if replacements parts are necessary, they may be purchased by contacting your local Stormceptor Representative, or Imbrium Systems.

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to Stormceptor's long and effective service life.

Stormceptor Inspection and Maintenance Log

Stormceptor Model No: _____

Allowable Sediment Depth: _____

Serial Number: _____

Installation Date: _____

Location Description of Unit: _____

Other Comments: _____

Contact Information

Questions regarding the Stormceptor can be addressed by contacting your area Stormceptor Licensee, Imbrium Systems, or visit our website at www.stormceptor.com.

Stormceptor Licensees:

CANADA

Lafarge Canada Inc.
www.lafargepipe.com

403-292-9502 / 1-888-422-4022	Calgary, AB
780-468-5910	Edmonton, AB
204-958-6348	Winnipeg, MB, NW. ON, SK

Langley Concrete Group
www.langleyconcretegroup.com

604-502-5236	BC

Hanson Pipe & Precast Inc.
www.hansonpipeandprecast.com

519-622-7574 / 1-888-888-3222	ON

Lécuyer et Fils Ltée.
www.lecuyerbeton.com

450-454-3928 / 1-800-561-0970	QC

Strescon Limited
www.strescon.com

902-494-7400	NS, NF
506-633-8877	NB, PE

UNITED STATES

Rinker Materials
www.rinkerstormceptor.com
1-800-909-7763

AUSTRALIA & SOUTHEAST ASIA, including New Zealand & Japan

Humes Water Solutions
www.humes.com.au
+61 7 3364 2894

Imbrium Systems Inc. & Imbrium Systems LLC

Canada	1-416-960-9900 / 1-800-565-4801
United States	1-301-279-8827 / 1-888-279-8826
International	+1-416-960-9900 / +1-301-279-8827
Email	info@imbriumsystems.com

www.imbriumsystems.com
www.stormceptor.com

Preliminary Stormwater System Operation and Maintenance Log Form

Long Island Bridge
Boston, MA
Boston PWD
April 2018

Best Management Practice	Inspection Frequency	Date	Inspector	Cleaning/Repair	
				Item Needed	Date Completed
Bridge Scuppers	Every six months				
Proprietary Water Quality Structures	Every six months				
Subsurface Infiltration System	Every six months				

Wannalancit Mills
650 Suffolk St., Suite 200
Lowell, MA 01854

978.970.5600 PHONE
978.453.1995 FAX

www.trcsolutions.com

May 4, 2018

Ms. Amelia Croteau, Conservation Agent
City of Boston
1 City Square, Room 709
Boston, MA 02201

RE: City of Boston Notice of Intent Filing
Long Island Bridge Project

Dear Ms. Croteau:

As requested, I'm writing on behalf of the Boston Public Works Department (BPWD) to state our position that the Long Island Bridge Superstructure Replacement Project (the "Project") as designed meets the relevant coastal resource area performance standards articulated in the Wetlands Protection Act (WPA) as follows:

Land Under Ocean
As per section 310 CMR 10.25(5), the performance standard for Land Under the Ocean is that: *"a project not included in 310 CMR 10.25(3) or 10.25(4) which affect nearshore areas of land under the ocean shall not cause adverse effects by altering the bottom topography so as to increase storm damage or erosion of coastal beaches, coastal banks, coastal dunes, or salt marshes*."

The design and construction approach planned for the Project will use the existing bridge piers. For this reason, there will be no "adverse effects resulting from alterations of bottom topography" caused by the project and therefore the project meets this performance standard.

Coastal Beach and Land Containing Shellfish
As per section 310 CMR 10.27(3), the performance standard for Coastal Beach is that "a*ny project on a coastal beach,…, shall not have an adverse effect by increasing erosion, decreasing the volume or changing the form of any such coastal beach or an adjacent or downdrift coastal beach*", while the performance standard for Land Containing Shellfish, as per section 310 CMR 10.34(4), is that *any project on land containing shellfish shall not adversely affect such land or marine fisheries by a change in the productivity of such land.*

Placement of six proposed temporary pipe piles to facilitate construction of the bridge over the Long Island Beach area will temporarily alter 120 square feet of land that is jurisdictional as both Coastal Beach and Land Containing Shellfish. These pipe piles will support temporary staging structures with minimal temporary impact to this area. The piles will be removed by the selected contractor at the end of construction.

Placement of the six pipe piles will not result in "an adverse effect by increasing erosion or decreasing the volume or changing the form of the coastal beach or an adjacent or downdrift coastal beach" and "shall not adversely affect" land containing shellfish "or marine fisheries by change in the productivity of such land" The project therefore meets these performance standards.

Coastal Bank
As per section 310 CMR 10.30(4), *any project on a coastal bank or within 100 feet landward of the top of a coastal bank, …, shall not have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action.*

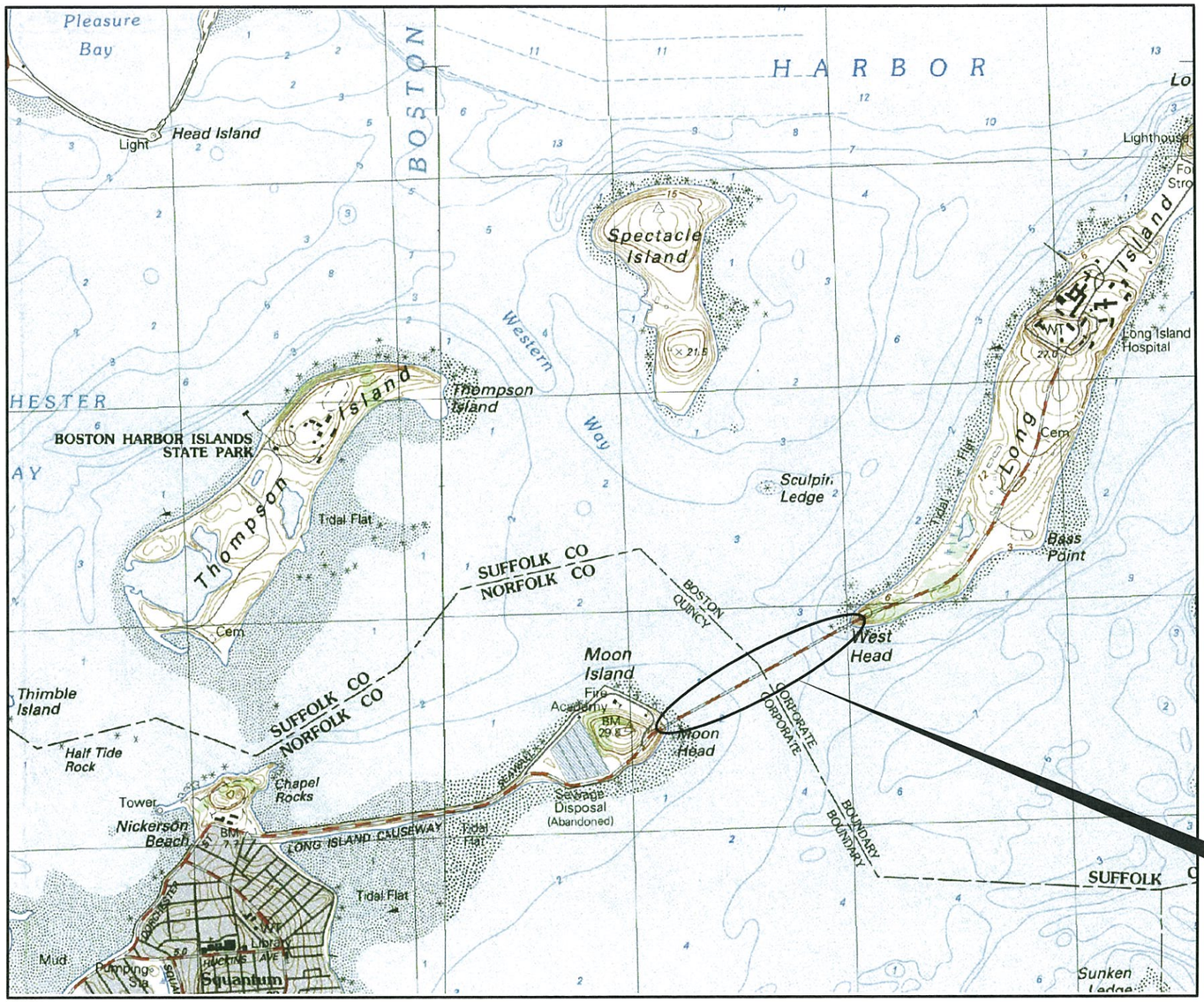
There will be approximately 30 linear feet of temporary impact to Coastal Bank for proposed work at Pier 15 during Project construction, and the Project has otherwise been designed to minimize work and construction impacts within Coastal Bank buffer. Construction of the Project will not "have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action" and thus the project meets this performance standard.

