New Bedford Harbor Superfund Site

U.S. Army Corps of Engineers New England District

Draft Final Intertidal Work Plan for West Zone 4

ACE-J23-35BG6000-M1-0053

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New Bedford Harbor Superfund Site

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Document history and status

Revision	Date	Description	By	Review	Approved

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Figures

Tables

Appendix

Acronyms and Abbreviations

CSO	combined sewer overflow
cy	cubic yards
EPA	U.S. Environmental Protection Agency
DDA	Debris Disposal Area
ft	foot/feet
Generic Work Plan	*Draft Final Generic Upper Harbor Intertidal Work Plan Revision 1*
GPS	Global Positioning System
IA	immunoassay
mg/kg	milligrams per kilogram
NAE	U.S. Army Corps of Engineers, New England District
NBHSS	New Bedford Harbor Superfund Site
PCB	polychlorinated biphenyl
PECC	pre-excavation confirmatory congener
RAL	remedial action level
ROD	Record of Decision
RTK	Real Time Kinematic
sf	square feet
TCLs	target cleanup level
TSCA	Toxic Substances Control Act
UCL	upper confidence limit

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1.0 Introduction

This Work Plan for West Zone 4 provides information concerning shoreline remediation and restoration pursuant to the New Bedford Harbor Superfund Site (NBHSS), including maps and figures of the excavation areas, equipment access plans, sample locations, and existing and proposed wetland cover and topography. The *Draft Final Generic Upper Harbor Intertidal Work Plan Revision 1* (Generic Work Plan; Jacobs 2019a) describes the means and methods for intertidal excavation, material stabilization, drainage water management, transport and disposal of polychlorinated biphenyl (PCB)-contaminated intertidal sediments, restoration of excavated areas and post-remediation monitoring and maintenance. This zone-specific work plan provides additional detail and documents any deviations from the procedures in the Generic Work Plan. The remediation approach described in this work plan for West Zone 4 Parcel 105-183 may be superseded by a capping plan in development for adjacent subtidal Area L.

As described herein, certain areas of the sediment and soil on the parcels contain PCB contamination that exceeds the established target cleanup levels (TCLs) for intertidal sediment. The PCB TCLs are provided in the 1998 U.S. Environmental Protection Agency (EPA) Record of Decision (ROD) for the NBHSS (EPA 1998). The TCLs for intertidal shoreline areas in West Zone 4 are 25 milligrams per kilogram (mg/kg) for the top 1 foot (ft) (95% upper confidence limit [UCL] of the mean concentration), and 50 mg/kg below 1 ft landward of the mudflats (not-to-exceed value). This 25 mg/kg TCL has been applied because of the anticipated construction of a recreational public walking path along the Upper Harbor western shoreline. The TCL for Upper Harbor mudflats and subtidal areas is 10 mg/kg, which must be attained as an average on an Upper Harbor-wide basis. Sediment and soil with PCB concentrations exceeding the TCLs will be removed and disposed of in an off-site Toxic Substances Control Act (TSCA) permitted landfill. Following contaminated sediment removal, areas that originally supported vegetative cover will be backfilled with clean topsoil to the approximate original elevation and restored with a similar vegetation type. Unvegetated areas (i.e., mudflats) will be backfilled as needed to stabilize the shoreline.

2.0 Parcel Description

The intertidal management area referred to as West Zone 4 is located on the western shore of the Upper New Bedford Harbor in New Bedford, MA. West Zone 4 consists of two parcels: 105-170 and 105-183; portions of each parcel will be remediated. A site location map showing the West Zone 4 parcels and the limits of the planned excavations is provided in Figure 2-1.

Parcel 105-170 is comprised of a former industrial building converted to residences and a parking area in the western portion and undeveloped land in the eastern portion. The shoreline consists of mudflats, low marsh, scrub-shrub marsh and beach. The parcel is bounded to the north by Parcel 111-155; to the west by Riverside Avenue; to the south by Parcels 105-183, 105-135 and 105-206; and to the east by the Upper Harbor.

Parcel 105-183 is comprised of an industrial building and parking area in the northwest corner and undeveloped land in the eastern portion. The shoreline consists of mudflats, low marsh, scrub-shrub marsh and the invasive grass, *Phragmites australis*. The parcel is bounded to the north by Parcel 105-170; to the west and southwest by Parcels 105-135, 105-209, 105-208 and 105-207; to the south by Manomet Street, and to the east by the Upper Harbor.

The existing wetland vegetation for West Zone 4 was surveyed in 2017. The mapped survey results and the outlines of the excavation areas are provided in Figure 2-2a and Figure 2-2b. Sediment and soil samples collected

during the site investigation/characterization phase were analyzed for total PCBs by both immunoassay (IA) and congener methods. The analytical results summarized in Table 2-1a and Table 2-1b were used to support remediation planning. The PCB characterization sample locations used to delineate the extent of PCB contamination within West Zone 4 are shown in Figure 2-3a and Figure 2-3b. A subset of these locations was also designated as confirmatory sample locations, which are described further in Section 3.3.

3.0 Excavation

3.1 Site Preparation

Access to the portions of Parcels 105-170 and 105-183 requiring remediation will be through private property that is currently under access agreements obtained by EPA. Temporary roads will be built to create equipment access to the remediation areas. Approximately 1,100 linear ft of temporary access roads will be constructed. The roads will be approximately 15 ft wide. A construction site plan showing the excavation areas and temporary access roads is provided as Figure 3-1. The temporary access road in the northern portion of Parcel 105-183 will traverse a patch of *Phragmites*. As described in the Generic Work Plan, the access road will be constructed using a layer of geotextile fabric covered by either 12 inches of dense-grade aggregate or construction mats, which will prevent contact between the construction vehicles using the road and the *Phragmites*. The use of aggregate or mats will be determined in the field when the roads are cleared.

Prior to any site clearing or grubbing necessary to build the access roads to the excavation areas, mature, non-invasive tree and shrub species will be marked in the field and preserved when possible during construction. Native tree and shrub inventories for Parcels 105-170 and 105-183 are included as Appendix A. Other vegetation will be cleared from the site as necessary to permit access road construction and remedial excavation. Construction access was designed to minimize disturbance of the property to the maximum extent practicable.

3.2 Excavation Plan

Using PCB data collected through multiple rounds of sampling, a 3-dimensional excavation model was developed as depicted in the West Zone 4 excavation plans in Figures 3-2a, 3-2b, and 3-2c. The horizontal and vertical extents of the excavations include all sample locations with total PCB concentrations exceeding TCLs (for non-mudflat locations), and mudflat locations with PCB concentrations exceeding the subtidal/mudflat remedial action level (RAL) of 30 mg/kg.[1] All of the 0-1 ft samples outside of the excavation areas have total PCB concentrations below 25 mg/kg except for WS408 in Parcel 105-170 (Figure 2-3a). The After-Action Report for WZ4 will include the calculated 95UCL for these parcels and document that it complies with the ROD's TCL. The vertical extent of contamination was not delineated at four locations on Parcel 105-183 as follows:

- INT239, INT240, and INT243: the maximum coring depth was 5 ft at these locations; the excavation depths will extend to 6 ft.
- S-3849: the maximum coring depth was 3 ft at this location; the excavation depth will extend to 4 ft.

The cut depth, areal extent of contamination and pre-excavation surface elevations for the excavation areas are shown on Figure 3-2a for Parcel 105-170 and on Figures 3-2b and 3-2c for Parcel 105-183. The total area to be

[1]The excavations in non-mudflat areas were designed to achieve a 95UCL of the mean PCB concentration in the 0-1 ft depth interval of <25 mg/kg and all PCB concentrations <50 mg/kg below 1 ft after remediation.

excavated is approximately 49,932 square feet (sf) and has a corresponding volume of 3,719 cubic yards (cy). The eastern (seaward) edge of the excavation areas has been adjusted to match the landward extent of dredging.

A combined sewer overflow (CSO) outfall and discharge channel bordered by rip rap and a deteriorated timber wall are located at the end of Manomet Street at the south end of Parcel 105-183. The outfall pipe will be extended east into the harbor during remediation to minimize potential impacts to the excavation from wet weather overflows. The excavation at the south end of Parcel 105-183 will approach but will not disturb or undermine the timber wall and rip rap on the north side of the CSO discharge channel. Several of the proposed excavations in West Zone 4 are narrow and up to 6 ft deep, and engineering controls may be required to stabilize the side slopes.[2] The nature of the engineering controls will be determined at the time of construction. Final excavation extents will be documented in the After-Action report.

The onsite materials management and excavation water management procedures provided in Section 4.3 of the Generic Work Plan assume that the Debris Disposal Area (DDA) at Area C will be available to support remediation activities. If the DDA is not available, then an alternative staging and dewatering area will be identified.

3.3 Post Excavation Compliance

Confirmation of compliance with the TCLs will be based on pre-excavation confirmatory congener (PECC) sampling and collection of post-excavation survey data to demonstrate that the excavation achieved the horizontal and vertical design limits. The PECC sample locations shown in Figures 2-3a and 2-3b include top-of-bank, excavation sidewall and excavation floor locations where PCB congener concentrations were previously determined to be below the TCLs. PECC sample results are shown in Tables 2-1a and 2-1b. In areas where the excavation extends to the base of shoreline rip rap, top-of-bank PECC samples were collected above the rip rap at approximate 100-ft intervals. Post-excavation confirmatory samples for mudflats that are subtidal after excavation will be collected as part of the subtidal confirmatory sampling program.

If the PECC approach is proven to be ineffective at a previous intertidal pilot test area (i.e., in East Zone 1 or West Zone 1), then post-excavation confirmatory samples will be collected at the PECC locations, and the excavation will not be backfilled until it is confirmed to be below the TCLs. However, if any areas of Parcel 105-183 show heavy oil staining or sheens within the excavation, the excavation will be backfilled immediately with topsoil with no post-excavation confirmatory sampling required.

Compliance survey locations are spaced at approximate 100-ft intervals along the excavation sidewalls and floors. Design elevation compliance measurements at the compliance survey locations will be made using a real-time kinematic (RTK) global positioning system (GPS) with vertical and horizontal accuracies of less than 0.1 ft. However, any areas of Parcel 105-183 that show heavy oil staining or sheens within the excavation will be backfilled immediately with topsoil without waiting for compliance surveying to occur. The steep-sided excavations that will be performed to access particularly deep areas of contaminated soil will also be backfilled rapidly to avoid wall failure. In these cases, the RTK GPS unit on the excavator bucket will be used to confirm that the design elevation was achieved. Compaction by heavy equipment after excavation will be avoided until target elevations are confirmed by RTK survey.

[2] The vertical extent of contamination at sampling location S-3415 on Parcel 105-170 is 3.3 ft; however, this location is immediately adjacent to the edge of the excavation at the base of a rip rap slope. The planned excavation is 3 ft at this location due to sidewall stability concerns.

Tables 3-1a and 3-1b provide survey control tables to document the pre- and post-excavation compliance measurements and compliance survey locations are shown in Figures 3-3a and 3-3b. Additional removal will be performed if a post-excavation elevation survey indicates that a compliance survey location was not excavated to the target elevation. Additional removal will be performed as described in Section 4.5 of the Generic Work Plan.

4.0 Backfill

After verification that compliance with the TCLs and design elevations has been met, the excavations will be backfilled with clean manufactured topsoil. The topsoil will meet the quality requirements identified in the *Draft Final Topsoil Acceptance Plan* (Jacobs 2019b). Backfill in saltmarsh areas will consist of 12 inches of topsoil to support vegetation regrowth and achieve the restoration design provided in Section 7.0. Where excavation depth exceeds 1 ft, a 3-inch minus clean gravel substrate will be placed to within 1 ft of the target grade and topsoil will be placed on top of the substrate to bring the surface to the target elevation. A possible exception to this will be in areas where heavy oil staining or sheens are observed within the excavation. In such cases, topsoil will be used for the entire backfill (without any subgrade gravel). The high organic carbon content of the topsoil backfill (5 to 8 percent) will reduce the mobility of heavy oil contaminants. Excavated mudflats will be backfilled with gravel as needed to provide slope stability or drainage. A specification for the gravel backfill is provided in the Generic Work Plan.

The gravel substrate and topsoil will be delivered to the restoration areas by over-the-road dump trucks and offloaded into stockpiles near the excavation areas. A clean, decontaminated all-terrain dump truck or tracked excavator will transport the topsoil for spreading. Post-backfill saltmarsh topography will closely match the pre-excavation topography with a tolerance of +/- 0.3 ft as described in Section 7.0. The surface may be restored to an elevation of 0.1 to 0.2 ft above the planned grade to allow for natural soil compaction. During the restoration process, the elevation of the placed topsoil will be checked periodically with the GPS Rover and with the excavator bucket. Elevation measurements will be taken after each area is backfilled, prior to relocating the excavator.

5.0 Schedule

The anticipated durations of the remedial activities included in this Work Plan are listed below. A more detailed construction planning schedule will be provided as Appendix C prior to initiation of field activities.

Activity	Anticipated Duration
Excavation	2 months
Restoration	1 month
After Action Report	3 months

6.0 Air Monitoring

The evaluation of existing PCB congener data (Tables 2-1a and 2-1b) indicates that the maximum PCB concentration at Parcel 105-183 is 2,360 mg/kg. Particulate and airborne PCB monitoring will be conducted in accordance with the guidelines provided in the *Draft Final Ambient Air Monitoring Plan for Remediation Activities Revision 2* (Jacobs 2018a).

7.0 Restoration

All excavated areas except mudflats will be backfilled, regraded, and revegetated to best replicate the pre-remediation conditions as outlined in the Generic Work Plan (Jacobs 2019a). Portions of areas originally mapped as scrub shrub marsh will be revegetated with low marsh, high marsh, or upland species depending on the elevation. The pre-construction wetland cover conditions shown on Figure 2-2b for Parcel 105-83 include a stand of the non-native invasive grass *Phragmites*. *Phragmites* that occurs within the excavation area will be removed and disposed of with the excavated sediment and the topography will be modified slightly to achieve a restoration design that includes transitions from low marsh to high marsh to scrub shrub marsh to upland. Mudflats will be backfilled to pre-excavation elevations to approximately 10 ft seaward of the low marsh/mudflat boundary, then sloped downward to meet the existing harbor bottom. As specified in the Generic Work Plan, upland areas impacted by remediation activities (i.e., access roads) will be seeded with conservation seed mix. Any trees removed as part of access road construction or excavation will be replaced at the same or nearby suitable location. A pre-construction tree and shrub inventory of plants within the excavation area and access road area is included in Appendix A.

