

NOTICE OF INTENT

pursuant to

The Regulations of the Massachusetts Wetlands Protection Act
310 CMR 10.00

Pier 4 Charlestown Navy Yard Culvert and Sinkhole Repairs Boston, Massachusetts

Prepared For:

**Boston Planning & Development Agency
22 Drydock Avenue
Boston, Massachusetts 02210**

MARCH 2019





Engineers | Scientists | Planners

PARECORP.COM



March 6, 2019

Department of the Environment
Conservation Commission
1 City Hall Square, Room 709
Boston, MA 02201

Re: **Notice of Intent**
Boston Planning & Development Agency
Pier 4 Culvert and Sinkhole Repairs
Charlestown Navy Yard
Boston, MA
(Pare Project No. 18228.00)

Dear Members of the Conservation Commission:

On behalf of the Boston Planning & Development Agency, Pare Corporation (Pare) is submitting the attached Notice of Intent for culvert and sinkhole repairs at Pier 4 in the Charlestown Navy Yard. Included for your review are the following materials:

- 1 original and 7 copies of the NOI including the required forms, abutter notification information, project narrative and Alternatives Analysis, figures, Pare Investigation Findings Report, and Dive Inspection Field Summary Report; and
- 8 copies of plans (reduced scale 11"x17") entitled "Pier 4 Culvert and Sinkhole Repairs-Charlestown Navy Yard" prepared by Pare Corporation dated February 2019.

An electronic copy of this NOI submission and plans is being emailed to cc@boston.gov concurrently.

The culvert and sinkhole repairs constitute a Limited Project pursuant to 310CMR10.24(7)(c)2 because they involve the maintenance, repair, and improvement of structures which existed on November 1, 1987.

The City of Boston, as a municipality, is exempt from the filing fee requirements of the WPA Regulations and the City of Boston filing fee.

Abutters within 100-feet of the project parcel boundaries will be notified concurrently via Certificates of Mailing and proof of mailing will be provided at the Public Hearing.



The primary purpose of this project is to repair failing infrastructure at Pier 4 in the Charlestown Navy Yard. The project initially began as an investigation into the cause of recurring sinkholes in the pier, which posed a significant public safety hazard. The investigations revealed that the sinkholes are caused by the migration of fill material from an approximately 3' wide gap between an existing 6' x 12' culvert, located beneath the pile supported portion of the pier and an adjacent sheet pile bulkhead wall. The culvert is located beneath, and supports, a public roadway and a pedestrian walkway. The dive inspection revealed that the timber pile foundation for the culvert has deteriorated to the point where the culvert is essentially unsupported. This condition represents a major safety hazard and resulted in the closure of the road and walkway.

The proposed repair solution, selected after review of several alternatives as documented in the attached project narrative and alternative analysis, is to fill the area below the culvert with concrete. This will affect approximately 1,830 square feet of Land Under the Ocean.

An Environmental Notification Form was sent to the Massachusetts Executive Office of Energy and Environmental Affairs for review under the Massachusetts Environmental Policy Act (MEPA) on February 28, 2019. Additional anticipated permitting includes US Army Corps of Engineers Section 10 Authorization under General Permit #1, SV/PCN category to be determined.

Thank you very much for your consideration in this matter. If you have any questions or require additional information please feel free to contact me at (508) 543-1755.

Sincerely,

Briscoe B. Lang, PWS
Principal Environmental Scientist

cc: Boston Planning & Development Agency
DEP Northeast Regional Office
Division of Marine Fisheries - North Shore Office (via electronic copy to: DMF.EnvReview-North@state.ma.us)

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Administrative Documentation

WPA Form 3 – Notice of Intent
Filing Fee Transmittal Form



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):

<u>Charlestown Navy Yard Pier 4 8th Street</u>	<u>Boston</u>	<u>02129</u>
a. Street Address	b. City/Town	c. Zip Code
<u>Latitude and Longitude:</u>	<u>42°22'23"</u>	<u>71°03'09"</u>
	d. Latitude	e. Longitude
<u>f. Assessors Map/Plat Number</u>	<u>Parcel ID 0203505000</u>	
	g. Parcel /Lot Number	

2. Applicant:

<u>Paul</u>	<u>Osborn</u>	
a. First Name	b. Last Name	
<u>Boston Planning & Development Agency</u>		
c. Organization		
<u>22 Drydock Avenue, Suite 201</u>		
d. Street Address		
<u>Boston</u>	<u>MA</u>	<u>02210</u>
e. City/Town	f. State	g. Zip Code
<u>(617) 918-6211</u>	<u>Paul.osborn@boston.gov</u>	
h. Phone Number	i. Fax Number	j. Email Address

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

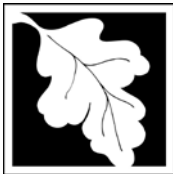
<u>a. First Name</u>	<u>b. Last Name</u>	
<u>c. Organization</u>		
<u>d. Street Address</u>		
<u>e. City/Town</u>	<u>f. State</u>	<u>g. Zip Code</u>
<u>h. Phone Number</u>	<u>i. Fax Number</u>	<u>j. Email address</u>

4. Representative (if any):

<u>Briscoe</u>	<u>Lang</u>	
a. First Name	b. Last Name	
<u>Pare Corporation</u>		
c. Company		
<u>10 Lincoln Road Suite 201</u>		
d. Street Address		
<u>Foxborough</u>	<u>MA</u>	<u>02035</u>
e. City/Town	f. State	g. Zip Code
<u>(508) 543-1755</u>	<u>blang@parecorp.com</u>	
h. Phone Number	i. Fax Number	j. Email address

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

<u>FEE EXEMPT</u>	<u>FEE EXEMPT</u>	<u>FEE EXEMPT</u>
a. Total Fee Paid	b. State Fee Paid	c. City/Town Fee Paid



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

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A. General Information (continued)

6. General Project Description:
Repairs to Pier 4 in the Charlestown Navy Yard

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 **Existing infrastructure repairs**

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)

10.24(7)(c)2. – Maintenance/repair/replacement of a structure in existence on November 1, 1987

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:

Suffolk	
a. County	b. Certificate # (if registered land)
09812	165
c. Book	d. Page Number

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

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

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



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

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

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. <input type="checkbox"/> Bank	1. linear feet	2. linear feet
b. <input type="checkbox"/> Bordering Vegetated Wetland	1. square feet	2. square feet
c. <input type="checkbox"/> Land Under Waterbodies and Waterways	1. square feet	2. square feet
	3. cubic yards dredged	

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

2. Width of Riverfront Area (check one):

- 25 ft. - Designated Densely Developed Areas only
- 100 ft. - New agricultural projects only
- 200 ft. - All other projects

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

4. Proposed alteration of the Riverfront Area:

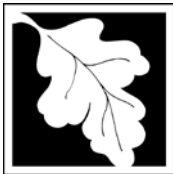
a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
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5. Has an alternatives analysis been done and is it attached to this NOI? Yes No

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

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

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



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

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

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

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input checked="" type="checkbox"/> Land Under the Ocean	1,830± 1. square feet	

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

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

	2. cubic yards dredged	
j. <input checked="" type="checkbox"/> Land Containing Shellfish	1,830± 1. square feet	

	1. square feet	
k. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above	

	1. cubic yards dredged	
l. <input checked="" type="checkbox"/> Land Subject to Coastal Storm Flowage	2,440± (temporary) 1. square feet	

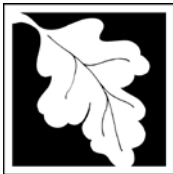
	1. square feet	

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

_____ a. square feet of BVW _____ b. square feet of Salt Marsh

5. Project Involves Stream Crossings

_____ a. number of new stream crossings _____ b. number of replacement stream crossings



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C. Other Applicable Standards and Requirements

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

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

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

- a. Yes No **If yes, include proof of mailing or hand delivery of NOI to:**

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

MassGIS Oliver 2/19/19

b. Date of map

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

- c. Submit Supplemental Information for Endangered Species Review*

1. Percentage/acreage of property to be altered:
 - (a) within wetland Resource Area _____ percentage/acreage
 - (b) outside Resource Area _____ percentage/acreage
2. Assessor's Map or right-of-way plan of site

2. Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **
 - (a) Project description (including description of impacts outside of wetland resource area & buffer zone)
 - (b) Photographs representative of the site

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

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



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

- (c) MESA filing fee (fee information available at http://www.mass.gov/dfwele/dfw/nhosp/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/nhosp/regulatory_review/mesa/mesa_exemptions.htm; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)
 2. Separate MESA review ongoing. _____ a. NHESP Tracking # _____ b. Date submitted to NHESP
 3. Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.
3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?
- a. Not applicable – project is in inland resource area only b. Yes No

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

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

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

North Shore - Hull to New Hampshire border:

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

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



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

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

- 4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?
 a. Yes No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.
 b. ACEC

- 5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?
 a. Yes No
- 6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?
 a. Yes No
- 7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?
 a. Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
 - 1. Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)
 - 2. A portion of the site constitutes redevelopment
 - 3. Proprietary BMPs are included in the Stormwater Management System.
 b. No. Check why the project is exempt:
 - 1. Single-family house
 - 2. Emergency road repair
 - 3. Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

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

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

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

- 1. USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
- 2. Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.