Land Subject to Coastal Storm Flowage
Though a performance standard is not currently defined in the WPA Regulations for Land Subject to Coastal Storm Flowage, the Project has been designed and will be constructed and operated in a way that minimizes activities within Land Subject to Coastal Storm Flowage.

Please contact me at (978) 656-3647 if you have any questions about the information presented in this letter or require additional materials to complete your review.

Sincerely,

Samuel Moffett
Project Manager



PROJECT LOCATION
BR. NO. B-16-368 (91M)

SCALE: 1" = 2000'±

COMMONWEALTH OF MASSACHUSETTS
NIKOLE A. BULGER
CIVIL
No. 48598
REGISTERED PROFESSIONAL ENGINEER

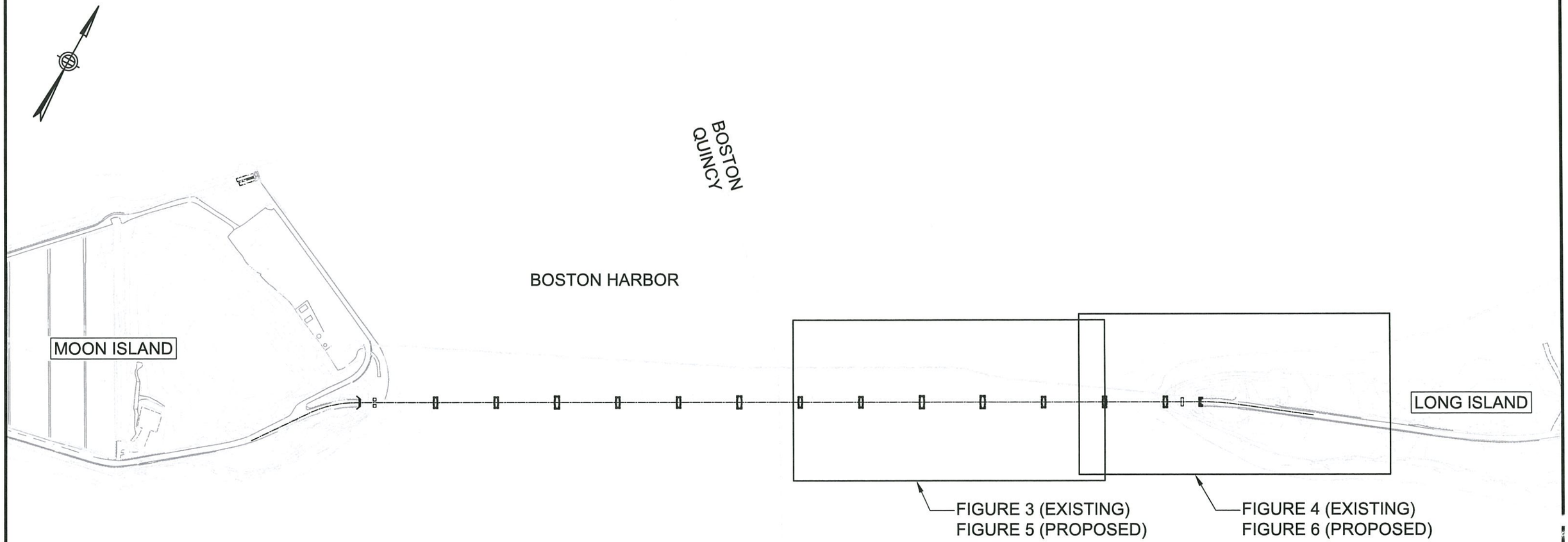
5/4/18

FOR PERMITTING ONLY

STV 100 Years
ONE FINANCIAL CENTER,
3RD FLOOR,
BOSTON, MA 02111–2621

CITY OF BOSTON PUBLIC WORKS DEPARTMENT
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 1: LOCUS MAP

DATE: APRIL 30, 2018



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BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 2: KEY PLAN

DATE: APRIL 30, 2018

MATCHLINE - SEE FIGURE 4

APPROX. ℄ OF CHANNEL

APPROXIMATE RECORD LOCATIONS OF ABANDONED SUBMARINE UTILITIES

EXISTING SUBMARINE UTILITIES

℄ PIER 7
STA. 104+88.77

℄ PIER 8
STA. 107+38.77

℄ PIER 9
STA. 109+88.77

℄ PIER 10
STA. 112+38.77

℄ PIER 11
STA. 114+88.77

TYPICAL EXISTING PIER TO REMAIN

MATCHLINE - SEE FIGURE 6

MATCHLINE - SEE FIGURE 4

SCALE: 1"=80'

80' 0 80'

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BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 3: EXISTING PLAN 1 OF 2

DATE: APRIL 30, 2018

MATCHLINE - SEE FIGURE 5

APPROXIMATE RECORD LOCATIONS OF ABANDONED SUBMARINE UTILITIES

EXISTING SUBMARINE UTILITIES

℄ PIER 12
STA. 117+38.77

TYPICAL EXISTING PIER TO REMAIN

LANDWARD LIMIT OF COASTAL BEACH

MEAN LOW WATER/SEAWARD LIMIT OF COASTAL BEACH (NAVD 88 ELEV. = -5.16')

℄ BEARING LONG ISLAND ABUTMENT
STA. 121+28.77

℄ PIER 13
STA. 119+88.77

℄ 1949 PIER 15
(TO BE ABANDONED)
STA. 120+58.77

LANDWARD LIMIT OF COASTAL BEACH

LANDWARD LIMIT OF LAND SUBJECT TO COASTAL STORM FLOWAGE (NAVD 88 ELEV. = 19.00')

MEAN HIGH WATER (NAVD 88 ELEV. = 4.33')

TOP OF COASTAL BANK (FIELD DELINEATED IN ACCORDANCE WITH DEP GUIDANCE 92-1)

LONG ISLAND

LONG ISLAND ROAD

TOP OF COASTAL BANK (FIELD DELINEATED IN ACCORDANCE WITH DEP GUIDANCE 92-1)

LANDWARD LIMIT OF LAND SUBJECT TO COASTAL STORM FLOWAGE (NAVD 88 ELEV. = 19.00')

MEAN HIGH WATER (NAVD 88 ELEV. = 4.33')

MATCHLINE - SEE FIGURE 5

SCALE: 1"=80'

80' 0 80'