Proposed restored vegetation types within the remediation areas are shown in plan view in Figure 7-1a and Figure 7-1b. A conceptual cross section is provided in Figure 7-2 and construction cross sections are provided in Appendix B. Tree and shrub species identified for restoration are included in the planting notes included in Figures 7-1a and 7-1b. The existing and proposed post-restoration acreages of each cover type are included in Tables 7-1a and 7-1b and shrub restoration area summaries are provided in Tables 7-2a and 7-2b. Areas to be restored as upland within the backfilled excavations on Parcel 105-183 will be seeded with the coastal salt-tolerant seed mix shown in Table 7-3. As depicted in Figures 7-1a and 7-1b, coir logs will run the entire length of the excavated areas on the seaward edge of the restored low marsh along both Parcels 105-170 and 105-183.

Planting of trees, shrubs and 2-inch bare-root salt grass plugs will be conducted after excavation and backfill in accordance with favorable weather conditions and within the planting season from approximately April 15 to June 30 or in the early fall (Jacobs 2019a). Salt grass plants will be obtained from a nursery that that can provide plugs grown from a Northeastern U.S. genotype seed stock.

Herbivory deterrents will be used to protect the seedlings during the establishment period. A combination fence and rope grid system similar to the one installed at the Pierce Mill Cove intertidal restoration area will be constructed (Jacobs, 2018b). If unforeseen conditions are identified that could affect the ability of the restoration to achieve the success standards adopted for the program, appropriate adaptive management measures will be developed and implemented in coordination with the U.S. Army Corps of Engineers, New England District (NAE) and EPA.

No mechanical removal of *Phragmites* is proposed outside of excavation boundaries. All remaining areas of *Phragmites* within 30 ft of the restored marsh will be treated with herbicide in accordance with the guidelines in the Generic Work Plan to promote a *Phragmites* free buffer. Monitoring and maintenance in restored areas will be performed as described in the Generic Work Plan (Jacobs 2019a). At the conclusion of all restoration activities, final vegetation and topographic surveys will be conducted to document the as-built elevation and vegetative cover conditions.

8.0 References

U.S. Environmental Protection Agency (EPA). 1998 (September). *Record of Decision for the Upper and Lower Harbor Operable Unit, New Bedford Harbor Superfund Site*. USEPA Region 1 – New England.

Jacobs. 2019a (May). *Draft Final Generic Upper Harbor Intertidal Work Plan Revision 1*. ACE-J23-35BG2000-M1-0109.

——— 2019b (January). *Draft Final Topsoil Acceptance Plan*. ACE J23 35BG2000 M1-0076.

——— 2018a (April). *Draft Final Ambient Air Monitoring Plan for Remediation Activities Revision 2*. ACE-J23-35BG2000-M17-0016.

——— 2018b (November). *NBHSS Draft Final Pierce Mill Cove Herbivory Control Plan.* ACE-J23-35BG2000-M17-0040.

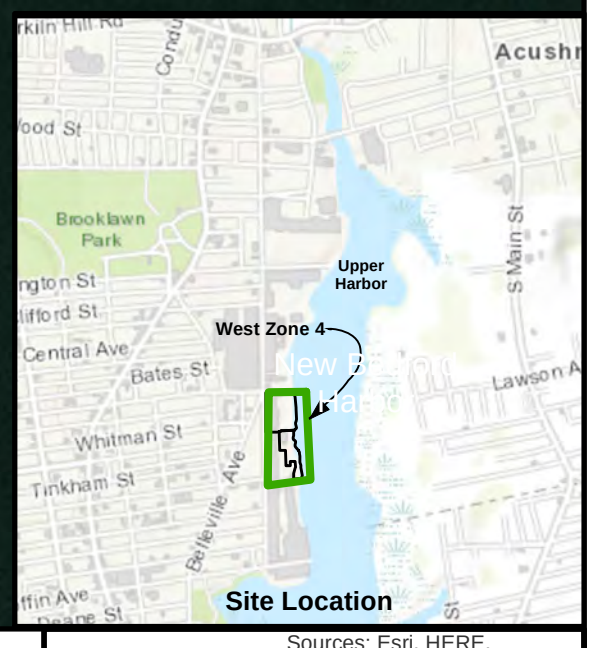
Figures

105-170

105-183

Riverside Ave

Manomet Street



Legend

- Proposed Limits of Excavation
- West Zone 4 Management Area
- Parcel Boundary

Basemap Data Source: MassGIS, ESRI
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

0 150 300 Feet

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo,

Intertidal West Zone 4
Site Location and Features

New Bedford Harbor Superfund Site

September 2019 **Figure 2-1**

Path: C:\Users\scottga\Documents\NBH\35BG.1001\20180901_Intertidal\WZ4\ArcGIS\WP_Figures\Fig 2-1 WZ4_WP_Site_Location_20190923.mxd

Notes:

Existing vegetative cover was surveyed by Nearview, LLC (October 2017).

105 183

105 170

111 155

5

5

5

0

0

0

-5

-5

-5

10

Legend

- 0-1' Excavation Depth
- 1-2' Excavation Depth
- 2-3' Excavation Depth
- 3-4' Excavation Depth
- 1-foot Contour
- Mean Lower Low Water
- Mean Higher High Water
- Beach
- Low Marsh
- Mudflat
- Scrub-Shrub Marsh
- Parcel Boundary

0 50 100 Feet

September 2019

Basemap Data Source:
Green Seal Environmental, MassGIS

Vertical Datum:
NAVD88

Intertidal West Zone 4 Parcel 105-170
Existing Vegetation, Topography, and Excavation Area

New Bedford Harbor Superfund Site

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Figure 2-2a

Notes:

Existing vegetative cover was surveyed by Nearview, LLC (October 2017).

105-170

105-183

ROW

5

0

-5

-10

Legend

- 0-1' Excavation Depth
- 1-2' Excavation Depth
- 2-3' Excavation Depth
- 3-4' Excavation Depth
- 4-5' Excavation Depth
- 5-6' Excavation Depth
- 1-foot Contour
- Mean Lower Low Water
- Mean Higher High Water
- Parcel Boundary
- Low Marsh
- Mudflat
- Phragmites
- Scrub-Shrub Marsh
- Upland

0 50 100 Feet

September 2019

Basemap Data Source:
Green Seal Environmental, MassGIS

Vertical Datum:
NAVD88

Intertidal West Zone 4 Parcel 105-183
Existing Vegetation, Topography, and Excavation Area

New Bedford Harbor Superfund Site

JACOBS

Figure 2-2b

Path: C:\Users\scottga\Documents\NBH35BG10012018090l_Intertidal\WZ4\ArcGIS\WP_Figures\Fig 2-3a WZ4_WP_Parcel_105_170_Sampling_Locations_with_Excavation_Footprint_20190923.mxd

Legend

- PCB Characterization and Pre-excavation Confirmatory Congener (PECC) Sample Location
- PCB Characterization Sample Location
- Proposed Limits of Excavation
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

Basemap Source: MassGIS 2014 and Green Seal 2018

0 40 80 Feet

MHHW and MLLW Elevations NAVD88 ft.
(Green Seal, 2018)

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Intertidal West Zone 4
Parcel 105-170
Sampling Locations with Excavation Footprint
(0-1 ft Depth Interval)

New Bedford Harbor Superfund Site

September 2019 **Figure 2-3a**

Legend

- PCB Characterization and Pre-excavation Confirmatory Congener (PECC) Sample Location
- PCB Characterization Sample Location
- Proposed Limits of Excavation
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

Basemap Source: MassGIS 2014 and Green Seal 2018

0 50 100 Feet

MHHW and MLLW Elevations NAVD88 ft.
(Green Seal, 2018)

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Intertidal West Zone 4
Parcel 105-183
Sampling Locations with Excavation Footprint
(0-1 ft Depth Interval)

New Bedford Harbor Superfund Site

September 2019 **Figure 2-3b**

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111-155

e Rd.

105-170

105-183

105-209

105-208

105-207

Manomet Street

100-118

Legend

- Temporary Gravel Access Road
- Proposed Limits of Excavation
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

MHHW and MLLW Elevations NAVD88 ft.
(Green Seal, 2018)

N

Aerial Photography Green Seal 2018 and MassGIS 2014

0 50 100
Feet

1:1,200

JACOBS

Intertidal West Zone 4 Construction Site Plan

New Bedford Harbor Superfund Site

September 2019 | **Figure 3-1**

Path: C:\Users\scottgal\Documents\NBH\35BG1001\20180901_Intertidal\WZ4\ArcGIS\WP_Figures\Fig 3-1 WZ4_WP_Construction_Site_Plan_20190923.mxd

105-170

105-183

Location Map

111-98

111-155

105-170

105-183

105-209

105-208

105-207

100-118

USGS, MassGIS

Legend

- Inland Reach of Dredge (Actual)
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

Feet of Sediment To Remove

- 4
- 3
- 2
- 1

2.1 Pre-Excavation Elevations NAVD88 ft. (Green Seal 2018)

N

0 20 40 Feet

Pre-Excavation, MHHW and MLLW Elevations NAVD88 ft.
and Basemap Photography Sources: Green Seal 2018 and MassGIS 2014

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Intertidal West Zone 4
Parcel 105-170
Excavation Plan
Showing Cut Depths and Pre-Excavation Elevations

New Bedford Harbor Superfund Site

September 2019 **Figure 3-2a**

Path: C:\Users\scottga\Documents\NBH\35BG1001\20180901_IntertidalWZ4\ArcGIS\WP_Figures\Fig 3-2a WZ4_WP_Parcel_105_170_Excavation_Plan_20190923.mxd

105-170

105-183

105-209

Legend

- Inland Reach of Dredge (Actual)
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

Feet of Sediment To Remove

- 6
- 5
- 4
- 3
- 2
- 1

2.1 Pre-Excavation Elevations NAVD88 ft. (Green Seal 2018)

0 20 40 Feet

Pre-Excavation, MHHW and MLLW Elevations NAVD88 ft.
and Basemap Photography Sources: Green Seal 2018 and MassGIS 2014

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Intertidal West Zone 4
Northern Portion Parcel 105-183
Excavation Plan
Showing Cut Depths and
Pre-Excavation Elevations

New Bedford Harbor Superfund Site

September 2019 **Figure 3-2b**

Path: C:\Users\scottga\Documents\NBH\35BG1001\20180901_IntertidalWZ4\ArcGIS\WP_Figures\Fig 3-2b WZ4_WP_Parcel_105_183_Excavation_Plan_Northern_Portion_20190923.mxd

105-183

105-209

105-208

105-207

100-118

Legend

- Inland Reach of Dredge (Actual)
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

Feet of Sediment To Remove

- 6
- 5
- 4
- 3
- 2
- 1

2.1 Pre-Excavation Elevations NAVD88 ft. (Green Seal 2018)

N

0 20 40 Feet

Pre-Excavation, MHHW and MLLW Elevations NAVD88 ft.
and Basemap Photography Sources: Green Seal 2018 and MassGIS 2014

JACOBS™

Intertidal West Zone 4
Southern Portion Parcel 105-183
Excavation Plan
Showing Cut Depths and
Pre-Excavation Elevations

New Bedford Harbor Superfund Site

September 2019 **Figure 3-2c**

Path: C:\Users\scottga\Documents\NBH\35BG100\120180901_Intertidal\WZ4\ArcGIS\WP_Figures\Fig 3-2c WZ4_WP_Parcel_105_183_Excavation_Plan_Southern_Portion_20190923.mxd

Legend

- Compliance Survey Location
- Proposed Limits of Excavation
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

Basemap Source: MassGIS 2014 and Green Seal 2018

0 40 80 Feet

MHHW and MLLW Elevations NAVD88 ft.
(Green Seal, 2018)

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Intertidal West Zone 4
Parcel 105-170
Compliance Survey Locations with Excavation Footprint
(0-1 ft Depth Interval)

New Bedford Harbor Superfund Site

September 2019 **Figure 3-3a**

Path: C:\Users\scottga\Documents\NBH\35BG1001\20180901_Intertidal\WZ4\ArcGIS\WP Figures\Fig 3-3a WZ4_WP_Parcel_105_170_Compliance_Sampling_Locations_with_Excavation_Footprint_20190923.mxd

105-170
105-183
105-209
105-208
105-207
Manomet Street
WS442
WS443
WS412
WS445
WS444
WS415
WS447
WS418
WS446
WS448
WS449
WS425
WS450
WS451
WS420
WS452
WS453
WS455
WS454
WS423
WS456
USGS, MassGIS

Legend

- Compliance Survey Location
- Proposed Limits of Excavation
- MHHW (1.99ft NAVD88)
- MLLW (-1.97ft NAVD88)
- Parcel Boundary

MHHW and MLLW Elevations NAVD88 ft.
(Green Seal, 2018)

Basemap Source: MassGIS 2014 and Green Seal 2018

0 50 100 Feet

JACOBS™

Intertidal West Zone 4
Parcel 105-183
Compliance Survey Locations with Excavation Footprint
(0-1 ft Depth Interval)

New Bedford Harbor Superfund Site

September 2019 **Figure 3-3b**

Path: C:\Users\scottga\Documents\NBH\35BG1001\20180901_Intertidal\WZ4\ArcGIS\WP_Figures\Fig 3-3b WZ4_WP_Parcel_105_183_Compliance_Sampling_Locations_with_Excavation_Footprint_20190923.mxd

Notes:
Proposed High Marsh plantings to include 50/50 mix of Spartina patens and Distichlis spicata, plugs, 12" on-center spacing requirements.

Proposed Low Marsh plantings to include Spartina alterniflora, plugs, 12" on-center spacing requirements.

Any native trees removed as part of access road construction or excavation will be replaced in-kind (1-gallon containers). Any invasive trees removed will be replaced on a one-to-one basis with native tree species constituting similar growth form, habit, and size (1-gallon containers).

Areas of proposed restoration surface shall be uniformly graded with a smooth finished surface and will transition back to match existing grades upon completion of construction. Slight differences between depicted and constructed surfaces may occur due to microtopographic variations across the site.

Final restored elevations will be documented in the After Action Report.

MHHW and MLLW lines are approximate.