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D. Additional Information (cont'd)

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

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

Charlestown Navy Yard Culvert and Sinkhole Repairs

a. Plan Title

Pare Corporation

b. Prepared By

February 2019

d. Final Revision Date

Ryan McCoy, P.E.

c. Signed and Stamped by

As noted

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:

FEE EXEMPT

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name



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F. Signatures and Submittal Requirements

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

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

1. Signature of Applicant

2. Date

3/5/19

3. Signature of Property Owner (if different)

4. Date

3/5/2019

5. Signature of Representative (if any)

6. Date

For Conservation Commission:

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

For MassDEP:

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

Other:

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

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



Massachusetts Department of Environmental Protection
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B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee

Step 5/Total Project Fee: _____

Step 6/Fee Payments:

Total Project Fee:	<u>FEE EXEMPT</u>
	a. Total Fee from Step 5
State share of filing Fee:	<u>FEE EXEMPT</u>
	b. 1/2 Total Fee less \$12.50
City/Town share of filing Fee:	<u>FEE EXEMPT</u>
	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.)

Abutter Notification Information

Notification to Abutters

Affidavit of Service

List of Abutters

Notification to Abutters Under the Massachusetts Wetlands Protection Act

March 6, 2019

Dear Abutter,

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

The applicant, Boston Planning & Development Agency, has filed a Notice of Intent seeking permission to remove, fill, dredge, or alter, an area subject to protection under the Wetlands Protection Act (General Laws Chapter 131, Section 40). The project involves culvert and sinkhole repairs at Pier 4 in the Charlestown Navy Yard. Pier 4 is designated as Parcel 0203505000 by the City of Boston.

Copies of the Notice of Intent may be examined at the Boston City Hall between the hours of 9:00 am and 5:00 pm on Monday through Friday, or at other times by appointment. To schedule an appointment to examine the Notice of Intent or for information on the date, time and place of the public hearing, please contact the Conservation Commission, at (617) 635-3850.

Copies of the Notice of Intent may be obtained by calling the applicant's representative, Pare Corporation, at (508) 543-1755 between the hours of 8:30 AM and 4:30 PM, Monday through Friday.

Please note that notice of the public hearing, including date, time, and place, will be posted on the Boston Conservation Commission website (<https://www.boston.gov/public-notices>) and at Boston City Hall not less than forty-eight (48) hours in advance. Said notice will be published in the Boston Herald not less than five (5) days in advance.

You may contact the Boston Conservation Commission at (617) 635-3850, or the Northeast Regional Office of the Massachusetts Department of Environmental Protection at 978-694-3200, for more information about this application or the Massachusetts Wetlands Protection Act.

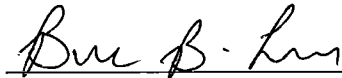
AFFIDAVIT OF SERVICE

*Under the Massachusetts Wetlands Protection Act, MGL Ch 131, S. 40
& Filing Requirements for a Wetlands Permit with the Boston Conservation Commission*

I, Briscoe Lang of Pare Corporation, hereby certify under the penalties of perjury that on March 6, 2019, I gave notification to abutters in compliance with the second paragraph of Massachusetts General Laws Chapter 131, Section 40, and the DEP Guide to Abutter Notification dated April 8, 1994, in connection with the following matter:

A Notice of Intent filed under the Massachusetts Wetlands Protection Act by the Boston Planning and Development Agency with the Boston Conservation Commission on March 6, 2019 for property located at Pier 4 in the Charlestown Navy Yard – Parcel ID 0203505000.

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



Signature and Date

List of Abutters to
Parcel 0203505000
Pier 4 Culvert and Sinkhole Repairs
Charlestown Navy Yard
March 2019

LOCUS PROPERTY

<u>Parcel</u>	<u>Owner/Address</u>
0203505000	Boston Redevelopment Authority Boston Planning and Development Agency One City Hall, Ninth Floor Boston, Massachusetts 02201

ABUTTING PROPERTIES

<u>Parcel</u>	<u>Owner/Address</u>
0203503000	United States of America 93 Chelsea Street Charlestown, MA 02129
0203510700	United States of America 6 th Street Charlestown MA 02129
0203512000	Navy Yard Plaza Development 120 Fulton Street Boston MA 02109
0203504000	MGH Institute of Health 101 Merrimack Street Boston MA 02114
0203506010	The Parris Landing Condo Trust 42 Eighth Street Charlestown, MA 02129
0203505700 ¹	Boston Redevelopment Authority Boston Planning and Development Agency One City Hall, Ninth Floor Boston, Massachusetts 02201
0203505550 ¹	Boston Redevelopment Authority Boston Planning and Development Agency One City Hall, Ninth Floor Boston, Massachusetts 02201

¹ A single notification was sent for all parcels owned by Boston Redevelopment Authority/Boston Planning & Development Agency.

List of Abutters to
Parcel 0203505000
Pier 4 Culvert and Sinkhole Repairs
Charlestown Navy Yard
March 2019

0203505600 ¹	Boston Redevelopment Authority Boston Planning and Development Agency One City Hall, Ninth Floor Boston, Massachusetts 02201
0203505100	Flagship Wharf Condo Association 1 Pier 8, 13 th Street Charlestown, MA 02129

Project Narrative and Alternatives Analysis

I. INTRODUCTION

This Notice of Intent (NOI), submitted under the provisions of the Regulations of the Massachusetts Wetlands Protection Act (the Regulations) addresses the proposed culvert and sinkhole repairs at Pier 4 in the Charlestown Navy Yard in Boston, Massachusetts. The project proponent is the Boston Planning & Development Agency (BPDA).

The project consists of critical repairs to failing infrastructure at Pier 4 in the Charlestown Navy Yard. The project initially began as an investigation into the cause of recurring sinkholes in the pier, which posed a significant public safety hazard. The investigations revealed the sinkholes are caused by migration of fill from voids between an existing culvert and the adjacent sheet pile bulkhead wall, causing the deterioration of the roadway and the pedestrian walkway. This condition represents a major safety hazard and resulted in the closure of the walkway and adjacent public roadway. Based upon the structures' exposure to the public and importance to the City's public waterfront, repairs are critical to maintain public safety at the site, and extend the longevity of the structures.

The project will require impacts to Land Under the Ocean (LUO) and Land Containing Shellfish (LCS), and work within Land Subject to Coastal Storm Flowage (LSCSF) associated with the Boston Harbor and the 100-foot Buffer Zone of the Coastal Bank. According to 310 CMR 10.24(7)(c)2. of the Regulations, the proposed activity qualifies as a limited project for *"the maintenance, repair and improvement (but not substantial enlargement except when necessary to reduce or eliminate a tidal restriction) of structures, including buildings, piers, towers, headwalls, bridges and culverts which existed on November 1, 1987."*

The repairs at Pier 4 will require authorization under General Permit 1 of the Army Corps of Engineers (ACOE) General Permits for Massachusetts, for maintenance, repair, or minor modifications to a previously licensed water dependent use.

The following sections will provide descriptions of the site, project background, and a description of the proposed project and project compliance with applicable performance standards.

II. SITE DESCRIPTION

a. Existing Conditions

The project site is located along the west side of Pier 4 in the Charlestown Navy Yard (CNY), adjacent to the Charlestown Navy Yard Ferry Terminal and the southerly terminus of Flagship Way Avenue. The pier was constructed by the US Navy in the early 1900's and reconstructed and/or renovated numerous times since. The pier consists of a combination of solid fill wharf contained within steel sheet piles, and pile supported reinforced concrete decks. During the 1980's, following the departure of the Navy, the site was redeveloped to include public spaces with new brick and concrete walkways, drainage improvements, a private condominium building (Flagship Wharf condominiums), and Flagship Way Avenue. Additionally a community sailing club and MBTA ferry are located nearby, contributing to the active



public space of the pier. An existing 6' high by 12' wide concrete discharge culvert extends south from the nearby abandoned pumphouse to the south face of an existing bulkhead at the end of Flagship Way Avenue. The culvert is believed to have been used to convey dewatering flows from the adjacent Drydock #2 when it was in operation. After penetrating the bulkhead the culvert continues south beneath the pile supported pier for an additional distance of approximately 100 feet. Record plans indicate that this portion of the culvert carries a portion of the pier above and is supported on timber piles. Over the past several years, a series of sinkholes have developed in the southerly end of Flagship Way Avenue at a location where a pile supported portion of the pier abuts the solid fill portion. After repeatedly filling the sinkholes the BPDA determined that a permanent solution to correct the issue was needed and engaged Pare Corporation (Pare) to identify the underlying cause of the sinkholes and design permanent repairs.