COMMONWEALTH OF MASSACHUSETTS
NIKOLE A. BULGER
CIVIL
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REGISTERED PROFESSIONAL ENGINEER
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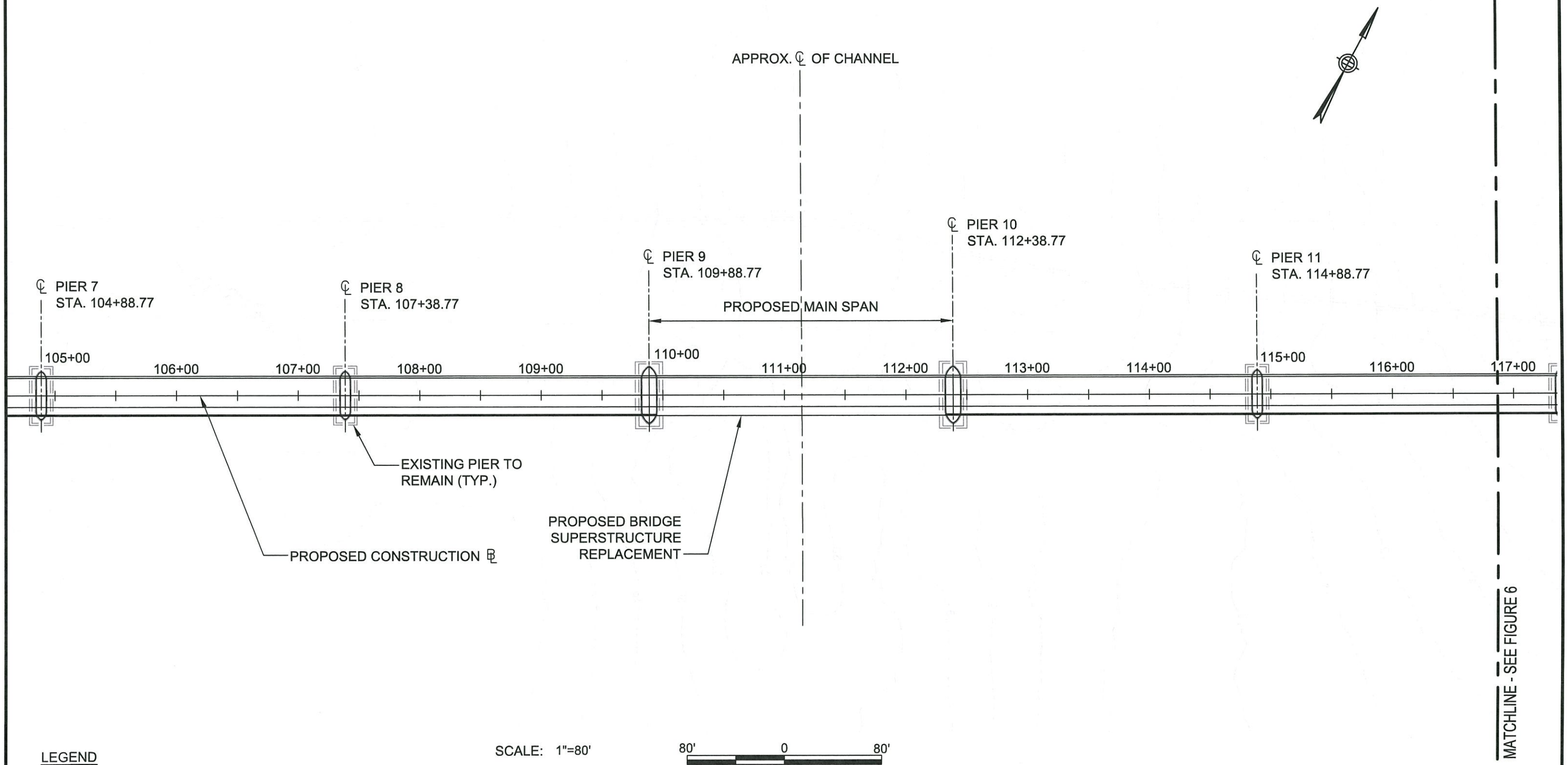
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 4: EXISTING PLAN 2 OF 2

DATE: APRIL 30, 2018



SCALE: 1"=80'

80' 0 80'

LEGEND

- TEMPORARY IMPACTS WITHIN LIMIT OF COASTAL STORM FLOWAGE (0 SF)
- PERMANENT IMPACTS WITHIN 100' BUFFER
- TEMPORARY IMPACTS WITHIN 100' BUFFER
- TEMPORARY IMPACTS WITHIN COASTAL BANK
- TEMPORARY IMPACTS WITHIN COASTAL BEACH
- TEMPORARY IMPACTS WITHIN LAND UNDER OCEAN

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BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 5: PROPOSED PLAN 1 OF 2

DATE: APRIL 30, 2018

MEAN LOW WATER/ SEAWARD LIMIT OF COASTAL BEACH (NAVD 88 ELEV. = -5.16')

LAND UNDER OCEAN

℄ PIER 12 STA. 117+38.77

℄ PIER 13 STA. 119+88.77

℄ BEARING LONG ISLAND ABUTMENT STA. 121+28.77

MEAN HIGH WATER (NAVD 88 ELEV. = 4.33')

LANDWARD LIMIT OF COASTAL BEACH

LANDWARD LIMIT OF LAND SUBJECT TO COASTAL STORM FLOWAGE (NAVD 88 ELEV. = 19.00')

PROPOSED STORMWATER OVERFLOW OUTLET

PROPOSED WATER QUALITY STRUCTURE

50.35

52.58

48.65

PROPOSED SUBSURFACE INFILTRATION SYSTEM

117+00 118+00 119+00 120+00 121+00 122+00 123+00 124+00 125+00 126+00

LONG ISLAND

47.58

44.55

PROPOSED LIMITS OF DISTURBANCE AND COMPOST FILTER TUBES

LONG ISLAND ROAD

38.69

TOP OF COASTAL BANK (FIELD DELINEATED IN ACCORDANCE WITH DEP GUIDANCE 92-1)

℄ 1949 PIER 15 (TO BE ABANDONED) STA. 120+58.77

LANDWARD LIMIT OF LAND SUBJECT TO COASTAL STORM FLOWAGE (NAVD 88 ELEV. = 19.00')

MEAN HIGH WATER (NAVD 88 ELEV. = 4.33')

TYPICAL PROPOSED TEMPORARY PIPE PILES (6 WITHIN LSCSF IMPACTS)

PROPOSED BRIDGE SUPERSTRUCTURE REPLACEMENT

LAND UNDER OCEAN

PROPOSED CONSTRUCTION ℄

TYPICAL EXISTING PIER TO REMAIN

MATCHLINE - SEE FIGURE 5

SCALE: 1"=80'

80' 0 80'

LEGEND

- TEMPORARY IMPACTS WITHIN LAND SUBJECT TO COASTAL STORM FLOWAGE (118 SF)
- PERMANENT IMPACTS WITHIN 100' BUFFER (537 SF)
- TEMPORARY IMPACTS WITHIN 100' BUFFER (8700 SF)
- TEMPORARY IMPACTS WITHIN COASTAL BANK (340 SF)
- TEMPORARY IMPACTS WITHIN COASTAL BEACH (120 SF)
- TEMPORARY IMPACTS WITHIN LAND UNDER OCEAN (40 SF)