Upland areas shall be seeded with conservation seed mix as specified in the Generic Intertidal Work Plan.

Scrub-Shrub Marsh areas shall be planted with a 50/50 mix of Iva frutescens, 1-gallon containers, 36" on-center spacing requirements, and Juniperus virginiana at landward edge, 1-gallon containers, 48" on-center spacing requirements.

Shrub Restoration Area Plantings:
Area 1:
Iva frutescens, 1-gallon containers, 36" on-center spacing requirements.

Area 2:
Myrica pensylvanica, 1-gallon containers, 36" on-center spacing requirements.
Clethra alnifolia, 1-gallon containers, 36" on-center spacing requirements.
Rhus glabra, 1-gallon containers, 48" on-center spacing requirements.

Area 1
Area 2
105-170
105-183
111-155
5
0
-5
-10

Legend

- 0-1' Excavation Depth
- 1-2' Excavation Depth
- 2-3' Excavation Depth
- 3-4' Excavation Depth
- Proposed Access Road
- 1-foot Contour
- Mean Lower Low Water
- Mean Higher High Water
- Proposed Coir Log
- Parcel Boundary
- Proposed Shrub Restoration Area
- Proposed Beach
- Proposed High Marsh
- Proposed Low Marsh
- Minimal Backfill as Needed for Drainage or Slope Stability
- Proposed Scrub-Shrub Marsh

0 50 100 Feet

October 2019

Basemap Data Source:
Green Seal Environmental, MassGIS

Vertical Datum:
NAVD88

Intertidal West Zone 4 Parcel 105-170
Proposed Wetland Cover Types and Topography

New Bedford Harbor Superfund Site

JACOBS

Figure 7-1a

Shrub Restoration Area Plantings:
Area 1:
Iva frutescens, 1-gallon containers, 36" on-center spacing requirements.
Lindera benzoin, 1-gallon containers, 36" on-center spacing requirements.

Notes:
Proposed High Marsh plantings to include 50/50 mix of Spartina patens and Distichlis spicata, plugs, 12" on-center spacing requirements.

Proposed Low Marsh plantings to include Spartina alterniflora, plugs, 12" on-center spacing requirements.

Any native trees removed as part of access road construction or excavation will be replaced in-kind (1-gallon containers). Any invasive trees removed will be replaced on a one-to-one basis with native tree species constituting similar growth form, habit, and size (1-gallon containers).

Areas of proposed restoration surface shall be uniformly graded with a smooth finished surface and will transition back to match existing grades upon completion of construction. Slight differences between depicted and constructed surfaces may occur due to microtopographic variations across the site.

Final restored elevations will be documented in the After Action Report.

MHHW and MLLW lines are approximate.

Upland areas within the backfilled excavations shall be seeded with coastal salt tolerant grass mix as shown in Table 7-2 and restored access road areas shall be seeded with conservation seed mix as specified in the Generic Intertidal Work Plan.

Scrub-Shrub Marsh areas shall be planted with a 50/50 mix of Iva frutescens, 1-gallon containers, 36" on-center spacing requirements, and Juniperus virginiana planted along landward edge, 1-gallon containers, 48" on-center spacing requirements.

105-170

105-183

ROW

Area 1

5
0
-5
-10

Legend

- 0-1' Excavation Depth
- 1-2' Excavation Depth
- 2-3' Excavation Depth
- 3-4' Excavation Depth
- 4-5' Excavation Depth
- 5-6' Excavation Depth
- Proposed Access Road
- 1-foot Contour
- Proposed Shrub Restoration Area
- Mean Lower Low Water
- Mean Higher High Water
- Proposed Coir Log
- Parcel Boundary
- Minimal Backfill as Needed for Drainage or Slope Stability
- Proposed High Marsh
- Proposed Low Marsh
- Proposed Scrub-Shrub Marsh
- Proposed Upland

0 50 100 Feet

November 2019

Basemap Data Source:
Green Seal Environmental, MassGIS

Vertical Datum:
NAVD88

Intertidal West Zone 4 Parcel 105-183
Proposed Wetland Cover Types and Topography
New Bedford Harbor Superfund Site

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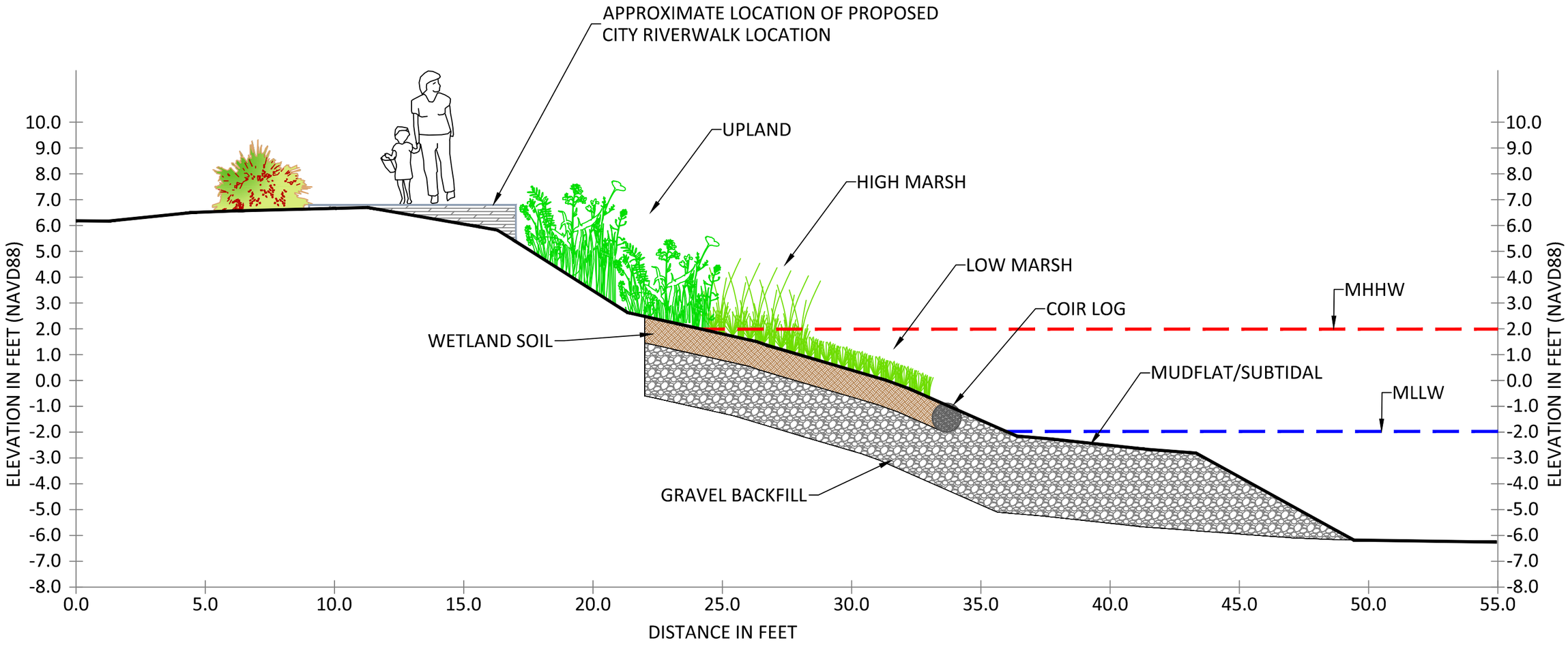
Figure 7-1b



0 4 feet

JACOBS™

West Zone 4
Conceptual Cross Section

New Bedford Harbor Superfund Site

July 2019 | Figure 7-2

last modified: 06/03/19 printed: 06/03/19 by sc C:\Users\scottga\Documents\NBH\355BG100112018090 1_Intertidal\WZ2_and_WZ3\AutoCAD\Fig 7-2 WZ2_WZ3_WP_Conceptual_Cross_Section_20190603.dwg

Tables

Table 2-1a
West Zone 4 Pre-Excavation PCB Characterization Sample Results for Parcel 105-170

Parcel	Sample ID	Station ID	Sample Depth Top (ft)	Sample Depth Bottom (ft)	Sample Date	Description	Total PCB (mg/kg)	Final Qualifier
105-170	S-15L-INT230-10-20	INT230	1.0	2.0	7/13/2015	Aroclor 1254 - Immunoassay	6.1	
105-170	S-15L-INT230-10-20-REP	INT230	1.0	2.0	7/13/2015	Aroclor 1254 - Immunoassay	0.50	U
105-170	S-15L-INT230-20-30	INT230	2.0	3.0	7/13/2015	Aroclor 1254 - Immunoassay	5.2	
105-170	S-15L-INT230-20-30-REP	INT230	2.0	3.0	7/13/2015	Aroclor 1254 - Immunoassay	6.6	
105-170	S-15L-INT231-00-10	INT231	0.0	1.0	7/13/2015	Aroclor 1254 - Immunoassay	1878	D
105-170	S-15L-INT231-10-20	INT231	1.0	2.0	7/13/2015	Aroclor 1254 - Immunoassay	467	D
105-170	S-15L-INT232-00-10	INT232	0.0	1.0	7/13/2015	Aroclor 1254 - Immunoassay	0.50	U
105-170	S-15L-INT232-10-20	INT232	1.0	2.0	7/13/2015	Aroclor 1254 - Immunoassay	0.50	U
105-170	S-15L-INT233-00-10	INT233	0.0	1.0	7/13/2015	Aroclor 1254 - Immunoassay	6.0	
105-170	S-15L-INT233-10-20	INT233	1.0	2.0	7/13/2015	Total 139 PCB cong (excl non-detects)	23.0	
105-170	S-15L-INT233-20-26	INT233	2.0	2.6	7/13/2015	Aroclor 1254 - Immunoassay	6.9	
105-170	S-15L-INT234-00-10	INT234	0.0	1.0	7/10/2015	Aroclor 1254 - Immunoassay	0.50	
105-170	S-15L-INT234-10-20	INT234	1.0	2.0	7/10/2015	Total 139 PCB cong (excl non-detects)	39.0	
105-170	S-15L-INT234-20-30	INT234	2.0	3.0	7/10/2015	Aroclor 1254 - Immunoassay	8.0	
105-170	S-15L-INT235-00-10	INT235	0.0	1.0	7/13/2015	Aroclor 1254 - Immunoassay	77.5	D
105-170	S-15L-INT235-10-20	INT235	1.0	2.0	7/13/2015	Aroclor 1254 - Immunoassay	1218	D
105-170	S-15L-INT236-00-10	INT236	0.0	1.0	7/10/2015	Total 139 PCB cong (excl non-detects)	0.30	
105-170	S-15L-INT236-10-20	INT236	1.0	2.0	7/10/2015	Total 139 PCB cong (excl non-detects)	2.4	
105-170	S-15L-INT236-20-30	INT236	2.0	3.0	7/10/2015	Aroclor 1254 - Immunoassay	0.50	
105-170	S-15L-INT236-30-40	INT236	3.0	4.0	7/10/2015	Aroclor 1254 - Immunoassay	0.50	U
105-170	S-15L-INT237-00-10	INT237	0.0	1.0	7/13/2015	Aroclor 1254 - Immunoassay	25.4	D
105-170	S-15L-INT237-10-15	INT237	1.0	1.5	7/13/2015	Total 139 PCB cong (excl non-detects)	41.0	
105-170	S-3415-2.0-3.0	S-3415	2.0	3.0	11/2/2001	Total 18 NOAA PCB cong (excl non-detects)	203	
105-170	S-3415-3.0-3.3	S-3415	3.0	3.3	11/2/2001	Total 18 NOAA PCB cong (excl non-detects)	98.8	
105-170	S-3415-3.3-3.5	S-3415	3.3	3.5	11/2/2001	Total 18 NOAA PCB cong (excl non-detects)	46.8	
105-170	S-3429-1.0-2.0	S-3429	1.0	2.0	11/5/2001	Total 18 NOAA PCB cong (excl non-detects)	6.2	
105-170	S-0925-1	S-925	0.0	1.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	676	
105-170	S-0925-2	S-925	1.0	2.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	72.8	
105-170	S-0925-2DUP	S-925	1.0	2.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	161	
105-170	S-0926-1	S-926	0.0	1.0	10/11/2000	Total 18 NOAA PCB cong (excl non-detects)	83.2	
105-170	S-0926-2	S-926	1.0	2.0	10/11/2000	Total 18 NOAA PCB cong (excl non-detects)	33.8	
105-170	S-0926-3	S-926	2.0	3.0	10/11/2000	Total 18 NOAA PCB cong (excl non-detects)	25.7	
105-170	S-WS406-18FSP15-00-10	WS406	0.0	1.0	12/11/2018	Total 209 PCB cong (excl non-detects)	13.4	
105-170	S-WS406-18FSP15-10-20	WS406	1.0	2.0	12/11/2018	PCB from Immunoassay (Aroclor 1254)	6.9	J
105-170	S-WS407-18FSP15-20-30	WS407	2.0	3.0	12/12/2018	Total 209 PCB cong (excl non-detects)	46.7	
105-170	S-WS407-18FSP15-30-40	WS407	3.0	4.0	12/12/2018	Total 209 PCB cong (excl non-detects)	25.0	
105-170	S-WS407-18FSP15-40-50	WS407	4.0	5.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	4.4	J

Table 2-1a
West Zone 4 Pre-Excavation PCB Characterization Sample Results for Parcel 105-170