Pare's investigations included two test pits, a boat inspection of the culvert and sheet pile walls at low tide, and an underwater inspection conducted by a commercial diver. Pare's Investigation Findings Report and the divers Field Summary Report are appended to this NOI. Test Pit #1 (TP1) was located at the sinkhole adjacent to the east side of the culvert. Existing plans indicated that there was no gap between the culvert and an adjacent sheet pile wall to the east, however TP1 revealed an approximate 3' wide space between the structures. Water in TP1 was observed at a depth of 15 feet below the surface at the same apparent elevation of the harbor and fluctuated with the tide level, indicating this soil was free draining. Test Pit #2 (TP2) was located adjacent to, and roughly perpendicular to, TP1. TP 2 was excavated parallel with the curb along Flagship Way Avenue, behind the sheet pile wall located east of the culvert. No water was observed in the test pit and soil appeared to be firm and undisturbed. The test pits indicate that fill material between the culvert and sheet pile wall is migrating out of the space between walls, resulting in the sink hole.

On September 19, 2018 Pare utilized a boat to inspect the accessible portions of the culvert and sheet pile walls at low tide. The boat inspection included inspection of the visible portions of the bulkhead adjacent to the culvert opening and along the west side of the culvert. An approximate 5-inch diameter hole was observed nearly 1-foot above the low water line approximately 4 feet east of the culvert opening in the bulkhead. The hole appeared to be cut in the sheet piles and had clean, square edges. A void was noted behind the wall and was probed with a measuring tape to approximately 8 feet, indicating that material behind the wall has migrated out of the bulkhead. No significant deterioration was observed in the section of sheet pile on the west side of culvert.

The objective of the dive inspection was to attempt to identify a source of leakage below TP1. The diver observed the area beneath TP1 (i.e., between the culvert wall and the sheet pile wall to the east) and reported that it appeared to be a deteriorated "wall" or mass plug consisting of stone and cobbles, brick, concrete, and other material, the top of which was slightly above the low water line. The top was deteriorated and scoured, exposing an approximate 18" high void beneath the culvert. More significantly, the diver reported that the majority of the timber support piles below the culvert are rotted from the bottom of the culvert to approximately 2' below the structure and are no longer connected to or supporting the culvert. The piles that do remain in contact with the bottom of culvert are critically deteriorated with significant section loss, deep striations and delamination, and holes from marine borer



attack. The diver inspected the sheet pile wall near the entrance to the culvert where Pare had previously noted a hole above low water. The diver indicated the deterioration extends below water, with larger voids at both belly-ins and belly-outs of the piles. The diver was able to probe inside one of the holes and noted a large void behind the wall. Based on measurements and estimates, the void appears to be approximately 10' in diameter, again indicating that fill material has migrated from behind the bulkhead.

In summary, the investigations revealed that the sink holes are likely caused by migration of fill material from between the culvert and the sheet pile wall to the east; that additional migration of material is occurring through holes in the sheet pile walls; and, most significantly, that the 6' by 12' concrete discharge culvert that underlies an active public space is essentially unsupported and susceptible to collapse. Following the discovery that the culvert is essentially unsupported Pare recommended that the BPDA close the area above the culvert to traffic, essentially shutting down the turnaround at the end of Flagship Way Avenue and limiting vehicular access to Pier 4.

b. Coastal Resources and Floodplain

Land beneath the Boston (Inner) Harbor is tidal, with a Mean High Water (MHW) of 8.26 and a Mean Low Water (MLW) of -1.29 (elevations are in Boston City Base). According to 310 CMR 10.25 of the Regulations, land below the MLW of the Boston Harbor is classified as LUO. The culvert is located beneath the pile supported CNY pier, and land beneath the culvert is classified as LUO and LCS.

According to the FEMA Flood Insurance Rate Map (FIRM) for the City of Boston, Massachusetts (Community Panel No. 25025C0081J effective 3/16/2016), the entire project area is located within 100-year Floodplain in the FEMA Zone AE, which has a designated elevation of 10 feet (NAVD 88) which equates to elevation 14.03 in Boston City Base. The Floodplain is classified as Land Subject to Coastal Storm Flowage (LSCSF) under the Regulations. The FIRM is attached in Section 3 of this NOI.

The Coastal Bank associated with the sites consist of a steel sheet pile bulkhead which will not be impacted by the proposed work. The entire project site landward of the bulkhead is located within the 100-foot Buffer Zone from the Coastal Bank. No freshwater wetlands are located in the vicinity of the proposed work.

c. Other Environmental Considerations

According to the most recent MassGIS data, the site is not located within Outstanding Resource Waters (ORW) or Areas of Critical Environmental Concern (ACEC). The site does not contain any mapped Priority or Estimated Habitat of Rare Species, and is located outside of the South Boston Designated Port Area. There are no historic properties in the vicinity of the project site.



III. PROPOSED PROJECT

a. Project Description

The BPDA proposes to repair the unsupported culvert and address the fill migration/sink holes by installing a cutoff wall along the western and southern sides of the culvert and filling the void beneath the culvert with concrete to support the structure. The infill would also fill the voids behind the deteriorated bulkhead, minimizing future subsidence and reducing the likelihood of failure of a soil bridge. The cutoff wall will be steel sheet piling or other formwork, and installation may require minimal excavation of fill and sawcutting of the concrete slabs along the length of the culvert. Concrete would then be poured through the “belly-outs” of the new cutoff wall, and any cut concrete repaired. This option represents a long-term solution which addresses both the concrete culvert support and bulkhead deterioration and will affect approximately 1,830 square feet of LUO beneath the culvert.

b. Construction Phasing

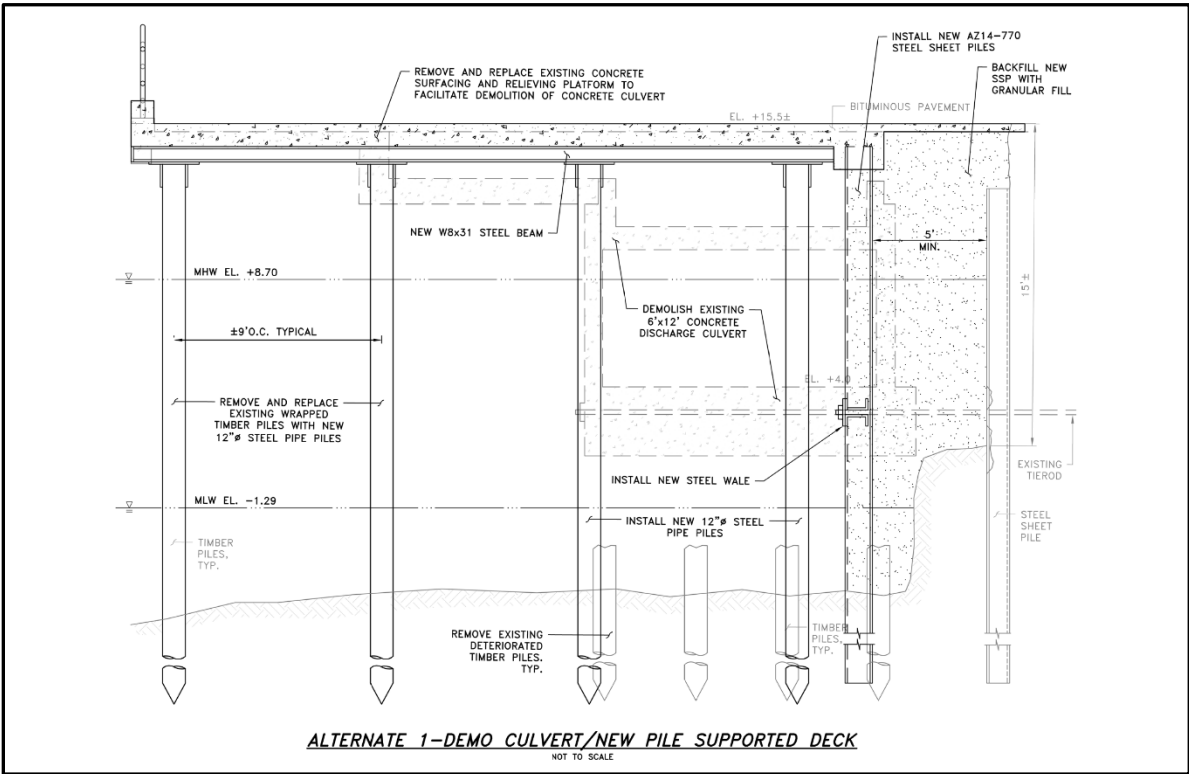
1. Install signage and security fencing.
2. Mobilize equipment and personnel to the site.
3. Install erosion and sediment controls and turbidity curtain as necessary.
4. Install temporary form work, shoring, falsework, and supports.
5. Patch holes in steel sheet pile.
6. Place concrete fill below culvert.
7. Remove existing bricks and pavement. Excavate areas of subsidence as indicated.
8. Backfill excavated areas with imported gravel fill.
9. Provide new full depth pavement and reset bricks.
10. Remove temporary form work, shoring, false work, and supports.
11. Final punch list and demobilize.