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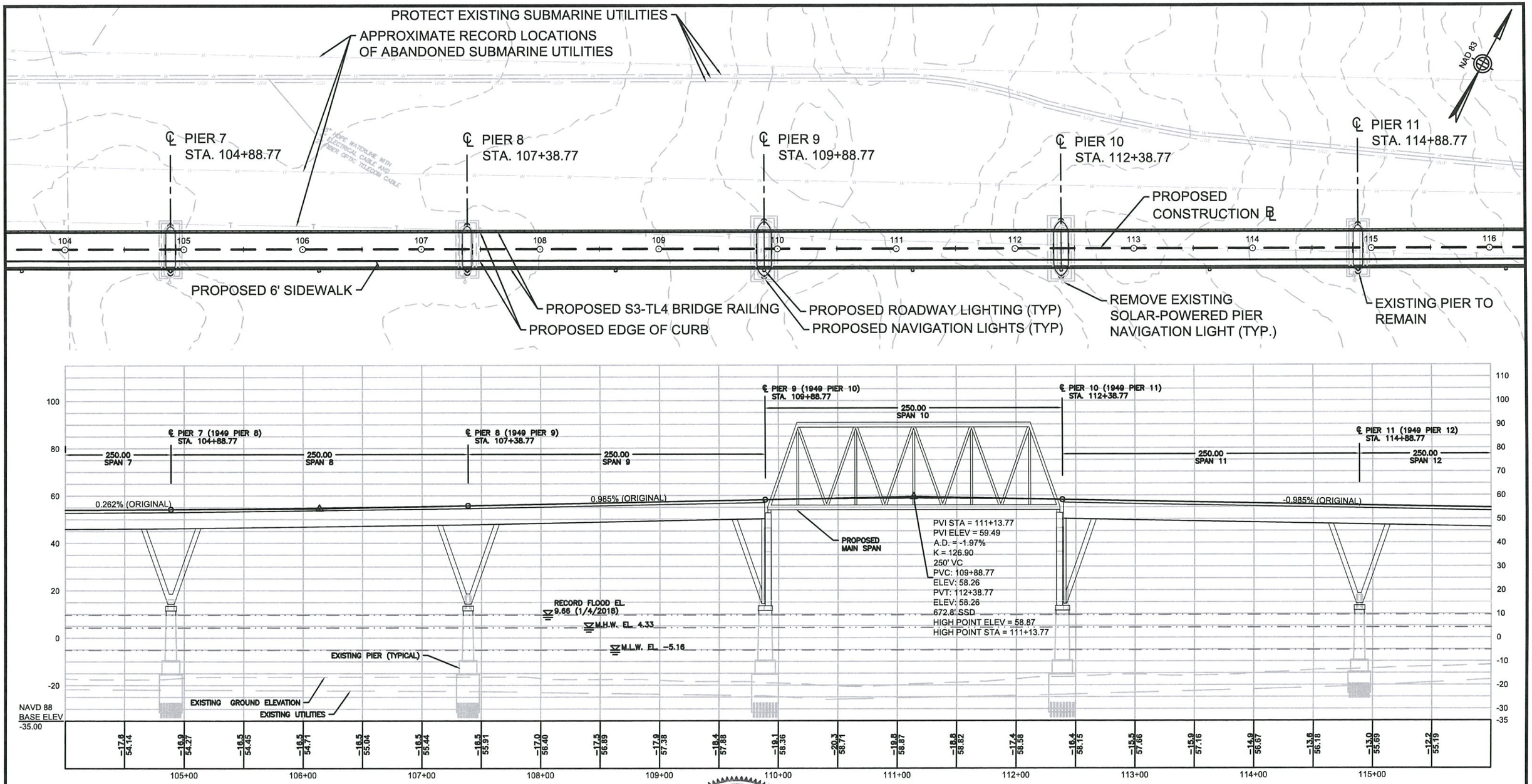
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 6: PROPOSED PLAN 2 OF 2

DATE: APRIL 30, 2018



HORIZONTAL SCALE IN FEET
80 0 80 160
40 0 40 80
VERTICAL SCALE IN FEET

COMMONWEALTH OF MASSACHUSETTS
NIKOLE A. BULGER
CIVIL
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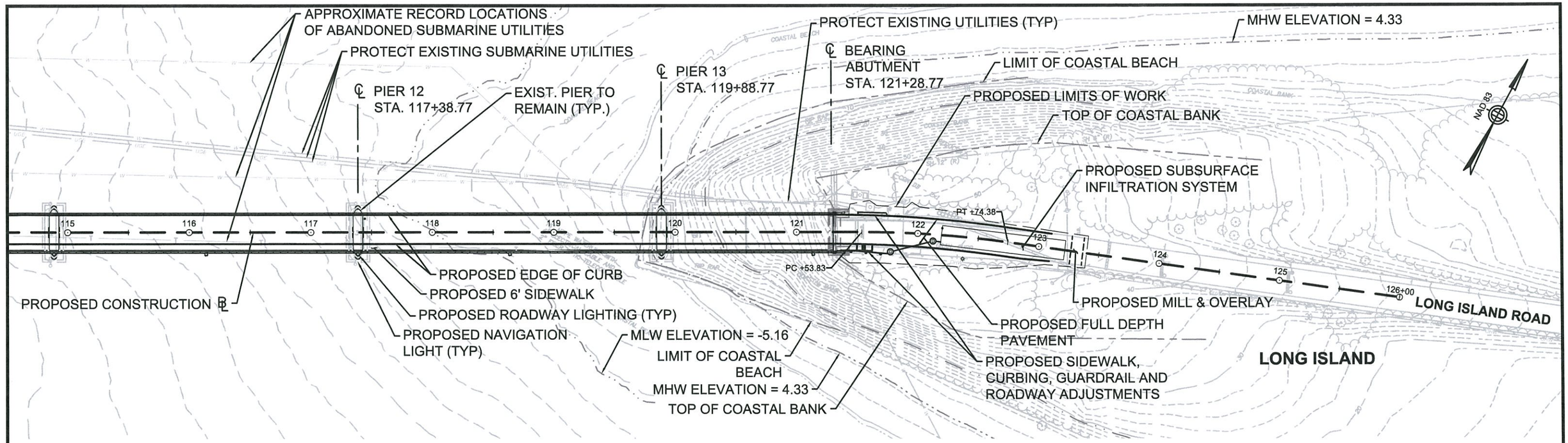
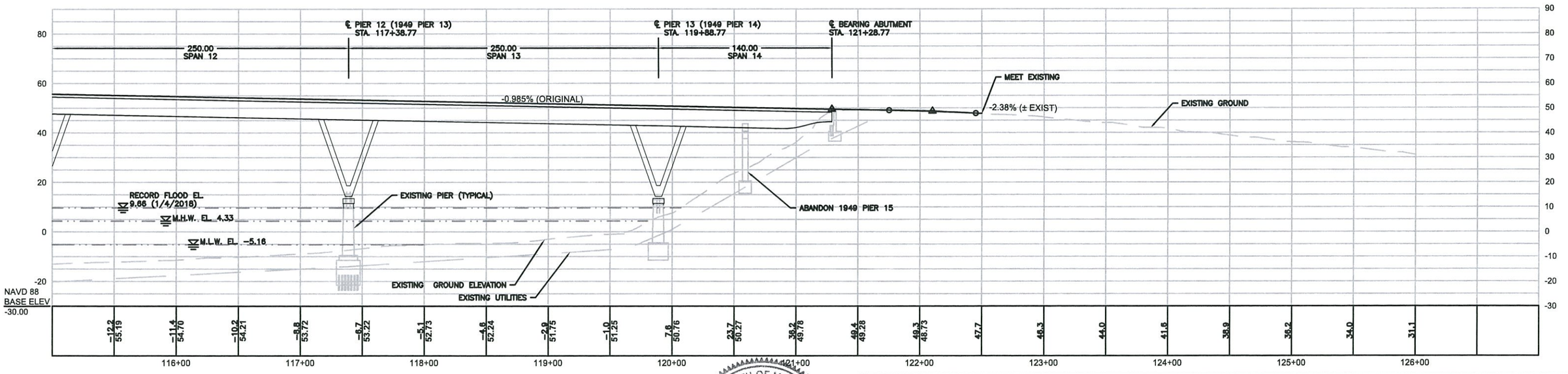
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 7: PLAN AND PROFILE 1 OF 2