Parcel	Sample ID	Station ID	Sample Depth Top (ft)	Sample Depth Bottom (ft)	Sample Date	Description	Total PCB (mg/kg)	Final Qualifier
105-170	S-WS408-18FSP15-00-10	WS408	0.0	1.0	12/11/2018	Total 209 PCB cong (excl non-detects)	33.3	
105-170	S-WS408-18FSP15-10-20	WS408	1.0	2.0	12/11/2018	PCB from Immunoassay (Aroclor 1254)	2.0	J
105-170	S-WS409-18FSP15-20-30	WS409	2.0	3.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	9.7	J
105-170	S-WS409-18FSP15-30-40	WS409	3.0	4.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	5.2	J
105-170	S-WS409-18FSP15-40-50	WS409	4.0	5.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	6.8	J
105-170	S-WS410-18FSP15-00-10	WS410	0.0	1.0	12/11/2018	Total 209 PCB cong (excl non-detects)	1.2	
105-170	S-WS410-18FSP15-10-20	WS410	1.0	2.0	12/11/2018	PCB from Immunoassay (Aroclor 1254)	2.4	J
105-170	S-WS411-18FSP15-20-30	WS411	2.0	3.0	12/13/2018	Total 209 PCB cong (excl non-detects)	155	
105-170	S-WS411-18FSP15-30-40	WS411	3.0	4.0	12/13/2018	Total 209 PCB cong (excl non-detects)	2.5	
105-170	S-WS411-18FSP15-40-50	WS411	4.0	5.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	10.0	J
105-170	S-WS426-18FSP15-00-10	WS426	0.0	1.0	12/12/2018	Total 209 PCB cong (excl non-detects)	49.1	
105-170	S-WS426-18FSP15-10-20	WS426	1.0	2.0	12/12/2018	Total 209 PCB cong (excl non-detects)	27.8	
105-170	S-WS427-18FSP15-00-10	WS427	0.0	1.0	12/11/2018	Total 209 PCB cong (excl non-detects)	3.7	
105-170	S-WS427-18FSP15-10-20	WS427	1.0	2.0	12/11/2018	PCB from Immunoassay (Aroclor 1254)	2.5	J
105-170	S-WS428-18FSP15-00-10	WS428	0.0	1.0	12/11/2018	Total 209 PCB cong (excl non-detects)	3.1	
105-170	S-WS428-18FSP15-10-20	WS428	1.0	2.0	12/11/2018	PCB from Immunoassay (Aroclor 1254)	1.1	J
105-170	S-WS429-18FSP15-00-10	WS429	0.0	1.0	12/12/2018	Total 209 PCB cong (excl non-detects)	55.3	
105-170	S-WS429-18FSP15-10-20	WS429	1.0	2.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	1.3	J
105-170	S-WS429-18FSP15-20-30	WS429	2.0	3.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	0.74	JB
105-170	S-WS429-18FSP15-30-40	WS429	3.0	4.0	12/12/2018	Total 209 PCB cong (excl non-detects)	81.2	
105-170	S-WS429-18FSP15-40-50	WS429	4.0	5.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	5.4	J
105-170	S-WS429-18FSP15-50-60	WS429	5.0	6.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	7.4	J
105-170	S-WS430-18FSP15-00-10	WS430	0.0	1.0	12/12/2018	Total 209 PCB cong (excl non-detects)	23.9	
105-170	S-WS430-18FSP15-10-20	WS430	1.0	2.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	4.7	J
105-170	S-WS431-18FSP15-20-30	WS431	2.0	3.0	1/31/2019	Total 209 PCB cong (excl non-detects)	73.3	
105-170	S-WS431-18FSP15-30-40	WS431	3.0	4.0	1/31/2019	PCB from Immunoassay (Aroclor 1254)	4.4	J
105-170	S-WS431-18FSP15-40-50	WS431	4.0	5.0	1/31/2019	PCB from Immunoassay (Aroclor 1254)	1.2	JB
105-170	S-WS432-18FSP15-00-10	WS432	0.0	1.0	3/13/2019	Total 209 PCB cong (excl non-detects)	38.4	
105-170	S-WS433-18FSP15-00-10	WS433	0.0	1.0	3/13/2019	Total 209 PCB cong (excl non-detects)	8.6	

Notes:
Pre-excavation confirmatory congener samples are shaded green.
D - reported value is from a dilution; U - not detected; J - estimated value; B - contaminant detected in the blank.
Total 18 NOAA PCB congeners multiplied by a factor of 2.6.

Table 2-1b
West Zone 4 Pre-Excavation PCB Characterization Sample Results for Parcel 105-183

Parcel	Sample ID	Station ID	Sample Depth Top (ft)	Sample Depth Bottom (ft)	Sample Date	Description	Total PCB (mg/kg)	Final Qualifier
105-183	S-15L-INT238-00-10	INT238	0.0	1.0	7/10/2015	Total 139 PCB cong (excl non-detects)	25.0	
105-183	S-15L-INT238-10-20	INT238	1.0	2.0	7/10/2015	Aroclor 1254 - Immunoassay	1.6	
105-183	S-15L-INT238-20-30	INT238	2.0	3.0	7/10/2015	Aroclor 1254 - Immunoassay	0.50	U
105-183	S-15L-INT239-00-10	INT239	0.0	1.0	7/10/2015	Aroclor 1254 - Immunoassay	47.1	D
105-183	S-15L-INT239-10-20	INT239	1.0	2.0	7/10/2015	Aroclor 1254 - Immunoassay	275	D
105-183	S-15L-INT239-20-30	INT239	2.0	3.0	7/10/2015	Aroclor 1254 - Immunoassay	82.2	D
105-183	S-15L-INT239-30-40	INT239	3.0	4.0	7/10/2015	Aroclor 1254 - Immunoassay	86.0	D
105-183	S-15L-INT239-40-50	INT239	4.0	5.0	7/10/2015	Aroclor 1254 - Immunoassay	495	D
105-183	S-15L-INT240-00-10	INT240	0.0	1.0	7/10/2015	Aroclor 1254 - Immunoassay	4.9	
105-183	S-15L-INT240-10-20	INT240	1.0	2.0	7/10/2015	Aroclor 1254 - Immunoassay	2.8	
105-183	S-15L-INT240-20-30	INT240	2.0	3.0	7/10/2015	Aroclor 1254 - Immunoassay	1305	D
105-183	S-15L-INT240-30-40	INT240	3.0	4.0	7/10/2015	Aroclor 1254 - Immunoassay	148	D
105-183	S-15L-INT240-40-50	INT240	4.0	5.0	7/10/2015	Aroclor 1254 - Immunoassay	40.7	D
105-183	S-15L-INT241-00-10	INT241	0.0	1.0	7/8/2015	Aroclor 1254 - Immunoassay	1.7	
105-183	S-15L-INT241-10-20	INT241	1.0	2.0	7/8/2015	Aroclor 1254 - Immunoassay	1.2	
105-183	S-15L-INT241-20-30	INT241	2.0	3.0	7/8/2015	Aroclor 1254 - Immunoassay	1.7	
105-183	S-15L-INT242-00-10	INT242	0.0	1.0	7/9/2015	Aroclor 1254 - Immunoassay	1.2	
105-183	S-15L-INT242-10-20	INT242	1.0	2.0	7/9/2015	Aroclor 1254 - Immunoassay	4.4	
105-183	S-15L-INT242-20-30	INT242	2.0	3.0	7/9/2015	Aroclor 1254 - Immunoassay	2.4	
105-183	S-15L-INT243-00-10	INT243	0.0	1.0	7/9/2015	Aroclor 1254 - Immunoassay	57.5	D
105-183	S-15L-INT243-40-50	INT243	4.0	5.0	7/9/2015	Aroclor 1254 - Immunoassay	83.9	D
105-183	S-15L-INT244-00-10	INT244	0.0	1.0	7/9/2015	Aroclor 1254 - Immunoassay	1.0	
105-183	S-15L-INT244-10-20	INT244	1.0	2.0	7/9/2015	Aroclor 1254 - Immunoassay	0.90	
105-183	S-15L-INT244-20-30	INT244	2.0	3.0	7/9/2015	Aroclor 1254 - Immunoassay	0.90	
105-183	S-15L-INT245-00-10	INT245	0.0	1.0	7/8/2015	Aroclor 1254 - Immunoassay	79.9	D
105-183	S-15L-INT245-10-20	INT245	1.0	2.0	7/8/2015	Aroclor 1254 - Immunoassay	274	D
105-183	S-15L-INT245-20-30	INT245	2.0	3.0	7/8/2015	Aroclor 1254 - Immunoassay	434	D
105-183	S-15L-INT245-30-40	INT245	3.0	4.0	7/8/2015	Aroclor 1254 - Immunoassay	61.8	D
105-183	S-15L-INT245-40-50	INT245	4.0	5.0	7/8/2015	Aroclor 1254 - Immunoassay	34.3	D
105-183	S-15L-INT246-00-10	INT246	0.0	1.0	7/9/2015	Total 139 PCB cong (excl non-detects)	11.0	
105-183	S-15L-INT246-10-20	INT246	1.0	2.0	7/9/2015	Total 139 PCB cong (excl non-detects)	18.0	
105-183	S-15L-INT246-20-30	INT246	2.0	3.0	7/9/2015	Aroclor 1254 - Immunoassay	6.0	
105-183	S-15L-INT246-30-40	INT246	3.0	4.0	7/9/2015	Aroclor 1254 - Immunoassay	0.50	U
105-183	S-3439-1.1-1.6	S-3439	1.1	1.6	8/24/2001	Total 18 NOAA PCB cong (excl non-detects)	41.6	
105-183	S-3439-1.6-2.1	S-3439	1.6	2.1	8/24/2001	Total 18 NOAA PCB cong (excl non-detects)	0.91	
105-183	S-3810-0.0-1.0	S-3810	0.0	1.0	11/2/2001	Total 18 NOAA PCB cong (excl non-detects)	24.7	
105-183	S-3845-0.0-1.0	S-3845	0.0	1.0	11/14/2001	Total 18 NOAA PCB cong (excl non-detects)	122	

Table 2-1b
West Zone 4 Pre-Excavation PCB Characterization Sample Results for Parcel 105-183

Parcel	Sample ID	Station ID	Sample Depth Top (ft)	Sample Depth Bottom (ft)	Sample Date	Description	Total PCB (mg/kg)	Final Qualifier
105-183	S-3845-1.0-2.0	S-3845	1.0	2.0	11/14/2001	Total 18 NOAA PCB cong (excl non-detects)	260	
105-183	S-3845-2.0-3.0	S-3845	2.0	3.0	11/14/2001	Total 18 NOAA PCB cong (excl non-detects)	28.6	
105-183	S-3849-0.0-1.0	S-3849	0.0	1.0	11/14/2001	Total 18 NOAA PCB cong (excl non-detects)	109	
105-183	S-3849-1.0-2.0	S-3849	1.0	2.0	11/14/2001	Total 18 NOAA PCB cong (excl non-detects)	312	
105-183	S-3849-2.0-3.0	S-3849	2.0	3.0	11/14/2001	Total 18 NOAA PCB cong (excl non-detects)	213	
105-183	S-0923-1	S-923	0.0	1.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	0.91	
105-183	S-0923-2	S-923	1.0	2.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	0.62	
105-183	S-0924-1	S-924	0.0	1.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	200	
105-183	S-0924-2	S-924	1.0	2.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	416	
105-183	S-0924-3	S-924	2.0	3.0	10/23/2000	Total 18 NOAA PCB cong (excl non-detects)	260	
105-183	S-WS412-18FSP15-30-40	WS412	3.0	4.0	12/19/2018	Total 209 PCB cong (excl non-detects)	57.4	
105-183	S-WS412-18FSP15-40-50	WS412	4.0	5.0	12/19/2018	Total 209 PCB cong (excl non-detects)	75.8	
105-183	S-WS412-18FSP15-50-60	WS412	5.0	6.0	12/19/2018	Total 209 PCB cong (excl non-detects)	5.0	
105-183	S-WS412-18FSP15-60-70	WS412	6.0	7.0	12/19/2018	PCB from Immunoassay (Aroclor 1254)	3.5	J
105-183	S-WS412-18FSP15-70-80	WS412	7.0	8.0	12/19/2018	PCB from Immunoassay (Aroclor 1254)	3.3	J
105-183	S-WS412-18FSP15-80-90	WS412	8.0	9.0	12/19/2018	PCB from Immunoassay (Aroclor 1254)	9.8	J
105-183	S-WS413-18FSP15-00-10	WS413	0.0	1.0	12/11/2018	Total 209 PCB cong (excl non-detects)	0.12	
105-183	S-WS413-18FSP15-10-20	WS413	1.0	2.0	12/11/2018	PCB from Immunoassay (Aroclor 1254)	3.5	J
105-183	S-WS413-18FSP15-20-28	WS413	2.0	2.8	12/11/2018	PCB from Immunoassay (Aroclor 1254)	3.3	J
105-183	S-WS414-18FSP15-30-40	WS414	3.0	4.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	93.0	JD
105-183	S-WS414-18FSP15-40-50	WS414	4.0	5.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	19.0	JD
105-183	S-WS414-18FSP15-50-60	WS414	5.0	6.0	12/20/2018	Total 209 PCB cong (excl non-detects)	89.5	
105-183	S-WS414-18FSP15-60-70	WS414	6.0	7.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	5.7	J
105-183	S-WS415-18FSP15-00-10	WS415	0.0	1.0	12/13/2018	Total 209 PCB cong (excl non-detects)	228	
105-183	S-WS415-18FSP15-10-20	WS415	1.0	2.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	93.0	JD
105-183	S-WS415-18FSP15-20-30	WS415	2.0	3.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	91.0	JD
105-183	S-WS415-18FSP15-30-40	WS415	3.0	4.0	12/13/2018	Total 209 PCB cong (excl non-detects)	64.8	
105-183	S-WS415-18FSP15-40-50	WS415	4.0	5.0	12/13/2018	Total 209 PCB cong (excl non-detects)	63.4	
105-183	S-WS415-18FSP15-50-60	WS415	5.0	6.0	12/13/2018	Total 209 PCB cong (excl non-detects)	32.6	
105-183	S-WS415-18FSP15-60-70	WS415	6.0	7.0	12/13/2018	Total 209 PCB cong (excl non-detects)	4.7	
105-183	S-WS416-18FSP15-00-10	WS416	0.0	1.0	12/13/2018	Total 209 PCB cong (excl non-detects)	5.0	
105-183	S-WS416-18FSP15-10-20	WS416	1.0	2.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	7.4	JD
105-183	S-WS417-18FSP15-00-10	WS417	0.0	1.0	12/13/2018	Total 209 PCB cong (excl non-detects)	1.5	
105-183	S-WS417-18FSP15-10-20	WS417	1.0	2.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	3.6	J
105-183	S-WS418-18FSP15-10-20	WS418	1.0	2.0	1/31/2019	Total 209 PCB cong (excl non-detects)	32.3	
105-183	S-WS418-18FSP15-20-30	WS418	2.0	3.0	12/20/2018	Total 209 PCB cong (excl non-detects)	21.0	
105-183	S-WS418-18FSP15-30-40	WS418	3.0	4.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	7.4	JD

Table 2-1b
West Zone 4 Pre-Excavation PCB Characterization Sample Results for Parcel 105-183