IV. Alternatives Analysis

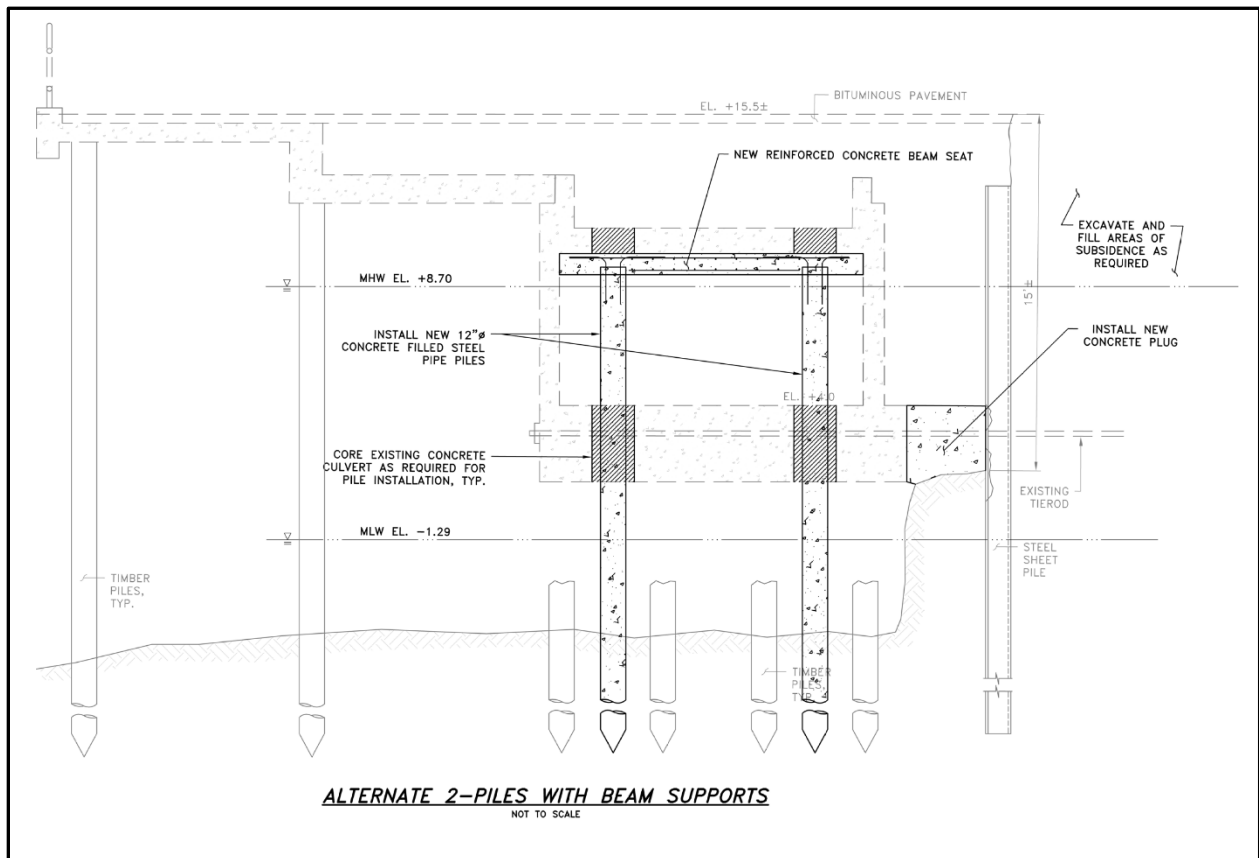
Alternative 1 Demolish Culvert and New Pile Supported Deck

The demolition option includes full removal of the existing structure, and would likely require partial demolition of the concrete slabs which are partly supported by the culvert. The installation of another support system, such as piles and beams, would be required to support the topside infrastructure. Temporary earth supports would likely be required in order to remove the steel sheet piles which extend through the culvert and a new steel wale would need to be installed for the tie rods which were cast into the base of the culvert. This option would still require the patching and filling of areas of subsidence in the new deteriorated bulkhead. The existing concrete culvert is integral to the surrounding infrastructure such as steel sheet pile walls, a concrete relieving platform, a granite block wall, and concrete abutments. Some components of the waterfront infrastructure, including the steel sheet pile walls which provide support for the earth-filled portion of the pier, were observed to be at the end of their useful service life with holes noted throughout. Demolition of the culvert may likely impact the integrity of the surrounding area. This condition, in conjunction with the estimated project cost of between \$2,030,000 and \$3,290,000 makes this alternative infeasible.