DATE: APRIL 30, 2018





HORIZONTAL SCALE IN FEET
80 0 80 160
40 0 40 80
VERTICAL SCALE IN FEET

COMMONWEALTH OF MASSACHUSETTS
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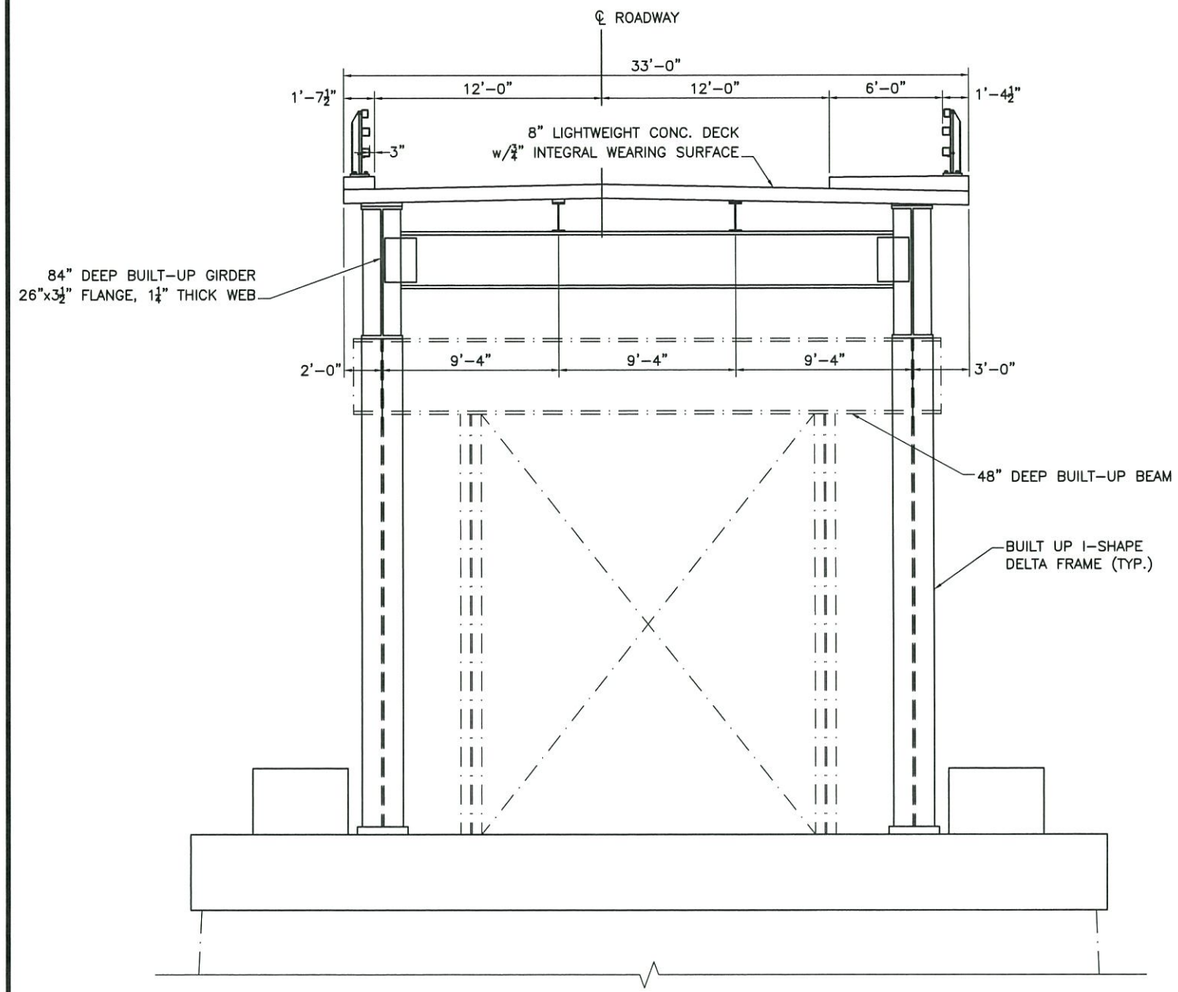
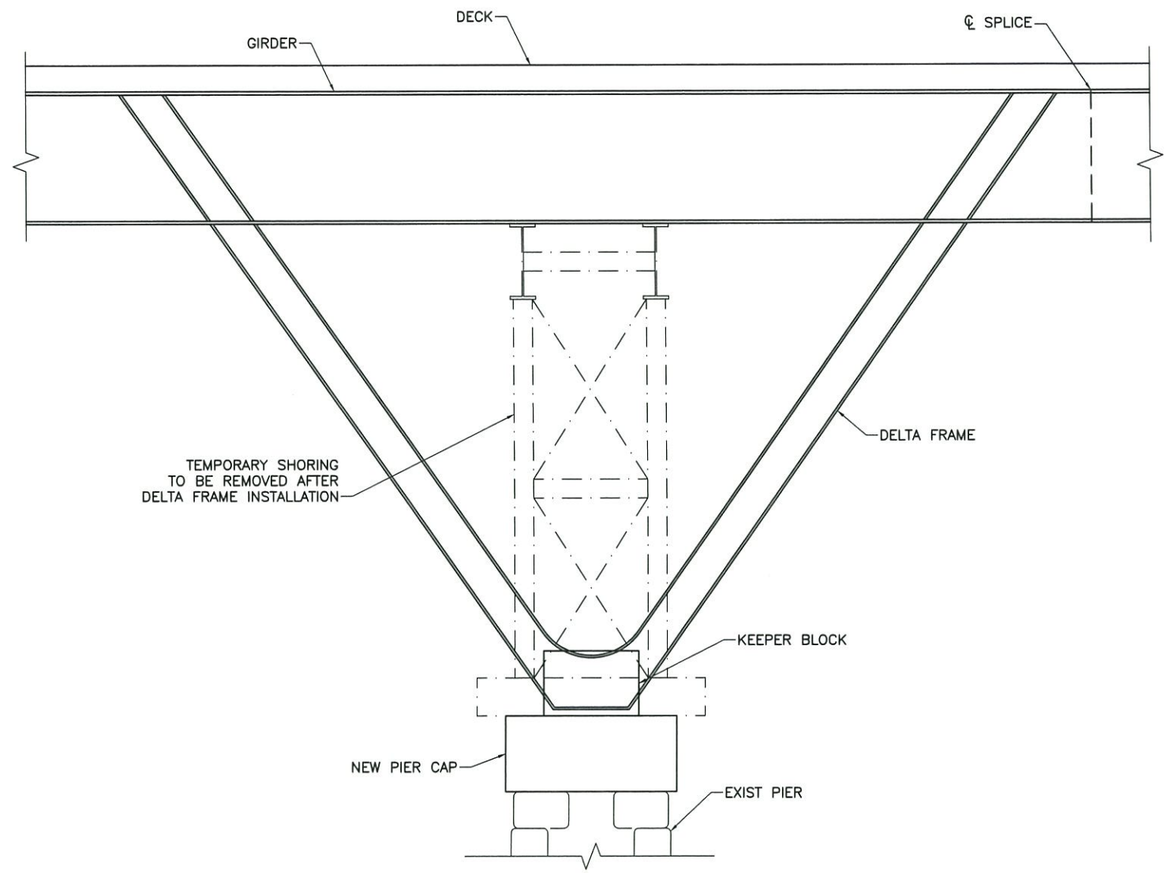
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 8: PLAN AND PROFILE 2 OF 2
DATE: APRIL 30, 2018