Parcel	Sample ID	Station ID	Sample Depth Top (ft)	Sample Depth Bottom (ft)	Sample Date	Description	Total PCB (mg/kg)	Final Qualifier
105-183	S-WS418-18FSP15-40-50	WS418	4.0	5.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	17.0	JD
105-183	S-WS418-18FSP15-50-60	WS418	5.0	6.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	8.2	J
105-183	S-WS418-18FSP15-60-70	WS418	6.0	7.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	2.6	J
105-183	S-WS418-18FSP15-70-80	WS418	7.0	8.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	0.70	JB
105-183	S-WS418-18FSP15-80-90	WS418	8.0	9.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	1.9	J
105-183	S-WS419-18FSP15-00-10	WS419	0.0	1.0	12/13/2018	Total 209 PCB cong (excl non-detects)	7.1	
105-183	S-WS419R-18FSP15-00-10-REP	WS419	0.0	1.0	12/13/2018	Total 209 PCB cong (excl non-detects)	2.5	
105-183	S-WS419-18FSP15-10-20	WS419	1.0	2.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	12.0	JD
105-183	S-WS419R-18FSP15-10-20-REP	WS419	1.0	2.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	12.0	JD
105-183	S-WS420-18FSP15-20-30	WS420	2.0	3.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	93.0	JD
105-183	S-WS420-18FSP15-30-40	WS420	3.0	4.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	70.0	JD
105-183	S-WS420-18FSP15-40-50	WS420	4.0	5.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	89.0	JD
105-183	S-WS420-18FSP15-50-60	WS420	5.0	6.0	12/20/2018	Total 209 PCB cong (excl non-detects)	179	
105-183	S-WS420-18FSP15-60-70	WS420	6.0	7.0	12/20/2018	Total 209 PCB cong (excl non-detects)	35.9	
105-183	S-WS420-18FSP15-70-80	WS420	7.0	8.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	14.0	JD
105-183	S-WS420-18FSP15-80-90	WS420	8.0	9.0	12/20/2018	PCB from Immunoassay (Aroclor 1254)	4.5	J
105-183	S-WS421-18FSP15-00-10	WS421	0.0	1.0	12/13/2018	Total 209 PCB cong (excl non-detects)	0.71	
105-183	S-WS421-18FSP15-10-20	WS421	1.0	2.0	12/13/2018	PCB from Immunoassay (Aroclor 1254)	3.8	J
105-183	S-WS422-18FSP15-00-10	WS422	0.0	1.0	12/13/2018	Total 209 PCB cong (excl non-detects)	2.2	
105-183	S-WS422-18FSP15-10-20	WS422	1.0	2.0	12/13/2018	Total 209 PCB cong (excl non-detects)	130	
105-183	S-WS422B-18FSP15-20-30	WS422B	2.0	3.0	3/13/2019	Total 209 PCB cong (excl non-detects)	2360	
105-183	S-WS422B-18FSP15-30-40	WS422B	3.0	4.0	3/13/2019	Total 209 PCB cong (excl non-detects)	250	
105-183	S-WS422B-18FSP15-40-50	WS422B	4.0	5.0	3/13/2019	Total 209 PCB cong (excl non-detects)	10.9	
105-183	S-WS423-18FSP15-20-30	WS423	2.0	3.0	1/16/2019	Total 209 PCB cong (excl non-detects)	0.89	
105-183	S-WS423-18FSP15-30-40	WS423	3.0	4.0	1/16/2019	PCB from Immunoassay (Aroclor 1254)	1.5	J
105-183	S-WS424-18FSP15-00-10	WS424	0.0	1.0	12/12/2018	Total 209 PCB cong (excl non-detects)	5.5	
105-183	S-WS424-18FSP15-10-20	WS424	1.0	2.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	1.3	J
105-183	S-WS424-18FSP15-20-30	WS424	2.0	3.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	1.7	J
105-183	S-WS424-18FSP15-30-40	WS424	3.0	4.0	12/12/2018	PCB from Immunoassay (Aroclor 1254)	1.7	J
105-183	S-WS425-18FSP15-20-30	WS425	2.0	3.0	12/19/2018	PCB from Immunoassay (Aroclor 1254)	92.0	JD
105-183	S-WS425-18FSP15-30-40	WS425	3.0	4.0	12/19/2018	Total 209 PCB cong (excl non-detects)	54.3	
105-183	S-WS425-18FSP15-40-50	WS425	4.0	5.0	12/19/2018	Total 209 PCB cong (excl non-detects)	10.1	

Notes:
Pre-excavation confirmatory congener samples are shaded green.
D - reported value is from a dilution; U - not detected; J - estimated value; B - contaminant detected in the blank.
Total 18 NOAA PCB congeners multiplied by a factor of 2.6.

Table 3-1a
Compliance Survey Locations for West Zone 4 Parcel 105-170

Parcel	Station ID	Location	Easting	Northing	Design Elevation	Post-Excavation Elevation	Δ (ft)
105-170	WS406	Sidewall	814910.3	2704682.0	2.5	TBD	TBD
105-170	WS408	Sidewall	814879.9	2704614.0	2.1	TBD	TBD
105-170	WS430	Sidewall	814931.1	2704707.0	-0.4	TBD	TBD
105-170	WS433	Sidewall	814928.5	2704742.0	-1.0	TBD	TBD
105-170	WS434	Sidewall	814894.1	2704872.4	-0.5	TBD	TBD
105-170	WS435	Sidewall	814917.1	2704852.7	-3.1	TBD	TBD
105-170	WS436	Sidewall	814925.8	2704781.4	-2.4	TBD	TBD
105-170	WS437	Sidewall	814937.7	2704754.9	-2.9	TBD	TBD
105-170	WS438	Sidewall	814899.5	2704987.5	-1.4	TBD	TBD
105-170	WS439	Sidewall	814931.3	2704608.7	-3.1	TBD	TBD
105-170	WS440	Sidewall	814857.0	2704517.9	2.0	TBD	TBD
105-170	WS441	Sidewall	814923.7	2704514.5	-2.7	TBD	TBD
105-170	WS457	Sidewall	814883.1	2704932.5	0.6	TBD	TBD
105-170	WS458	Sidewall	814904.7	2704923.3	-0.3	TBD	TBD
105-170	WS426	Floor	814892.5	2704911.1	-0.7	TBD	TBD
105-170	S-926	Floor	814927.0	2704799.0	-2.0	TBD	TBD
105-170	WS407	Floor	814927.5	2704654.3	-0.4	TBD	TBD
105-170	INT237	Floor	814911.0	2704562.0	-0.9	TBD	TBD
105-170	WS411	Floor	814899.6	2704519.5	-2.4	TBD	TBD

Notes:
Elevation measurements at sidewall locations will be taken at the base of the sidewall (bottom of the excavation).
Locations WS434 through WS441 and WS457-WS458 are compliance survey locations only (no associated PCB sample data).
MA - Massachusetts; NAD83 - North American Datum 1983; NAVD88 - North American Vertical Datum 1988; ft - feet; TBD - to be determined.
Δ - difference between post-excavation elevation and design elevation.

Table 3-1b
Compliance Survey Locations for West Zone 4 Parcel 105-183

Parcel	Station ID	Location	Easting	Northing	Design Elevation	Post-Excavation Elevation	Δ (ft)
105-183	WS442	Sidewall	814852.2	2704449.1	2.1	TBD	TBD
105-183	WS443	Sidewall	814909.8	2704435.5	-2.3	TBD	TBD
105-183	WS444	Sidewall	814849.0	2704355.5	2.5	TBD	TBD
105-183	WS445	Sidewall	814921.1	2704351.3	-2.3	TBD	TBD
105-183	WS446	Sidewall	814879.4	2704262.4	1.0	TBD	TBD
105-183	WS447	Sidewall	814930.7	2704279.0	-2.5	TBD	TBD
105-183	WS448	Sidewall	814965.2	2704221.0	0.5	TBD	TBD
105-183	WS449	Sidewall	814982.9	2704198.2	-3.7	TBD	TBD
105-183	WS450	Sidewall	814983.7	2704117.5	1.1	TBD	TBD
105-183	WS451	Sidewall	814999.3	2704105.4	-4.6	TBD	TBD
105-183	WS452	Sidewall	814982.3	2704018.3	-0.3	TBD	TBD
105-183	WS453	Sidewall	815001.9	2704013.9	-4.7	TBD	TBD
105-183	WS454	Sidewall	815015.0	2703921.5	-2.0	TBD	TBD
105-183	WS455	Sidewall	814975.0	2703921.5	3.6	TBD	TBD
105-183	WS456	Sidewall	815013.4	2703863.9	-3.2	TBD	TBD
105-183	WS412	Floor	814878.8	2704431.3	-4.3	TBD	TBD
105-183	WS415	Floor	814907.0	2704333.3	-4.0	TBD	TBD
105-183	WS418	Floor	814933.8	2704256.5	-1.2	TBD	TBD
105-183	WS420	Floor	814987.1	2704052.7	-5.1	TBD	TBD
105-183	WS423	Floor	814996.1	2703922.8	-1.0	TBD	TBD
105-183	WS425	Floor	814988.9	2704129.7	-3.7	TBD	TBD

Notes:
Elevation measurements at sidewall locations will be taken at the base of the sidewall (bottom of the excavation).
Locations WS442 through WS456 are compliance survey locations only (no associated PCB sample data).
MA - Massachusetts; NAD83 - North American Datum 1983; NAVD88 - North American Vertical Datum 1988; ft - feet; TBD - to be determined.
Δ - difference between post-excavation elevation and design elevation.

Table 7-1a
Proposed Restoration Acreages by Cover Type for Parcel 105-170

Habitat Type	Existing Pre-Construction Area [acres]	Proposed Area of Restoration [acres]
Low Marsh	0.197	0.209
High Marsh	0.000	0.027
Scrub-Shrub Marsh	0.136	0.102
Mudflat/subtidal	0.010	0.005
Beach	0.006	0.006
TOTAL	**0.349**	**0.349**

Table 7-1b
Proposed Restoration Acreages by Cover Type for Parcel 105-183

Habitat Type	Existing Pre-Construction Area [acres]	Proposed Area of Restoration [acres]
Low Marsh	0.307	0.309
High Marsh	0.000	0.127
Scrub-Shrub Marsh	0.120	0.047
Mudflat/Subtidal	0.017	0.017
Upland	0.008	0.058
Phragmites	0.105	0.000
TOTAL	**0.558**	**0.558**

Table 7-2a
Parcel 105-170 Shrub Restoration Summary

Scientific Name	Common Name	On-Center Spacing Requirements (inches)	Number of Proposed Plants	Shrub Restoration Area
Iva frutescens	high-tide bush	36"	27	Area 1
Myrica pensylvanica	northern bayberry	36"	34	Area 2
Clethra alnifolia	sweet pepperbush	36"	34	Area 2
Rhus glabra	smooth sumac	48"	19	Area 2
Total Proposed Trees/Shrubs for Parcel 105-170[1]			114	

[1]Additional plantings will be required for the scrub-shrub marsh restoration.

Table 7-2b
Parcel 105-183 Shrub Restoration Summary

Scientific Name	Common Name	On-Center Spacing Requirements (inches)	Number of Proposed Plants[1]	Shrub Restoration Area
Iva frutescens	high-tide bush	36"	66	Area 1
Lindera benzoin	northern spicebush	36"	66	Area 1
Total Proposed Trees/Shrubs for Parcel 105-183			132	

[1]Additional plantings will be required as part of the Scrub-Shrub marsh restoration area.

Table 7-3
New England Coastal Salt Tolerant Grass Mix

Botanical Name	Common Name	Wetland Indicator Status
Elymus canadensis	Canada Wild Rye	FACU+
Festuca rubra	Red Fescue	FACU
Panicum amarum	Atlantic Coastal Panic Grass	FACU-
Andropogon gerardii	Big Bluestem	FAC
Sorghastrum nutans	Indian Grass	UPL
Panicum virgatum	Switch Grass	FAC
Juncus tenuis	Path Rush	FAC

Appendix A

West Zone 4
Pre-Excavation Tree and Shrub Inventories

Appendix A
Parcel 105-170

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Memorandum

Subject	Parcel 105-170 Native Tree and Shrub Inventory	**Project Name**	New Bedford Harbor Superfund Site
Attention	Marie Esten USACE	**Project No.**	35BG6000
From	Jessica Rebholz	**Document Control No.**	ACE-J23-35BG6000-M1-0053
Date	18 September 2019		

Attachments: Figure 1 Parcel 105-170 Pre-Excavation Tree and Shrub Inventory, Tables 3-1, 3-2, and 3-3 (inventory results)

1.0 Background

Jacobs conducted an inventory of existing trees and shrubs on Parcel 105-170 in the intertidal remediation area (Figure 1) on 28 November 2018 and 12 September 2019. The purpose of the inventory was to identify existing trees and shrubs that would be removed in association with site remediation activities, including construction of the gravel access road and areas of excavation associated with contaminated sediment and soil removal. The information collected from this inventory is intended to be used to inform selection of proposed native woody species for future restoration plantings.

2.0 Methods

For the purposes of the inventory, trees were defined as any nonclimbing, woody plant that had at least one erect perennial stem (trunk) with a diameter at breast height (DBH) of 3.0 inches or greater, regardless of height. Jacobs' wetland biologists walked the planned remediation portions of Parcel 105-170 and identified all trees within the proposed excavation area and proposed access road. Tree locations were recorded using a Trimble Geo 7X GPS, capable of sub-meter accuracy.

For the purposes of the inventory, shrubs were defined as any nonclimbing, woody plant with a DBH less than 3.0 inches. Shrubs were inventoried according to dominant shrub types that appeared to constitute similar species diversity and percent areal cover.

3.0 Results

Eastern red cedar (*Juniperus virginiana*), black locust (*Robinia pseudoacacia*), and choke cherry (*Prunus virginiana*) were the three tree species identified within Parcel 105-170. Eastern red cedar and choke cherry are considered native and non-invasive, while black locust is considered non-native and invasive. A total of 5 trees were identified (Table 3-1) within Parcel 105-170.

Two shrub areas were identified within Parcel 105-170 and included high-tide bush (*Iva frutescens*), staghorn sumac (*Rhus hirta*), poison ivy (*Toxicodendron radicans*), and northern bayberry (*Myrica pensylvanica*), all of which are native and non-invasive species (Tables 3-2, 3-3). It is worth noting that a portion of proposed access road will be constructed through a large stand of *Phragmites australis* and *Reynoutria japonica* (Japanese knotweed), two extremely invasive species found throughout the intertidal zones.