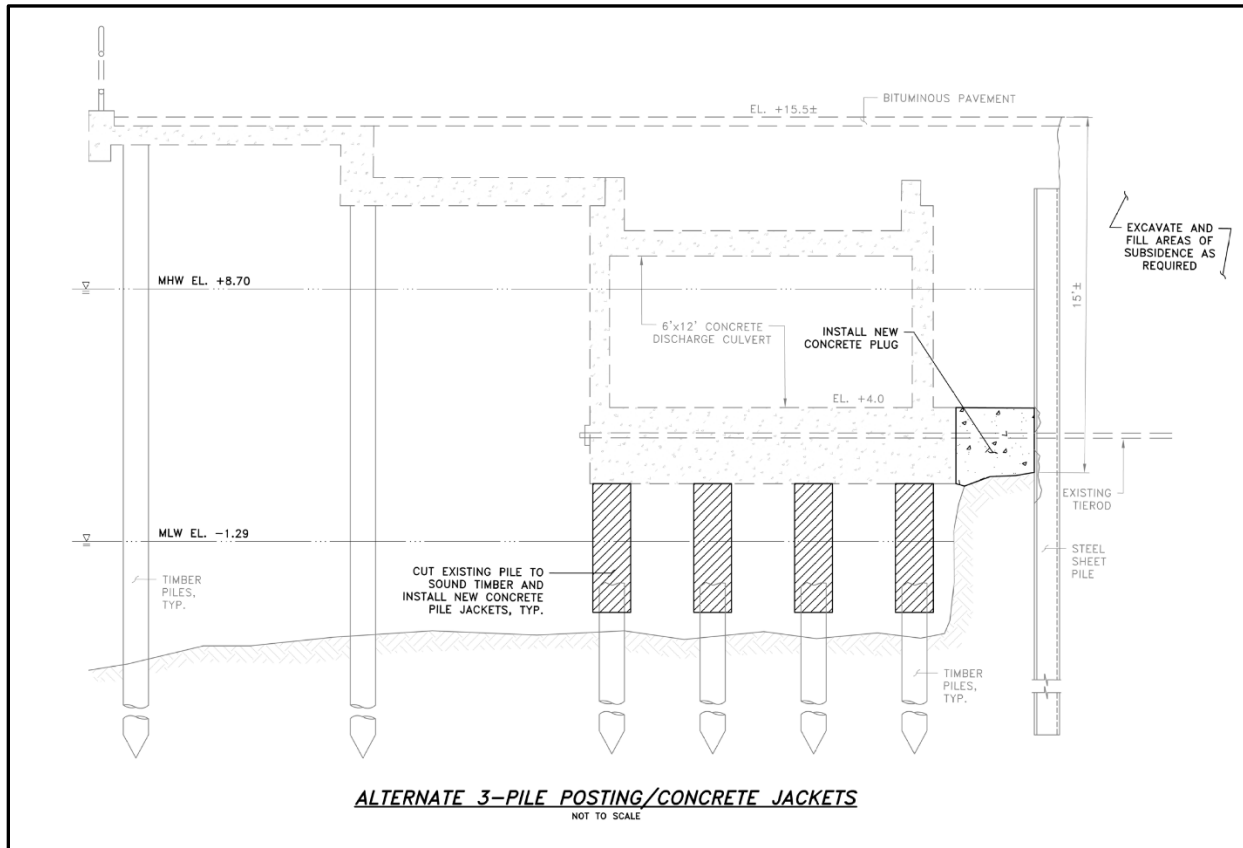
Alternative 2 Piles with Beam Supports

This option considered the installation of new piles and beams to support the existing concrete culvert in the long-term. Due to the existing stone, brick, concrete, and gravel plug located between the east side of the concrete culvert and the steel sheet pile bulkhead, piles would not be drilled in this area and would need to be driven through the concrete culvert. Installation of piles would require partial excavation of fill above the concrete culvert, and sawcutting of the existing concrete culvert and/or concrete slabs. It is anticipated that steel pipe piles could be driven with new concrete beams attached to the existing concrete culvert to hold the structure in place. This option would still require the patching and filling of areas of subsidence in the deteriorated bulkhead. In addition, a new concrete plug would be poured between the existing culvert and steel sheetpile bulkhead along the length of the structure to prevent additional loss of fill through the existing stone, brick, concrete, and gravel plug which has settled. This option has workplace safety concerns, and does not address other deteriorated infrastructure connected to the culvert, such as the steel sheet pile walls which were observed to be at the end of their useful service life. This option also considers the use of steel piles which have a shorter service life in the marine environment than concrete, therefore this option is not recommended.



Alternative 3 Pile Posting/Concrete Jackets

This option considers the installation of fiberglass pile jackets on top of the existing deteriorated timber piles to support the concrete culvert. The pile jackets would be filled with reinforced concrete and extend below the mudline to sound timber. Due to the lack of intact timber piles that currently support the culvert and the amount of work that would be required beneath the structure, this option is not recommended because of safety concerns. In addition, the estimated cost of between \$2,528,000 and \$3,830,000 made this alternative infeasible.



No Action - The no action alternative involves leaving the culvert in its present condition and allowing it to gradually fail. It should be noted that the existing infrastructure at Pier 4 is connected in several locations. An existing steel sheet pile bulkhead runs along the eastern side of the culvert, with tie rods which were cast into the base of the concrete culvert. There are also two sheet pile walls which extend through the culvert, and the concrete slabs above partially rest on the top of the culvert. Without the necessary repairs, the existing bulkhead and concrete slabs adjacent to the culvert will also become increasingly vulnerable to failure, resulting in potential catastrophic loss of infrastructure. The culvert is also located in an area accessed openly by the public and failure could result in a danger to human life. Although there are no repair costs, the long-term costs and implications will be the highest. Therefore, this option is not considered feasible.



V. Wetlands Impacts and Regulatory Compliance

a. Land Under the Ocean

A total of 1,830 square feet of LUO will be permanently impacted as a result of the proposed project. The LUO located beneath the culvert is proposed to be permanently filled in with concrete, thus permanently occupying the area.

For the purpose of this NOI it is presumed that the LUO to be affected by the project is significant to the protection of marine fisheries, protection of wildlife habitat, storm damage prevention or flood control, and therefore the performance standards at 310 CMR 10.25(3) through (7) are met as follows.

310 CMR 10.25(3) pertains to improvement dredging and is therefore not applicable to this project.

310 CMR 10.25(4) pertains to maintenance dredging and is therefore not applicable to this project.

310 CMR 10.25(5): *Projects 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.*

Coastal beaches, dunes and salt marshes are not present in the vicinity of the project therefore the proposed concrete fill above bottom sediments will not result in an alteration of bottom topography sufficient to cause adverse effects to those resource areas. The Coastal Bank in the vicinity of the project sites consist of a steel sheet pile which will not be adversely impacted by the proposed work.

310 CMR 10.25(6): *Projects not included in 310 CMR 10.25(3) which affect land under the ocean shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on marine fisheries habitat or wildlife habitat caused by:*

- (a) alterations in water circulation;*
- (b) destruction of eelgrass (*Zostera marina*) or widgeon grass (*Rupia maritima*) beds;*
- (c) alterations in the distribution of sediment grain size;*
- (d) changes in water quality, including, but not limited to, other than natural fluctuations in the level of dissolved oxygen, temperature or turbidity, or the addition of pollutants; or*
- (e) alterations of shallow submerged lands with high densities of polychaetes, mollusks or macrophytic algae.*

The project is a water dependent activity and the impacts to LUO are unavoidable due to the nature of the failing culvert and the selected repair alternative. Given the historic and extensive industrial use of this part of the Charlestown waterfront it is highly unlikely that submerged aquatic vegetation is present in the project area. The small scale of the proposed alteration to LUO will not affect water circulation, the



distribution of grain size, or existing water quality. Any *polychaetes, mollusks or macrophytic algae* present in the work area are not likely to be in high densities, and the scale of the work affecting LUO will not result in any adverse impacts to such populations. To further ensure the containment of any sediment distribution, a turbidity/silt barrier will be placed around the limit of work.

310 CMR 10.25 (7): *Notwithstanding the provisions of 310 CMR 10.25(3) through (6), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.*

According to the current MassGIS data layers for Estimated and Priority Habitat the site does not contain any mapped Priority or Estimated Habitat of Rare Species.

b. Land Containing Shellfish

For the same reasons set forth above, the area is presumed to not be significant to the protection of marine fisheries. Nevertheless, the performance standards at 310 CMR 10.34(4) are addressed below.

310 CMR 10.34(4): *Any project on land containing shellfish shall not adversely affect such land or marine fisheries by a change in the productivity of such land caused by:*

- (a) alterations of water circulation;*
- (b) alterations in relief elevation;*
- (c) the compacting of sediment by vehicular traffic;*
- (d) alterations in the distribution of sediment grain size;*
- (e) alterations in the distribution from adjacent land; or*
- (f) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of salinity, dissolved oxygen, nutrients, temperature or turbidity, or the addition of pollutants.*

The small scale of the proposed alteration to LCS will not affect water circulation, the distribution of grain size, or existing water quality. No changes to elevation are proposed, and any bottom sediment displacement by installation of temporary falsework/formwork or construction activity, will inevitably settle back to the ocean bottom in the vicinity of its origin. No vehicular activity is proposed to effect LCS. Any sediment displaced by the proposed activities will be temporary and will not be distributed to an alternate location. There are no proposed alterations in drainage from adjacent uplands. The project will not introduce new sources, types, or quantities of pollutants, and therefore water quality will not be adversely affected. A turbidity/silt curtain will be installed and remain in place during construction to retain any materials that may enter the water during construction and contain any potential turbidity or sediment dispersion.



c. Land Subject to Coastal Storm Flowage

The project area landward of the Coastal Bank is located within the LSCFS associated with Boston Harbor. The proposed project will not result in any decrease to the flood storage capacity of the site. The proposed gravel fill to mitigate for the void below the approximately 720 square foot area of brick walkway is limited to the replacement of pre-existing fill that has since its original installation, deteriorated with time, and the replacement of such fill will not result in a change to flood storage capacity. Removal and replacement of approximately 1,720 square feet of bituminous pavement will have no adverse effect on LSCSF.

There are no regulatory performance standards associated with LSCFS.

d. 100-foot Buffer Zone

The entire project area outside of Boston Harbor is located within the 100-foot Buffer Zone associated with the Coastal Bank. Impacts within this area are limited to approximately 1,720 square feet, for the removal and replacement of existing bituminous pavement, and approximately 720 square feet for the removal of existing brick walkway to fill in the voids beneath the brick walkway. Temporary impacts within the buffer zone will result from staging of construction equipment and materials.

There are no regulatory performance standards associated with Buffer Zones.

e. Mitigation Measures

The project itself is mitigation for the public safety issues caused by the sinkholes and potential failure of the culvert. Additional mitigation includes minimizing the amount of fill to that necessary to affect the repairs, isolating the area to be filled with formwork to prevent concrete migration out of the work zone, and utilizing a turbidity barrier to prevent migration of sediments out of the work zone.