GIRDER SPAN SHORING – TRANSVERSE SECTION



GIRDER SPAN SHORING – ELEVATION

COMMONWEALTH OF MASSACHUSETTS
JOHN M. ENNIS
STRUCTURAL
No. 41191
REGISTERED
PROFESSIONAL ENGINEER

5.4.18

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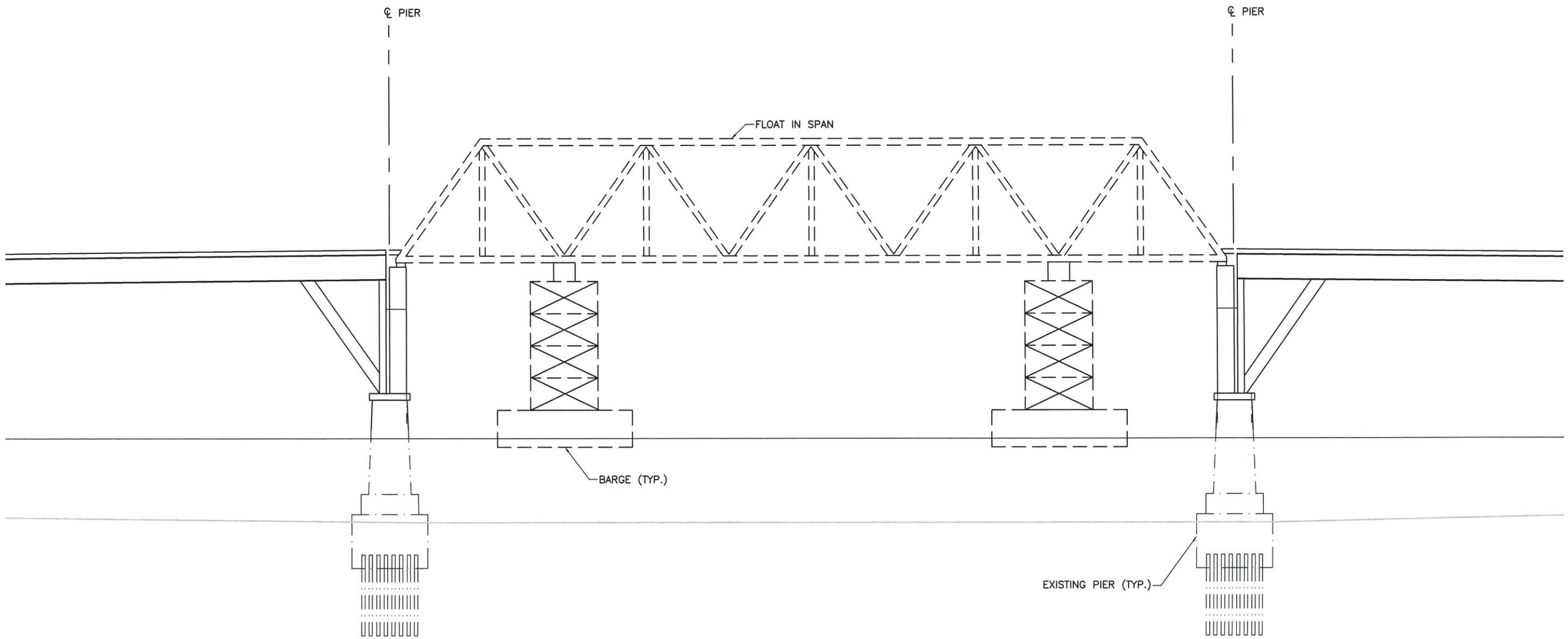
LONG ISLAND BRIDGE
FIGURE 12: DELTA FRAME ERECTION

DATE: APRIL 30, 2018



THROUGH TRUSS ERECTION

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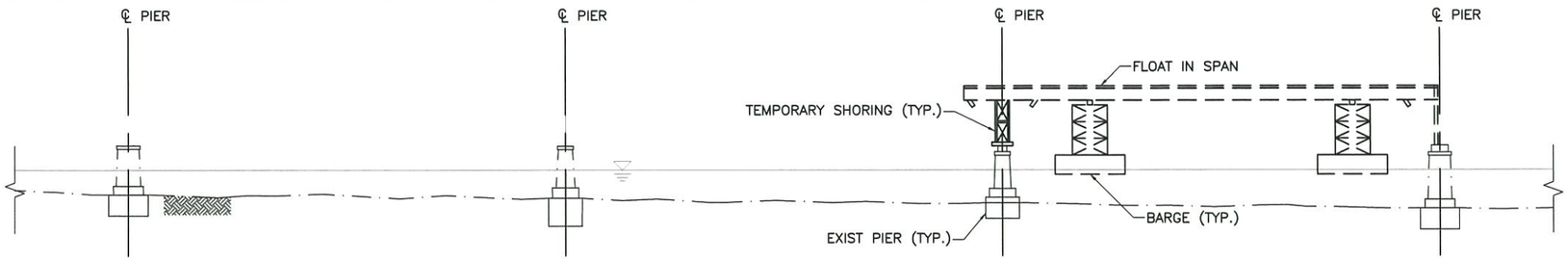
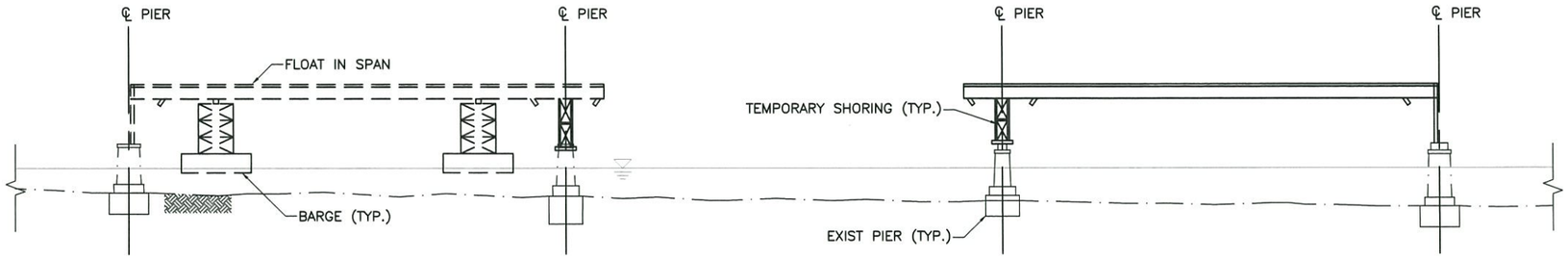
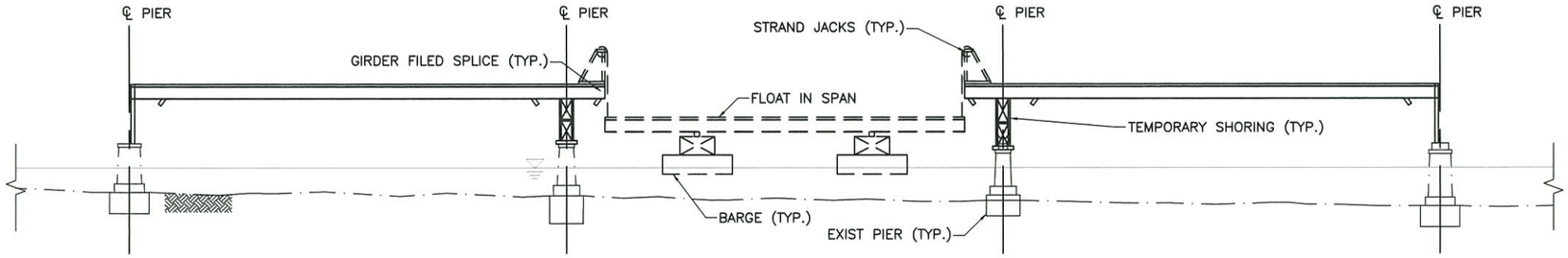
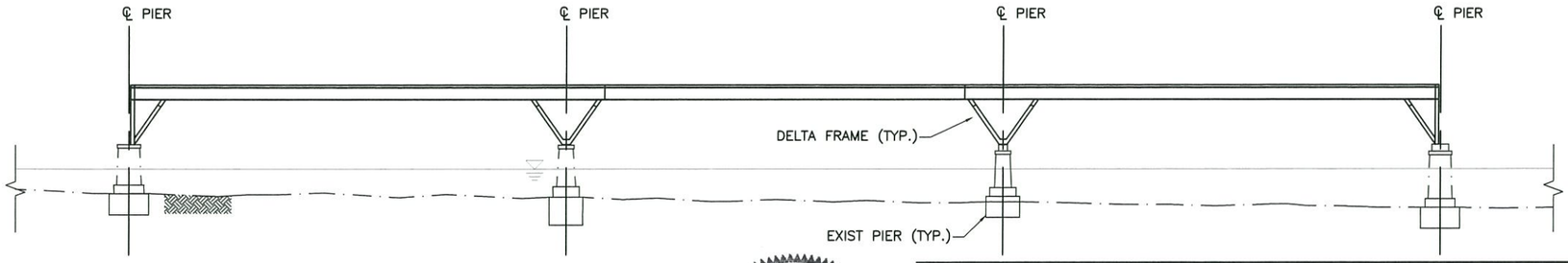
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 11: MAIN SPAN ERECTION