4.0 Conclusion

The species makeup of Parcel 105-170 is comprised of both native and non-native trees and native, non-invasive shrubs.

Legend

- Choke cherry
- Eastern red cedar
- Black locust
- MLLW
- MHHW
- 0-1' Excavation Area
- Inventoried Shrub Areas
- Proposed Access Road
- Parcel Boundary

0 50 100 Feet

September 2019

Basemap Data Source:
Green Seal Environmental, MassGIS

Vertical Datum:
NAVD88

Parcel 105-170 Pre-Excavation Tree and Shrub Inventory

New Bedford Harbor Superfund Site

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Figure 1

Table 3-1
Existing Tree Inventory for Parcel 105-170

Scientific Name	Common Name	Tree Count (≥3" DBH)	Invasive[1]	Native/Non-Native[2]
Juniperus virginiana	eastern red cedar	1	no	native, county documented
Prunus virginiana	choke cherry	1	no	native, county documented
Robinia pseudoacacia	black locust	3	yes	non-native, county documented
	Total	**5**		

[1]According to "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts": https://www.mass.gov/files/documents/2016/08/tm/invasive-plantlist.pdf

[2]PLANTS Database | USDA PLANTS, USDA-NRCS, plants.sc.egov.usda.gov/java/.

Table 3-2
Existing Shrub Cover for Parcel 105-170, Area 1

Scientific Name	Common Name	Area 1 Percent Areal Cover	Invasive[1]	Native/Non-Native[2]	Upland/Wetland
Iva frutescens	hightide bush	90%	no	native, county documented	wetland

[1]According to "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts": https://www.mass.gov/files/documents/2016/08/tm/invasive-plantlist.pdf

[2]New England Wildflower Society. 2011. Go Botany, 12 April 2018 (https://gobotany.newenglandwild.org/). New England Wildflower Society, Framingham, MA

Table 3-3
Existing Shrub Cover for Parcel 105-170, Area 2

Scientific Name	Common Name	Area 2 Percent Areal Cover	Invasive[1]	Native/Non-Native[2]	Upland/Wetland
Rhus hirta	staghorn sumac	10%	no	native, county documented	upland
Toxicodendron radicans	poison ivy	15%	no	native, county documented	both
Myrica pensylvanica	northern bayberry	20%	no	native, county documented	both

[1]According to "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts": https://www.mass.gov/files/documents/2016/08/tm/invasive-plantlist.pdf

[2]New England Wildflower Society. 2011. Go Botany, 12 April 2018 (https://gobotany.newenglandwild.org/). New England Wildflower Society, Framingham, MA

Appendix A
Parcel 105-183

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Memorandum

Subject	Parcel 105-183 Native Tree and Shrub Inventory	**Project Name**	New Bedford Harbor Superfund Site
Attention	Marie Esten USACE	**Project No.**	35BG2000
From	Jessica Rebholz	**Document Control No.**	ACE-J23-35BG6000-M1-0053
Date	27 September 2019		

Attachments: Figure 1 Parcel 105-183 Pre-Excavation Tree and Shrub Inventory, Tables 3-1 through 3-4 (inventory results)

1.0 Background

Jacobs conducted an inventory of existing trees and shrubs on Parcel 105-183 in the intertidal remediation area (Figure 1) on 28 November 2018. An additional inventory was taken on 12 September 2019. The purpose of the inventory was to identify existing trees and shrubs that would be removed in association with site remediation activities, including construction of the gravel access road and areas of excavation associated with contaminated sediment and soil removal. The information collected from this inventory is intended to be used to inform selection of proposed native woody species for future restoration plantings.

2.0 Methods

For the purposes of the inventory, trees were defined as any nonclimbing, woody plant that had at least one erect perennial stem (trunk) with a diameter at breast height (DBH) of 3.0 inches or greater, regardless of height. Jacobs' wetland biologists walked the planned remediation portions of Parcel 105-183 and identified all trees within the proposed excavation area and proposed access road. Tree locations were recorded using a Trimble Geo 7X GPS, capable of sub-meter accuracy.

For the purposes of the inventory, shrubs were defined as any nonclimbing, woody plant with a DBH less than 3.0 inches. Shrubs were inventoried according to dominant shrub types that appeared to constitute similar species diversity and percent areal cover.

3.0 Results

Eastern red cedar (*Juniperus virginiana*) was the dominant tree species within Parcel 105-183. Eastern red cedar is considered native and non-invasive. A total of 7 red cedar trees were identified (Table 3-1), and a total of 8 trees were identified within Parcel 105-183.

Three (3) shrub areas were identified within Parcel 105-183 (Tables 3-2 through 3-4). Nearly all the species identified within the shrub areas were native and non-invasive, with *Iva frutescens* being the dominant shrub across Parcel 105-183. Of note, the proposed access road will be constructed through a large stand of *Phragmites australis* and *Fallopia japonica*. Both are extremely invasive grasses found throughout the intertidal zones.

4.0 Conclusion

The species makeup of Parcel 105-183 is comprised almost entirely of native, non-invasive trees and shrubs.

Legend

- Eastern red cedar
- Autumn olive
- MLLW
- MHHW
- 0-1' Excavation Area
- Proposed Access Road
- Parcel Boundary

0 50 100 Feet

September 2019

Basemap Data Source:
Green Seal Environmental, MassGIS

Vertical Datum:
NAVD88

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Parcel 105-183 Pre-Excavation Tree and Shrub Inventory

New Bedford Harbor Superfund Site

Figure 1

Table 3-1
Existing Tree Inventory for Parcel 105-183

Scientific Name	Common Name	Tree Count (≥3" DBH)	Invasive[1]	Native/Non-Native[2]
Elaeagnus umbellata	autumn olive	1	yes	non-native, county documented
Juniperus virginiana	Eastern red cedar	7	no	native, county documented
	Total	**8**		

[1]According to "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts": https://www.mass.gov/files/documents/2016/08/tm/invasive-plantlist.pdf

[2]PLANTS Database | USDA PLANTS, USDA-NRCS, plants.sc.egov.usda.gov/java/.

Table 3-2
Existing Shrub Cover for Parcel 105-183, Area 1

Scientific Name	Common Name	Area 1 Percent Areal Cover	Invasive[1]	Native/Non-Native[2]	Upland/Wetland
Iva frutescens	hightide bush	90%	no	native, county documented	wetland

[1]According to "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts": https://www.mass.gov/files/documents/2016/08/tm/invasive-plantlist.pdf

[2]New England Wildflower Society. 2011. Go Botany, 12 April 2018 (https://gobotany.newenglandwild.org/). New England Wildflower Society, Framingham, MA

Table 3-3
Existing Shrub Cover for Parcel 105-183, Area 2

Scientific Name	Common Name	Area 2 Percent Areal Cover	Invasive[1]	Native/Non-Native[2]	Upland/Wetland
Elaeagnus umbellata	autumn olive	20%	yes	non-native, county documented	upland
Toxicodendron radicans	poison ivy	30%	no	native, county documented	both
Iva frutescens	high-tide bush	25%	no	native, county documented	wetland
Juniperus virginiana	eastern red cedar	5%	no	native, county documented	upland
Lindera benzoin	northern spicebush	15%	no	native, county documented	both

[1]According to "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts": https://www.mass.gov/files/documents/2016/08/tm/invasive-plantlist.pdf

[2]New England Wildflower Society. 2011. Go Botany, 12 April 2018 (https://gobotany.newenglandwild.org/). New England Wildflower Society, Framingham, MA

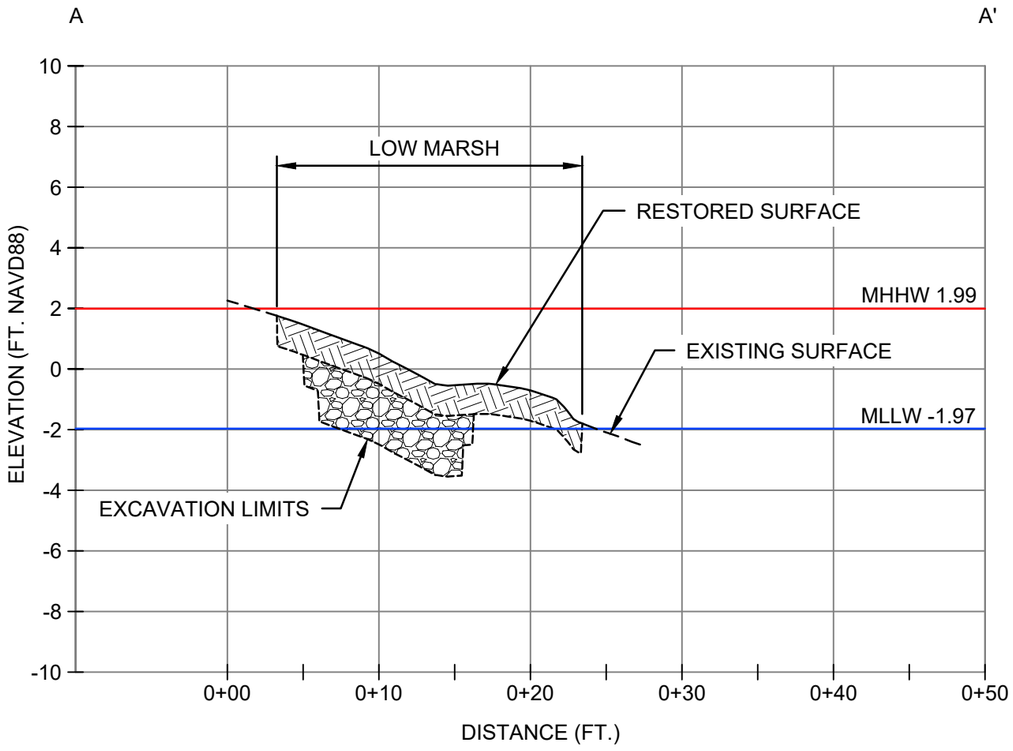
Table 3-4
Existing Shrub Cover for Parcel 105-183, Area 3

Scientific Name	Common Name	Area 3 Percent Areal Cover	Invasive[1]	Native/Non-Native[2]	Upland/Wetland
Iva frutescens	high-tide bush	70%	no	native, county documented	wetland
Toxicodendron radicans	poison ivy	10%	no	native, county documented	both
Lindera benzoin	northern spicebush	15%	no	native, county documented	wetland

[1]According to "The Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts": https://www.mass.gov/files/documents/2016/08/tm/invasive-plantlist.pdf

[2]New England Wildflower Society. 2011. Go Botany, 12 April 2018 (https://gobotany.newenglandwild.org/). New England Wildflower Society, Framingham, MA