Figures

Figure 1 – Site Location Map

Figure 2 – Annotated MassGIS Aerial Photograph

Figure 3 – FEMA Map



SITE LOCATION MAP

SCALE: 1"=2,000'



8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865
(401) 334-4100

10 LINCOLN ROAD, SUITE 210
FOXBORO, MA 02035
(508) 543-1755

PARE PROJECT No. 18228.00

FEBRUARY 2019

FIGURE 1

PIER 4 CULVERT AND SINKHOLE REPAIRS
CHARLESTOWN NAVY YARD





AERIAL PHOTOGERAPH

SCALE:1"=100'



8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865
(401) 334-4100

10 LINCOLN ROAD, SUITE 210
FOXBORO, MA 02035
(508) 543-1755

PARE PROJECT No. 18228.00

FEBRUARY 2019

FIGURE 2

PIER 4 CULVERT AND SINKHOLE REPAIRS
CHARLESTOWN NAVY YARD

National Flood Hazard Layer FIRMette



42°22'35.49"N
71°3'27.53"W



USGS The National Map: Orthoimagery. Data refreshed October, 2017.
42°22'28.91"N
71°2'50.07"W

Legend

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

SPECIAL FLOOD HAZARD AREAS

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

OTHER AREAS OF FLOOD HAZARD

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

OTHER AREAS

- Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

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

OTHER FEATURES

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

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/1/2019 at 3:03:59 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Figure 3

Investigation Findings Report

October 23, 2018

Ms. Dolores Fazio
Senior Project Engineer
Boston Planning and Development Agency (BPDA)
22 Drydock Avenue, Suite 201
Boston, MA 02210

Re: **Charlestown Navy Yard Pier 4 Sinkhole Repairs
Investigation Findings Report
Boston, MA**
(Pare Project No.: 18228.00)

Dear Ms. Fazio:

In accordance with our scope of work, Pare Corporation (Pare) has completed an investigation into several sinkholes that have developed at Pier 4 in the Charlestown Navy Yard (CNY). The investigation included two (2) test pits, a visual inspection of the existing culvert at low water completed by boat, and a dive inspection to review the conditions below the culvert.

BACKGROUND

At the landside connection of Pier 4, an approximate 8" diameter sinkhole developed adjacent to the vehicular driveway accessing the pier. The sinkhole has been a recurring issue at the site and has been patched several times, most recently approximately 6 months ago with a small concrete plug and compacted gravel. Several depressions were also noted in the brick walkway between the roadway and pile-supported pier.

Existing drawings depict a steel sheet pile bulkhead wall and a timber pile supported concrete box culvert below grade near the observed sinkhole. The purpose of the investigation is to identify to source of the loss of fill, which will enable the design of permanent repairs.

INVESTIGATION FINDINGS

Several test pits were completed by Fleming Brothers under a separate contract with the BPDA between September 19-20, 2018. Two test pits were completed in the bituminous turn-around area and the brick walkway, as shown on Figure 1-Site Sketch. Pare utilized a boat to inspect portions of the steel sheet pile wall and the culvert on September 19, 2018. The underwater dive inspection was completed by InnerTech Marine Services under subcontract to Pare on October 2, 2018. The following observations were noted during the investigation:

Test Pit #1 (TP1) - under bituminous pavement:

- The test pit was approximately 20 feet long, 3 feet wide, and up to 15 feet deep.
- The test pit was located at the sinkhole and adjacent to the existing concrete culvert wall.
- The existing As-Built plans indicated that there was no gap between the sheet pile wall and the culvert wall; however, the test pit uncovered an approximate 3' wide space between the structures. The test pit was excavated between the exposed side of the culvert and steel sheet pile wall.
- Both the concrete culvert wall and steel sheet pile wall appeared to be in fair condition given their age.
- A concrete plug was removed from the excavation near the top of the test pit. This is believed to be part of the previous repair from 6 months prior.
- A second concrete plug was uncovered at a depth of approximately 8 feet. It is unknown when this plug was placed.
 - A void was revealed below the concrete plug. The void was approximately 2 feet high and 3 feet wide. The void was probed to be approximately 7 feet long, terminated at a second sheet pile wall.





- Water was observed at a depth of 15 feet below the top of the excavation, and appeared to be near the same elevation of the harbor.
 - While the test pit was open, the water within the excavation fluctuated with the tide level, indicating this soil was free draining.

Test Pit #2 (TP2) - under brick walkway:

- The test pit was approximately 14 foot long, 5 foot wide, and 12 foot deep excavated within the brick walkway area adjacent to the first test pit. The test pit was located parallel with the curb.
- No water was observed in the test pit and soil appeared to be firm and undisturbed. It does not appear that the sinkhole extends to this side of the sheet pile wall.
- A concrete seal was shown on the existing drawings at the joint of two sheet pile walls. The seal was observed in the test pit and appeared to be intact.

Culvert Inspection:

- A boat inspection was completed of the visible exterior and interior portions of the 6-foot by 12-foot concrete culvert. The culvert inspection was limited to the accessible areas between the discharge end of the culvert to the 45-degree bend in the culvert as the culvert approached the pump house.
- The discharge end of the culvert extended through a sheet pile wall which was cast into the floor of the culvert. The steel sheet pile below the opening of the culvert was severely deteriorated with areas of 100% section loss.
- The tide gate located at the discharge end of the culvert is no longer operational. The gate was detached from its hinges and is laying on the floor of the culvert.. A ladder with an access hatch to the topside was located within the culvert and appeared to be abandoned as there is no access on the topside.
- No significant deterioration was observed throughout the concrete culvert. Cracking was typical along the concrete joints with minor efflorescence noted at several locations.
- A steel sheet pile wall, perpendicular to the culvert alignment was exposed at the bottom of the culvert. It appears that the sheet piles were cut to for the installation of the culvert and the floor was cast around the SSP. Based on available drawings, it is believed to be the steel sheet pile observed in TP2,
- No significant sediment buildup was observed along the bottom of culvert.
- The outboard face of the culvert appeared to be in fair condition with minor scour and deterioration at the cold joint between the culvert floor and walls.

Bulkhead Inspection:

- A boat inspection was performed of the visible portions of the bulkhead adjacent to the culvert opening and along the west side of the culvert.
- To the east of the culvert opening, an electrical duct bank that penetrated the sheet pile was abandoned and was patched with steel plates. The patches appear to be in good condition with no observed leaks or significant deterioration.
- An approximate 5-inch diameter hole was observed nearly 1-foot above the low water line approximately 4 feet east of the culvert opening in the bulkhead.
 - The hole appeared to be cut in the piles, with clean, square edges.
 - A void was noted behind the wall and was probed with a measuring tape to approximately 8 feet.
- No significant deterioration was observed in the section of sheet pile on west side of culvert.

Underwater Inspection:

The following comments provide a summary of the underwater observations. For detailed descriptions, please see the attached Underwater Inspection Report.

- The objective of the underwater inspection was to attempt to identify a source of leakage below the test pit. The Diver also provided a general conditions overview of the timber piles below the culvert and the existing steel sheet piles along the eastern side of the culvert.



- The diver observed the area beneath the test pit, indicating that it appeared to be a deteriorated “wall” or mass plug. The “wall” consisted of stone and cobbles, brick, concrete, and other deleterious material.
 - The “wall” appeared hard and was probed with a rod. Some of the stone or brick near the top of the wall could be broken away from the concrete.
 - The top of the wall was slightly above the low water line. The top of the wall was deteriorated and scoured, exposing an approximate 18” high void between the top of the wall and the bottom of the culvert.
- The diver indicated that a majority of the timber support piles below the culvert are rotted to the extent where they are no longer connected to or are supporting the culvert.
 - A majority of the piles are rotted from the bottom of the culvert to approximately 2’ below the structure.
 - The piles that remain in contact with the bottom of culvert are critically deteriorated with significant section loss, deep striations and delamination, and holes from marine borer attack.
- The diver inspected the sheet pile wall near the entrance to the culvert. Pare had previously noted a hole above low water. The diver indicated the deterioration extends below water, with larger voids at both belly-ins and belly-outs of the piles.
 - The diver was able to probe inside one of the holes and noted a large void behind the wall. Based on measurements and estimates, the void appears to be approximately 10’ in diameter.

RECOMMENDATIONS

Based on the results of the investigation, there are several critical deficiencies that require urgent attention; the large sinkhole that has developed behind the existing bulkhead and the deteriorated support piles beneath the culvert. The repairs for these deficiencies will likely include options for short-term and long-term solutions and may have significant design and permitting implications. Construction impacts should also be considered for each alternative.

In the short term, since there is no evidence of support for the culvert, it would be prudent to close the area above the culvert to traffic. This will essentially shut down the rotary and would limit vehicular access to Pier 4; however, the installation of a temporary access ramp over the curb may be possible to maintain access to Pier 4. The sidewalk to the south of the culvert is part of the pile supported pier and could likely remain open.