DATE: APRIL 30, 2018









CONTINUOUS GIRDER STRUCTURE ERECTION
(GIRDER STRUCTURES B & C)
NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
JOHN M. ENNIS
STRUCTURAL
No. 41191
REGISTERED PROFESSIONAL ENGINEER
5.4.18

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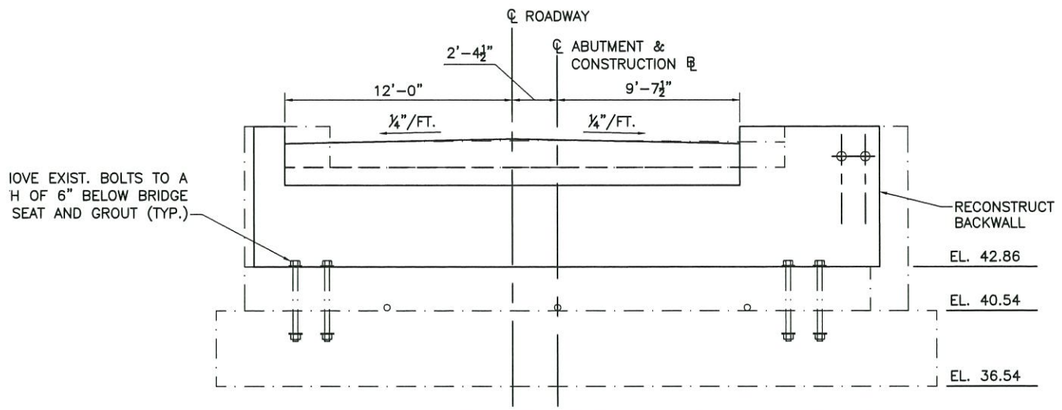
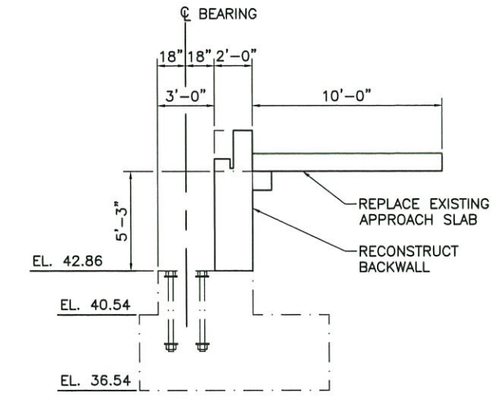
CITY OF BOSTON PUBLIC WORKS DEPARTMENT
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 10: GIRDER SPAN ERECTION

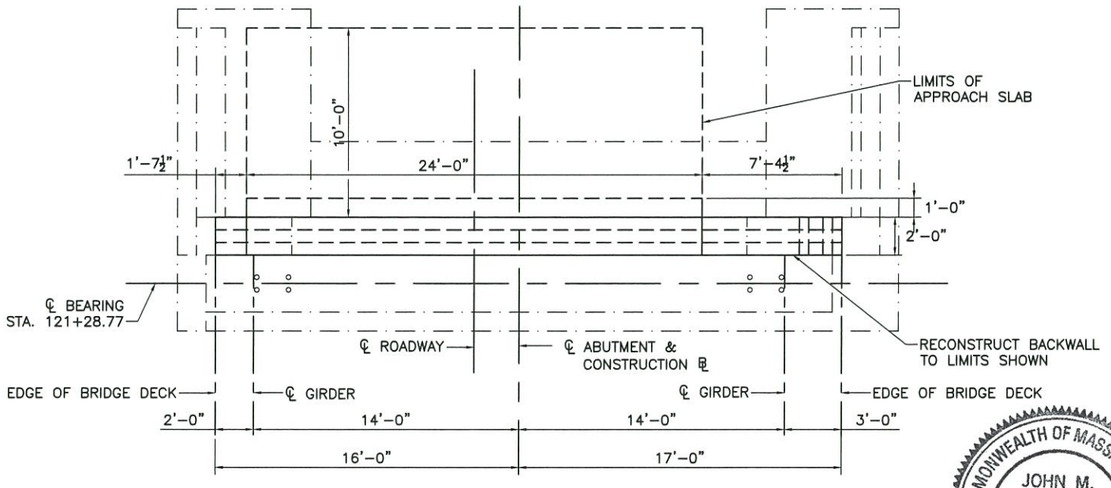
DATE: APRIL 30, 2018



LONG ISLAND ABUTMENT ELEVATION (LOOKING EAST)



LONG ISLAND ABUTMENT SECTION



LONG ISLAND ABUTMENT PLAN

COMMONWEALTH OF MASSACHUSETTS
JOHN M. ENNIS
STRUCTURAL
No. 41191
REGISTERED
PROFESSIONAL ENGINEER
5.4.18

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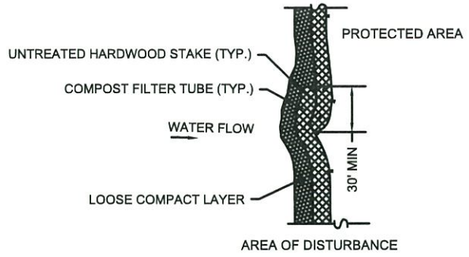
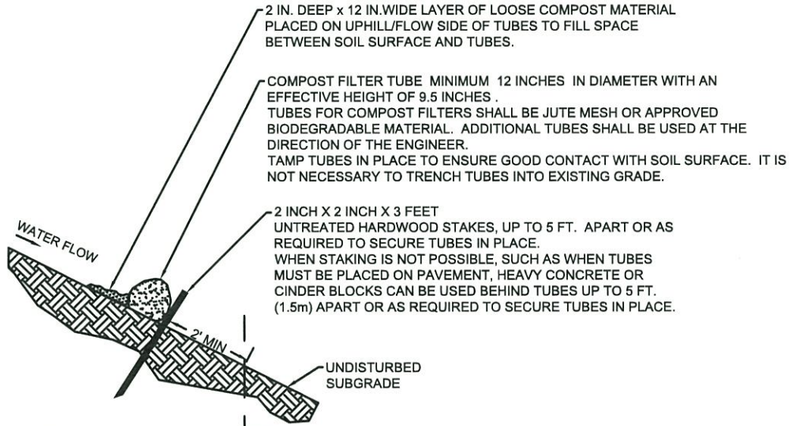
CITY OF BOSTON PUBLIC WORKS DEPARTMENT
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 9: EAST ABUTMENT DETAILS