Appendix B
Cross Sections



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

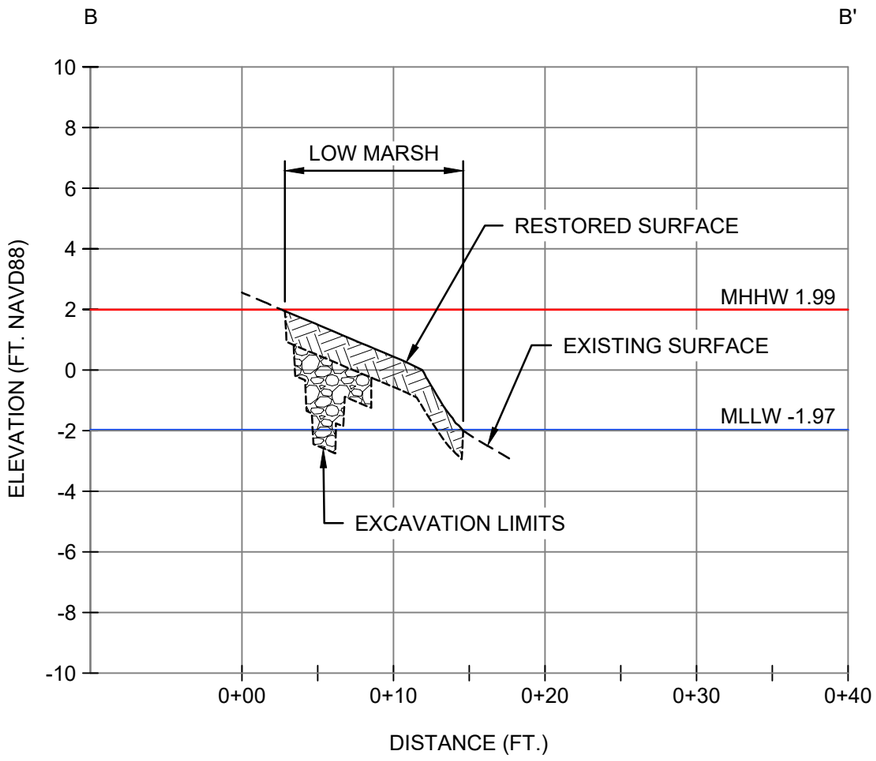
JACOBS®

WEST ZONE 4
SECTION A-A'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 1

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



CREATED: 7/14/2019 LAST SAVED: 12/13/2019 BY: ENGLANLL

LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

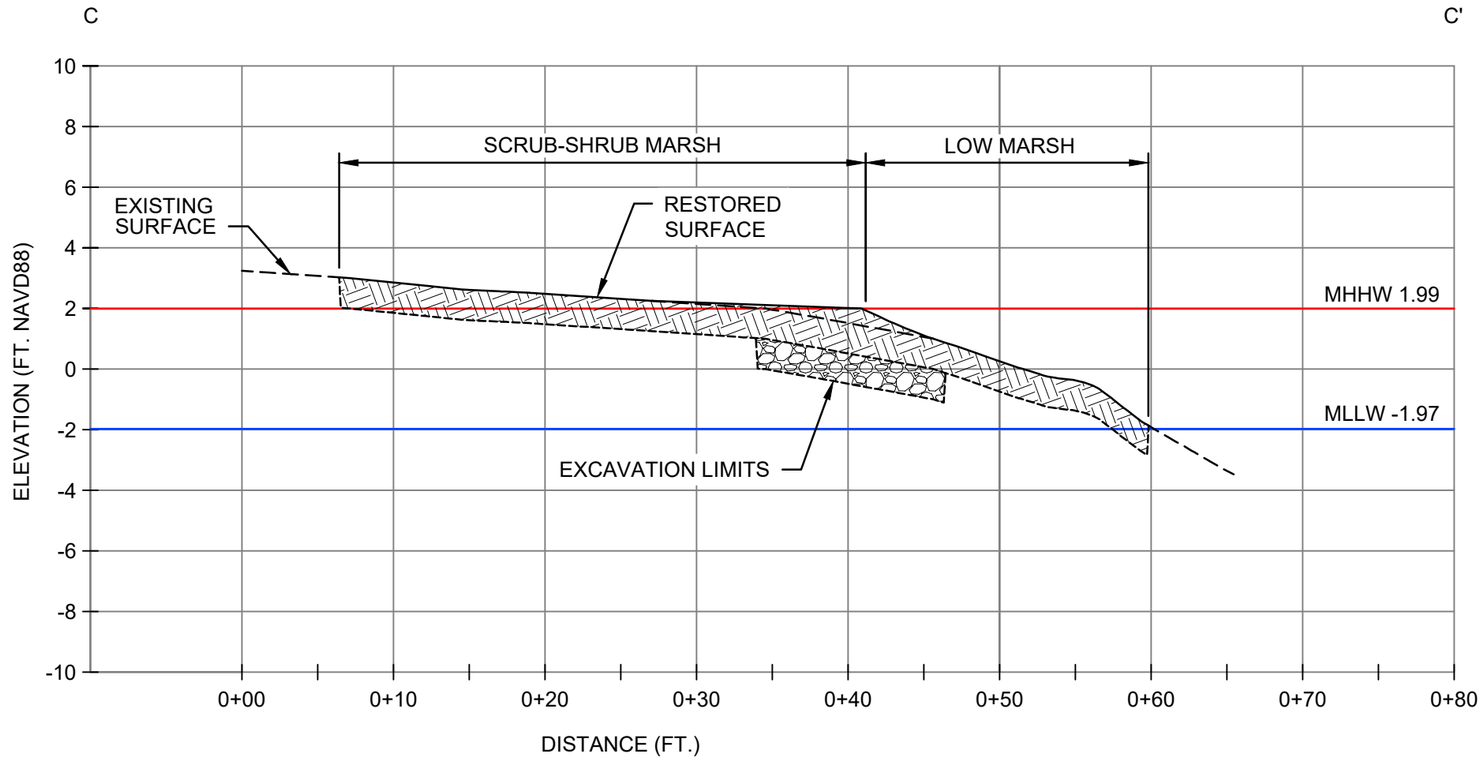
1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

JACOBS®

WEST ZONE 4
SECTION B-B'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 2



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

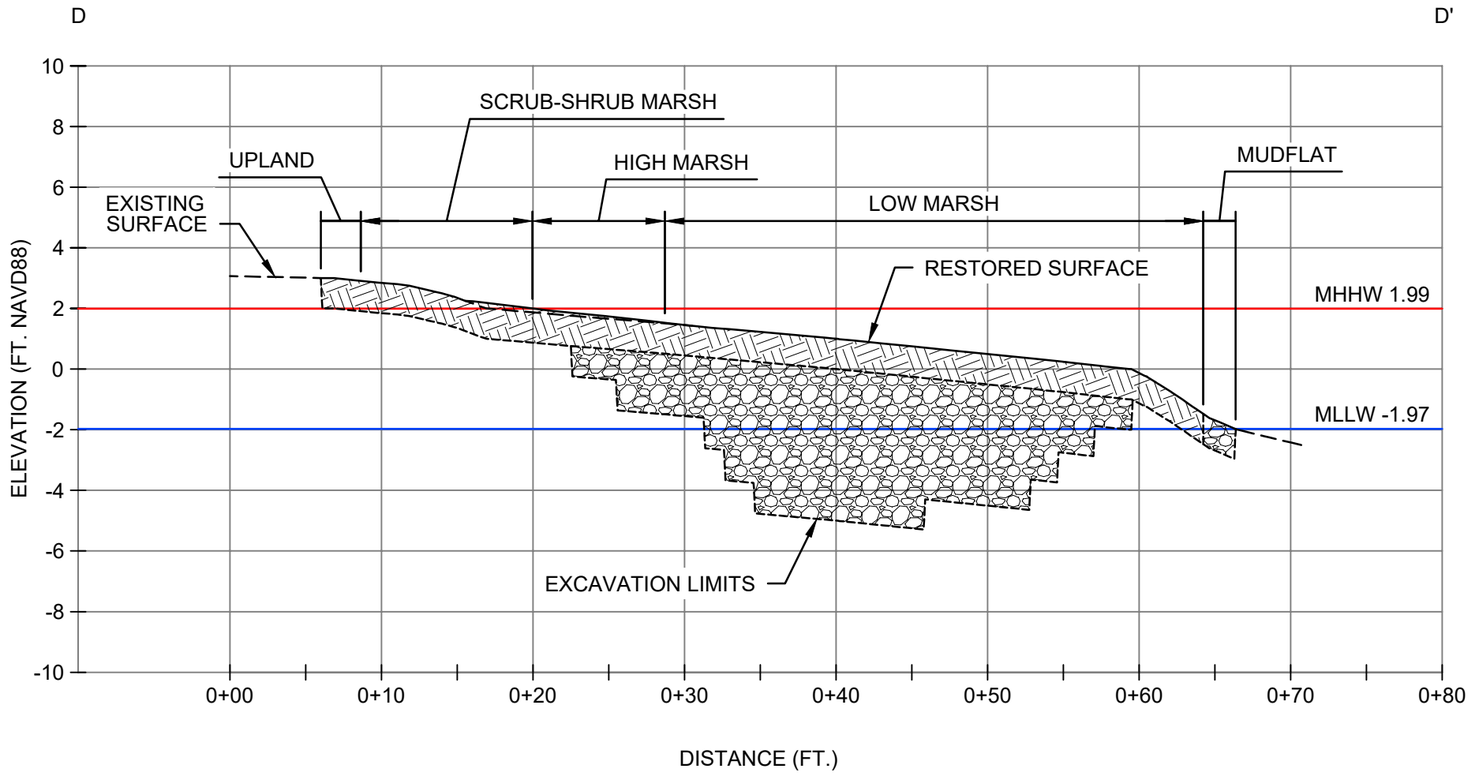
JACOBS®

WEST ZONE 4
SECTION C-C'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 3

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

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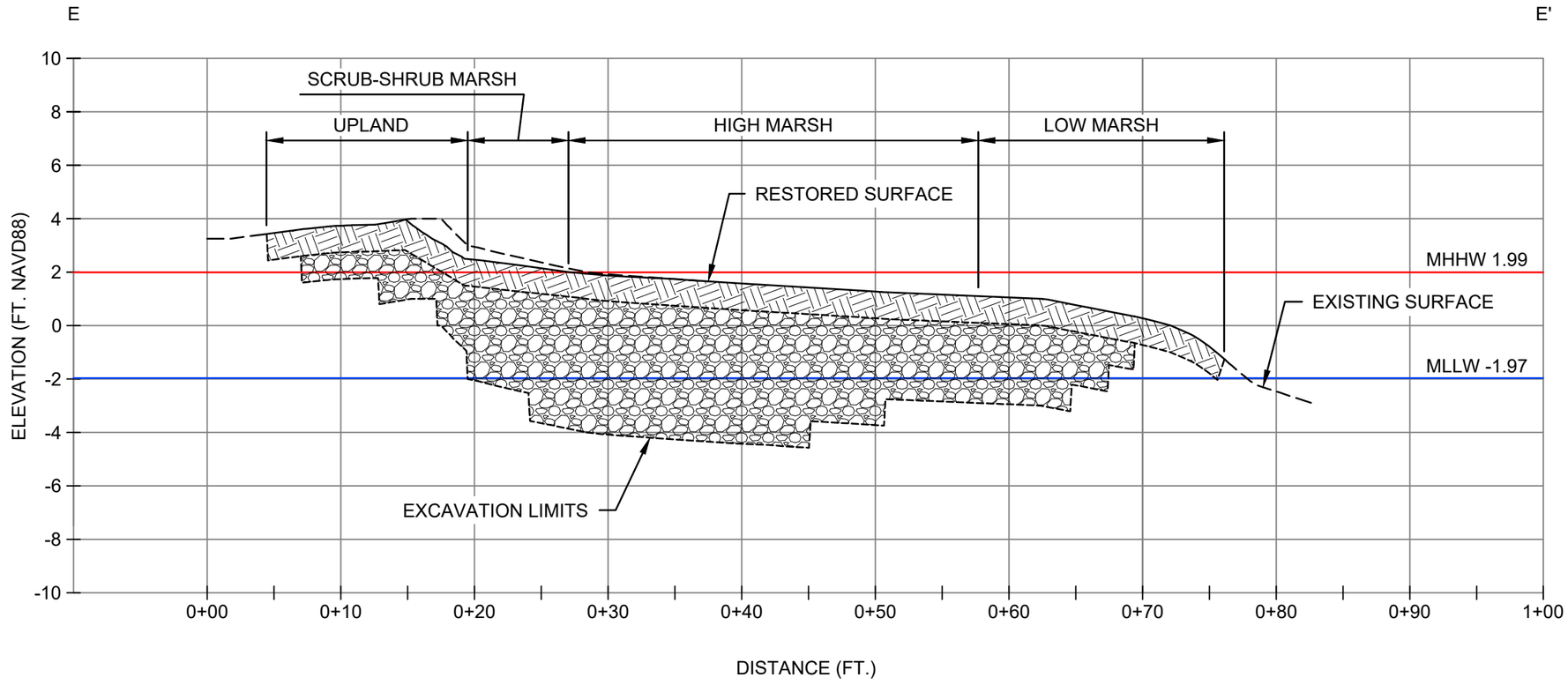
WEST ZONE 4
SECTION D-D'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 4