We trust that this report suits your needs at this time, and we look forward to discussing the next steps toward the design of repairs with you. If you have any questions, please contact me at 508.543.1755.

Sincerely,
PARE CORPORATION

Ryan McCoy, P.E.
Senior Project Engineer

Attachments: Photos
 Existing Site Plan
 Existing Sections



Photo No. 1: Overview of the west side of Pier 4.



Photo No. 2: Overview of Test Pit 1 (TP1). The excavation is approximately 50% completed within this picture.





Photo No. 3: Overview of TP1 after the excavation was complete. Note the void below the concrete plug.



Photo No. 4: View of the void below the concrete plug. A concrete seal appears to be at the intersection of the SSP and the concrete culvert wall.





Photo No. 5: 3-foot thick concrete plug placed between the concrete wall and the steel sheet pile wall before backfilling.



Photo No. 6: Location of Test Pit 2 (TP2).





Photo No. 7: Overview of TP2, note the soil appears to be dry intact.



Photo No. 8: Overview of TP2 after it was backfilled. A concrete overlay was placed at the top of the test pit.





Photo No. 9: View of the discharge end of the culvert. The tide gate is laying at the bottom of the culvert and detached from its hinges.



Photo No. 10: Overview of the tide gate on the floor of the culvert. Note the gate is no longer operational.





Photo No. 11: Location of a 5" diameter hole east of the culvert opening.

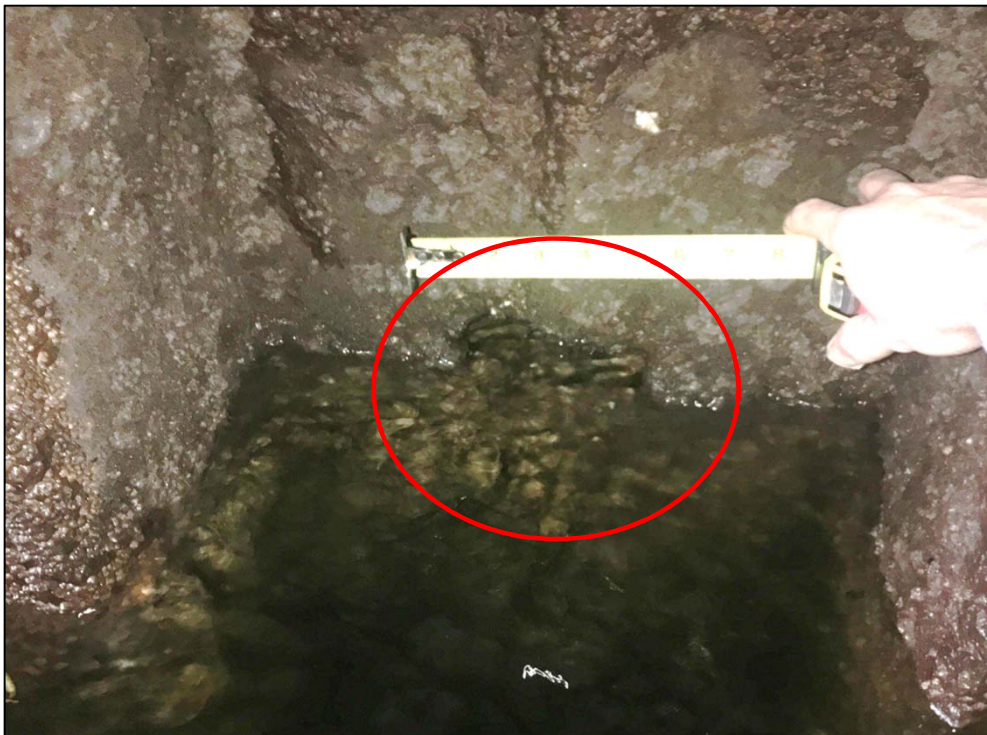


Photo No. 12: Detailed photograph of the 5-inch diameter hole.





Photo No. 13: Typical wall and ceiling joint intersection. Note efflorescence along roof joint.



Photo No. 14: Overview of typical culvert ceiling joint.





Photo No. 15: Overview of the inside of the culvert looking towards the pump house and the 45-degree bend.



Photo No. 16: Sheet pile wall protruding through the floor of the culvert, approximately 50 feet from the discharge end of the culvert.





Photo No. 17: Culvert access ladder approximately 15 feet from the discharge end of the culvert.



Photo No. 18: Access to culvert hatch opening. Access is not visible from the topside and appears to be abandoned.





Photo No. 19: Discharge end of the culvert ceiling. Note the culvert appears to protrude through a sheet pile wall.



Photo No. 20: Floor of the discharge end of the culvert. Note the sheet pile wall along the underside of the culvert.





Photo No. 21: View of the cut sheet pile wall from the outside of the culvert, approximately 50 feet from the discharge end.



Dive Inspection Report

**FIELD SUMMERY REPORT
INVESTIGATION OF FILL LOSS AND EXISTING CONDITIONS
UNDER THE CHARLESTOWN NAVY YARD, PIER 4
CONCRETE CULVERT**

**TERRY RING WAY, BOSTON
MASSACHUSETTS**

PROJECT DATE: October 3rd, 2018

PERSONAL: S. Antoniou- Diving inspector
M. Bradshaw- Stand-by diver, topsides supervisor
J. Marmaris- Tener

PROJECT HISTORY: There is a concrete discharge culvert coming from the old Charlestown Navy Yard pump house. The culvert is a square concrete structure bearing on wooden pilings adjacent to the Charlestown Navy Yard harbor walk and the Bay Transit Authority pier. Depressions were forming in the brick walkway above the path of the culvert. Excavations uncovered the east wall of the culvert and a sheet pile bulkhead, approximately 3ft from the east wall. The excavation was subject to tidal flow and gravel fill between the bulkhead and east wall was believed to be emptying out under the culvert. Inner Tech was contracted to conduct an inspection of the area under the culvert and report on existing conditions.

DIVE STATION: The dive station, including compressor, umbilicals, helmets, safety equipment and service trailer was brought to site and set up on the brick walkway next to the culvert. Access to the water was via the Bay Transit Authority float, the exposed west wall of the culvert and the area to be inspected was visible from the float.

OBSERVATIONS: The entire culvert floor is exposed and undermined 6-18 inches under the east wall-floor and 3-5ft under the west wall-floor. The culvert was constructed on top of wooden pile bents. There are approximately 4 piles per bent, the bents are approximately 4ft apart. The wooden piles are totally deteriorated and with the exception of an occasional pile. All that remains are the round casting depressions left in the undersides of the culvert floor and a small stub with pencil like projections sticking out of the gravel bottom. 3 or 4 intact piles were noticed along the 30-40ft inspected. These piles have considerable sectional loss and large holes likely left by marine borers. There is a east-west sheet pile bulkhead running perpendicular and under the culvert, just downstream from the area which is loosing fill. The sheet pile is in very poor condition with large holes. The metal around the holes can be pulled off by hand. Loose gravel fill from above was emptying along a 6ft area under the east wall-floor, from the perpendicular bulkhead north. Beyond this is an area which the fill is more

compacted or solid, similar to deteriorated concrete or brick rubble, the rubble is hard to a probe. The compacted material is keeping the gravel from above from dropping out under the floor of the flume. There is another undermined area visible when looking through the bulkhead holes in front of the culvert discharge, east of the adjacent culvert wall. The hollow area was observed to be approximately 4-6ft wide, approximately 6-12 inches or greater high and extending along the east side of the sheet pile bulkhead as far as can be seen, 5-6ft or greater. There is a depression in the brick walkway above this area.