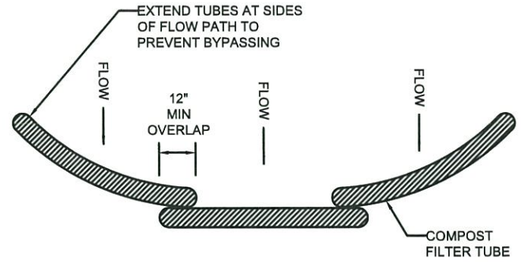
DATE: APRIL 30, 2018





NOTES:

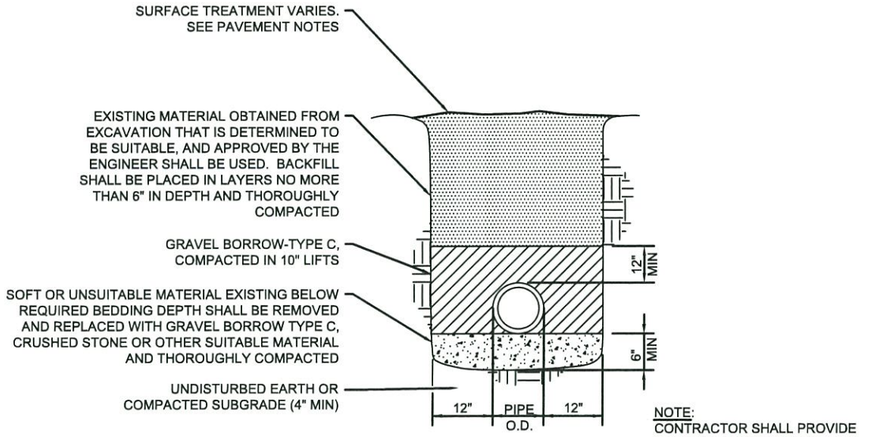
1. THE CONTRACTOR SHALL INSPECT SILT SOCK REGULARLY AND WITHIN 12 HOURS AFTER ANY RAIN EVENT
2. THE CONTRACTOR SHALL MAINTAIN THE EROSION CONTROL SILT SOCK IN A FUNCTIONAL CONDITION AT ALL TIMES. REPAIR OR REPLACE SILT SOCK AS REQUIRED TO ENSURE THAT IT IS FUNCTIONING PROPERLY.
3. THE CONTRACTOR SHALL REMOVE SEDIMENTS COLLECTED AT THE BASE OF THE SILT SOCK WHEN THEY REACH 1/3 OF THE EXPOSED HEIGHT OF THE SILT SOCK, OR AS DIRECTED BY THE ENGINEER.
4. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
5. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
6. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
7. CONFIGURE TUBES AROUND EXISTING SITE FEATURES TO MINIMIZE SITE DISTURBANCE AND MAXIMIZE CAPTURE AREA OF STORMWATER RUN-OFF.



NOTE:
1. COMPOST FILTER TUBE TO BE INSTALLED AND MAINTAINED PER MANUFACTURER'S INSTRUCTIONS

COMPOST FILTER TUBES PLAN VIEW

N.T.S.



NOTE:
CONTRACTOR SHALL PROVIDE SHEETING, TRENCH BOX OR SLOPED WALLS IN ACCORDANCE WITH APPLICABLE SAFETY REGULATIONS.

UTILITY TRENCH

N.T.S.

COMMONWEALTH OF MASSACHUSETTS
NIKOLE A. BULGER
CIVIL
No. 48598
REGISTERED PROFESSIONAL ENGINEER
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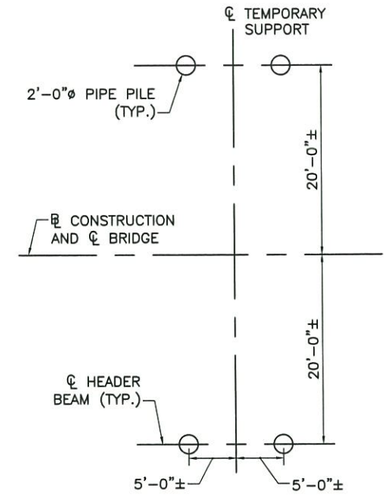
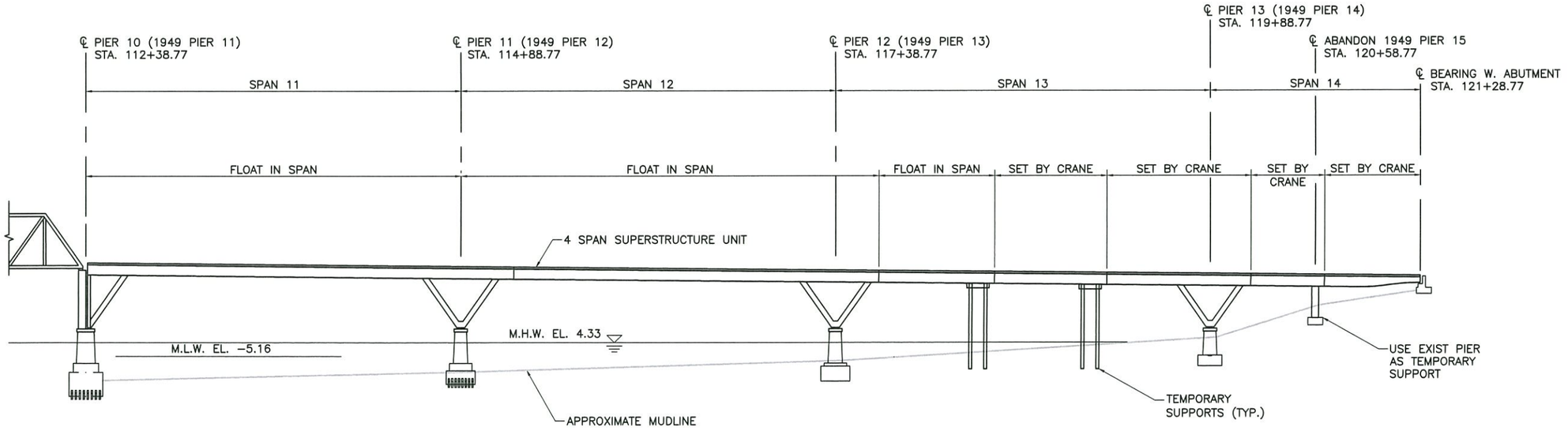
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 13: CIVIL DETAILS

DATE: APRIL 30, 2018



TEMPORARY SUPPORT PILE LAYOUT

SCALE: ⅛" = 1'–0"



4–SPAN CONTINUOUS GIRDER STRUCTURE D

SCALE: N.T.S.

COMMONWEALTH OF MASSACHUSETTS
JOHN M. ENNIS
STRUCTURAL
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CITY OF BOSTON PUBLIC WORKS DEPARTMENT
BRIDGE SUPERSTRUCTURE REPLACEMENT
LONG ISLAND BRIDGE
FIGURE 14: ERECTION STAGING

DATE: APRIL 30, 2018