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

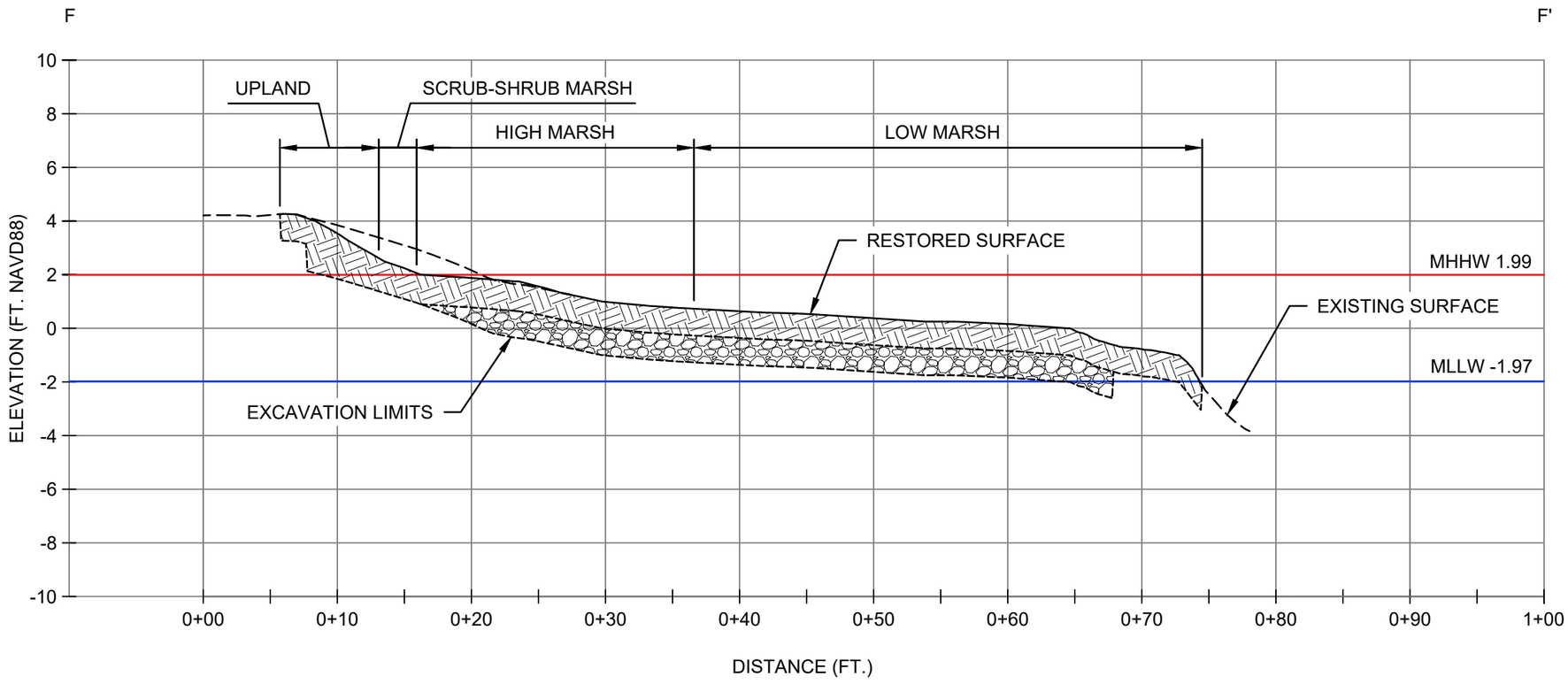
JACOBS®

WEST ZONE 4
SECTION E-E'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 5

CREATED: 7/14/2019 LAST SAVED: 12/13/2019 BY: ENGLANLL



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

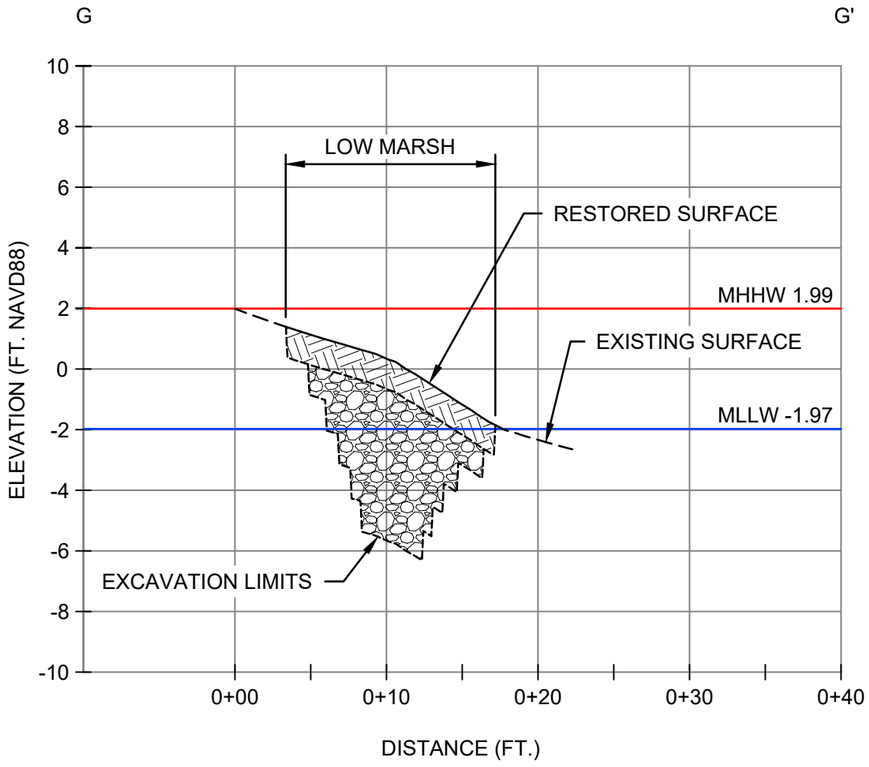
JACOBS®

WEST ZONE 4
SECTION F-F'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 6

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

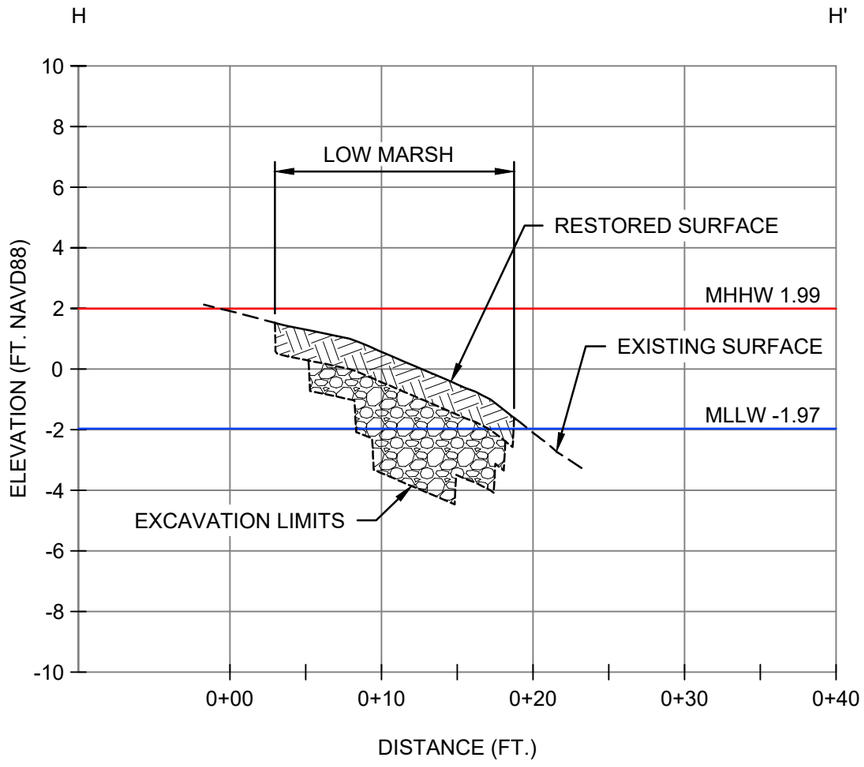
JACOBS®

WEST ZONE 4
SECTION G-G'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 7

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

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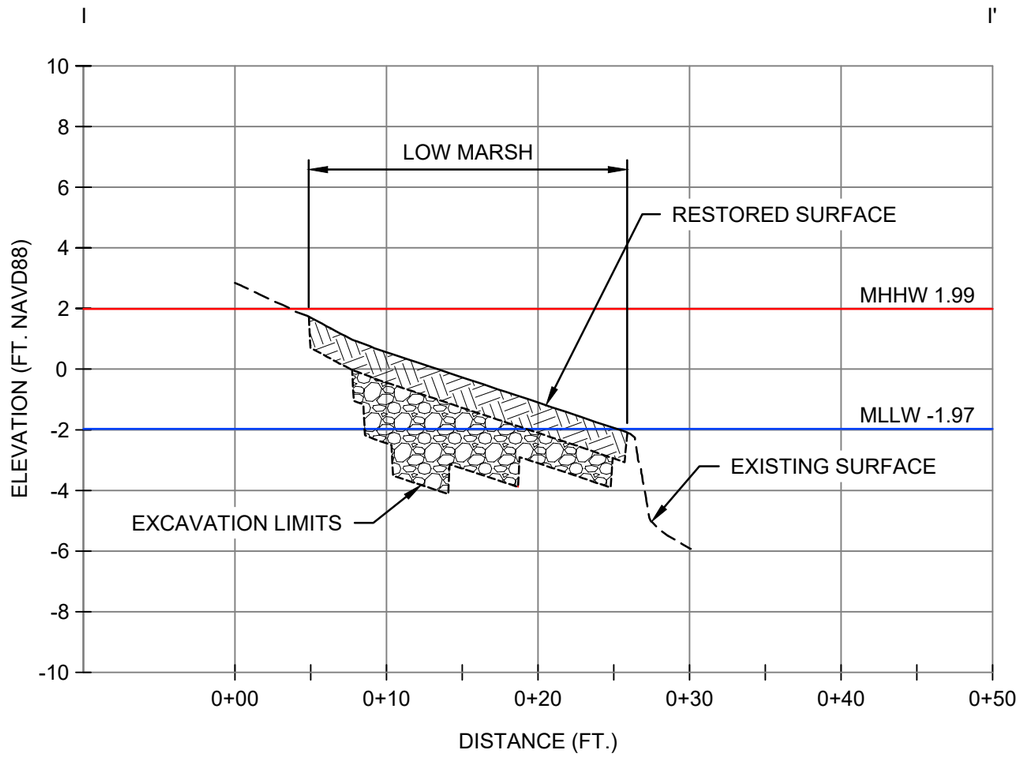
WEST ZONE 4
SECTION H-H'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 8

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

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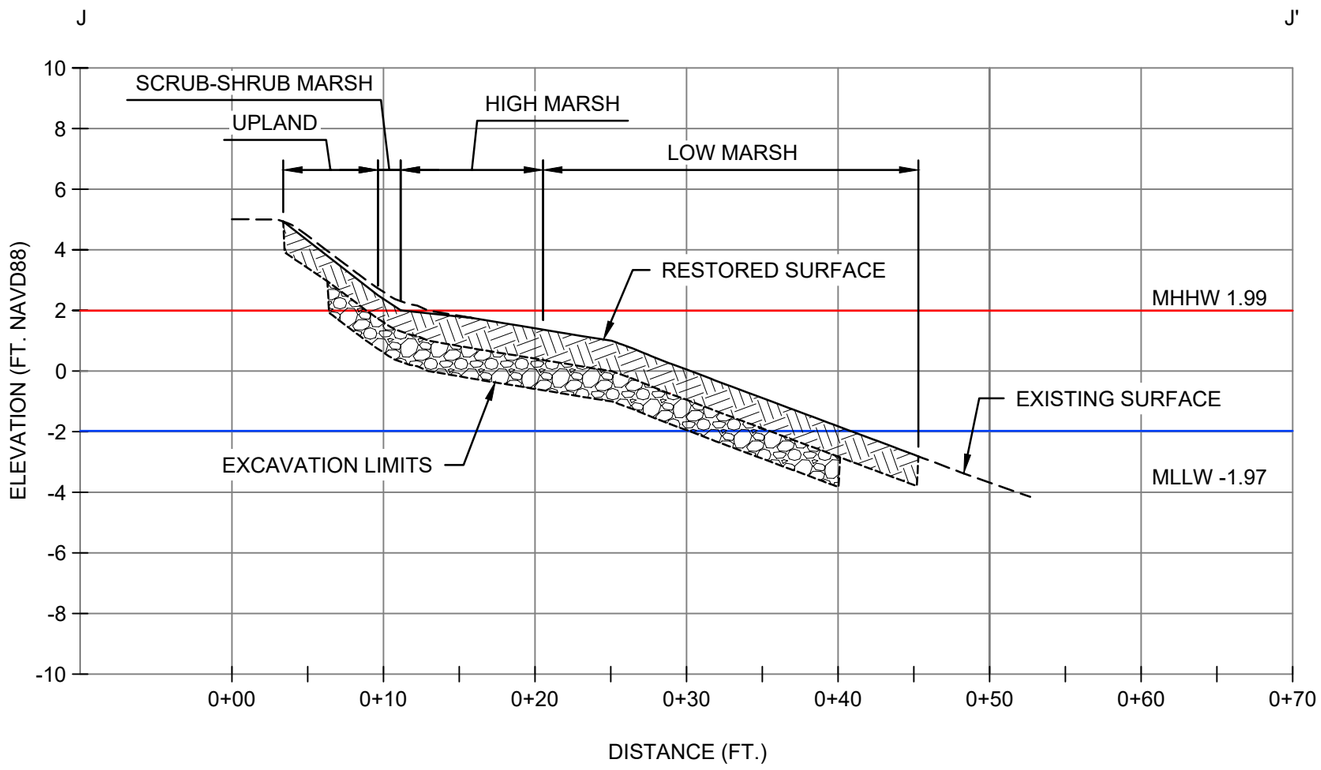
WEST ZONE 4
SECTION I-I'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 9

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



LEGEND:

- MLLW -1.97
- MHHW 1.99
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTES:

1. MUDFLATS WILL BE BACKFILLED TO APPROXIMATELY 10 FEET SEAWARD OF THE COIR LOGS INSTALLED AT THE LOW MARSH/MUDFLAT BOUNDARY, THEN SLOPED DOWNWARD TO MEET THE EXISTING HARBOR BOTTOM.
2. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

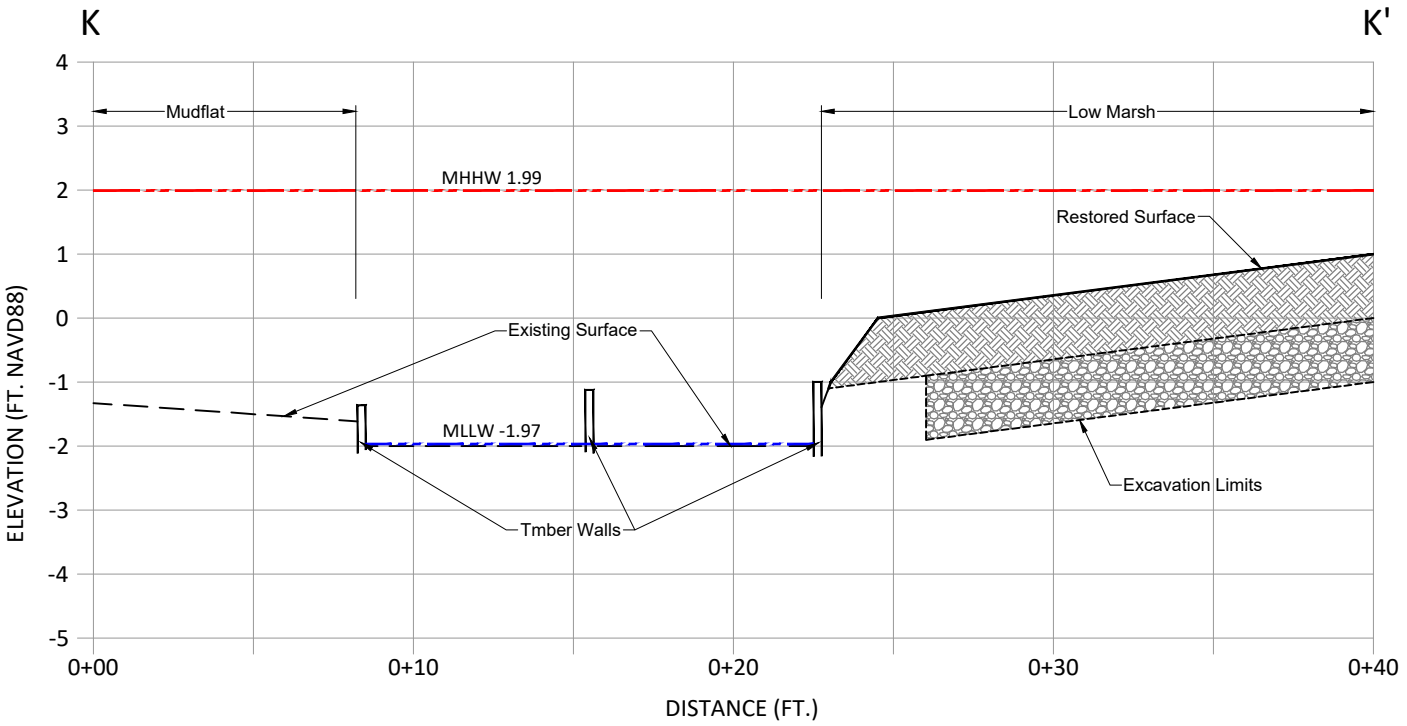
JACOBS®

WEST ZONE 4
SECTION J-J'

NEW BEDFORD HARBOR

SEPTEMBER 2019 | FIGURE 10

CREATED: 7/14/2019 LAST SAVED:12/13/2019 BY:ENGLANLL



LEGEND:

- MHHW (1.99 FT)
- MLLW (-1.97 FT)
- TOPSOIL BACKFILL
- GRAVEL BACKFILL

NOTE: 1. SUBSURFACE VERTICAL EXTENT OF TIMBER WALLS IS UNKNOWN.
2. RESTORED SURFACE WILL BE RESTORED TO SAME ELEVATION AS EXISTING SURFACE.
3. IN AREAS WITH HEAVY OIL STAINING OR SHEENS WITHIN THE EXCAVATION, TOPSOIL WILL BE USED EXCLUSIVELY FOR BACKFILLING WITH NO UNDERLYING GRAVEL USED. SEE WORK PLAN.

JACOBS™

WEST ZONE 4

SECTION K-K'

NEW BEDFORD HARBOR

October 2019 | FIGURE 11

Appendix C

Schedule

(to be provided at a later date)