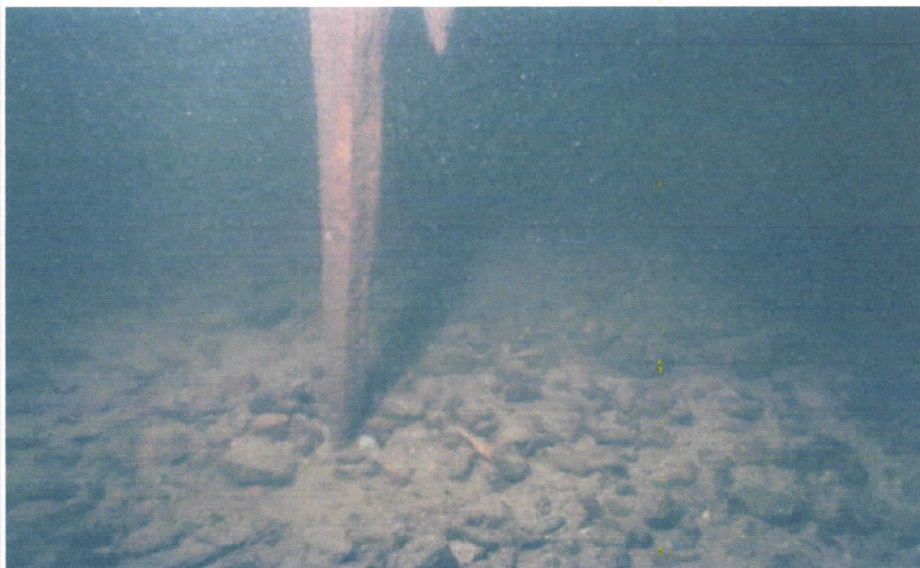


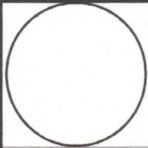
Photo #1 showing remains of bearing pile under the culvert



Photo #2 showing intact pile with deep striations



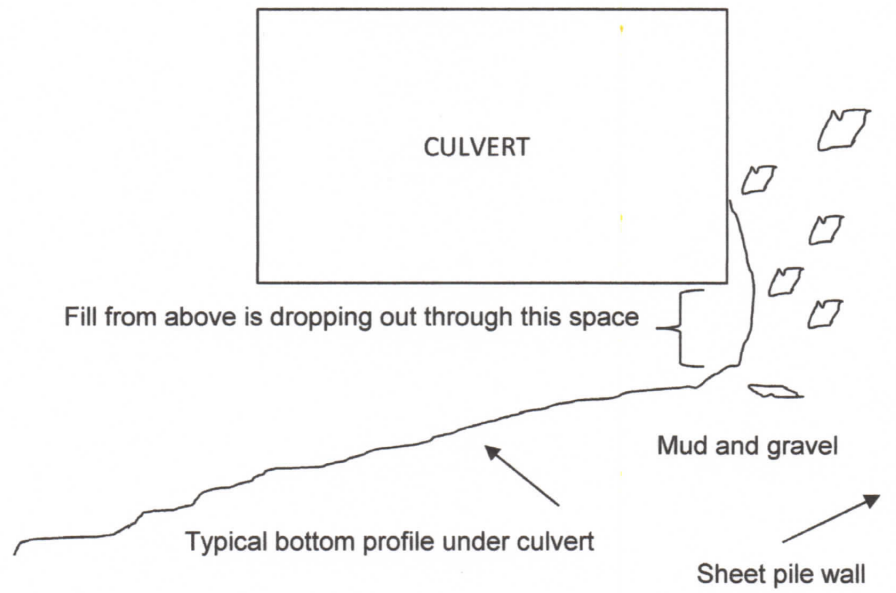
Photo #3 showing typical rubble fill between the sheet pile wall and the culvert wall

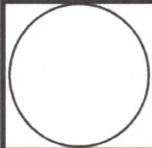


north

BOSTON NAVY YARD
X SECTION THROUGH DISCHARGE CULVERT
IN THE AREA OF FILL LOSS

NOT TO SCALE

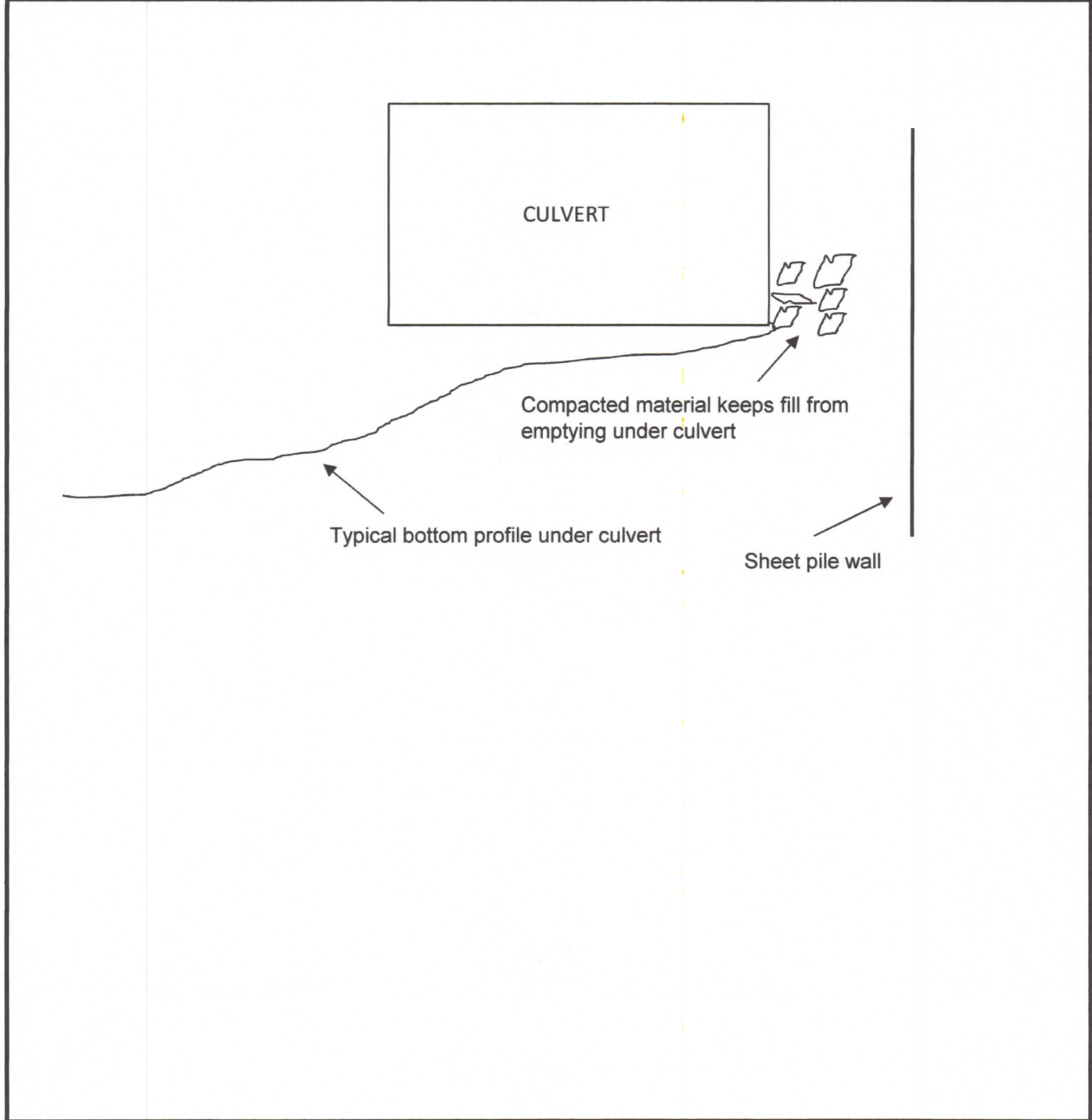


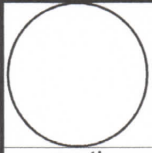


north

BOSTON NAVY YARD
X SECTION THROUGH DISCHARGE CULVERT
JUST NORTH OF AREA WITH FILL LOSS

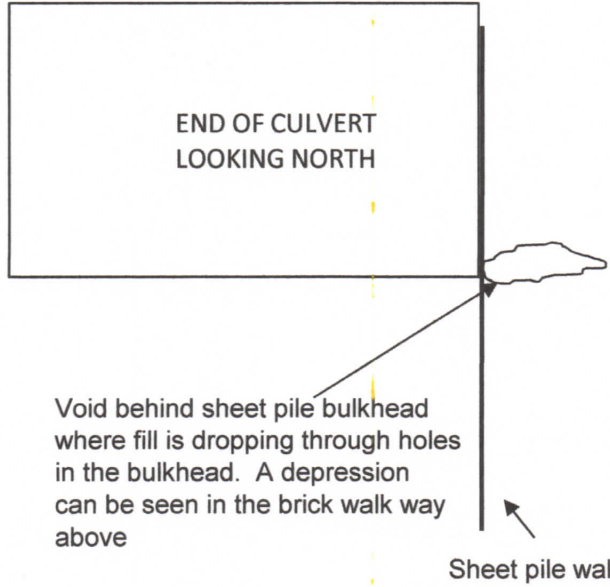
NOT TO SCALE





north

BOSTON NAVY YARD
X SECTION THROUGH END OF DISCHARGE CULVERT
JUST NORTH OF SHEET PILE BULKHEAD
ACROSS END OF CULVERT
NOT TO SCALE



**Project Plans
(Bound Separately)**