Port of Bellingham
Harris Avenue Shipyard

Interim Action
Work Plan

FINAL

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List of Abbreviations and Acronyms

Acronym/ Abbreviation	Definition
All American	All American Marine, Inc.
AO	Agreed Order
AOC	Area of concern
AST	Aboveground storage tank
Bay	Bellingham Bay
bgs	Below ground surface
BMP	Best Management Practice
CAP	Cleanup Action Plan
cm	Centimeters
COC	Contaminant of concern
COPC	Contaminant of potential concern
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
CUL	Cleanup level
DAHP	Department of Archaeology and Historic Preservation
Ecology	Washington State Department of Ecology
IHS	Indicator Hazardous Substances
JARPA	Joint Aquatic Resource Permit Application
LPAH	Low molecular-weight polycyclic aromatic hydrocarbon
MHHW	Mean higher high water
MLLW	Mean lower low water
MTCA	Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated biphenyl
POC	Point of compliance
Port	Port of Bellingham
Puglia	Puglia Engineering
QAPP	Quality Assurance Project Plan
RAL	Remedial action level

Acronym/ Abbreviation	Definition
RCW	Revised Code of Washington
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
Site	Harris Avenue Shipyard Site
SMS	Sediment Management Standards
SPCC	Spill, Prevention, Control, and Countermeasure
SWAC	Surface-weighted area average concentration
TESC	Temporary Erosion Sediment Control
TPH	Total petroleum hydrocarbon
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources

1.0 Introduction

This Interim Action Work Plan (Work Plan) proposed by the Port of Bellingham (the Port) for implementation of the proposed Interim Action at the Harris Avenue Shipyard Site (Site) located at 201 Harris Avenue in Bellingham, Washington (Figure 1.1). The proposed Interim Action is planned to be conducted by the Port to implement cleanup actions within Bellingham Bay (the Bay) consistent with Agreed Order (AO) No. 7342 between the Washington State Department of Ecology (Ecology) and the Port. Permitting for the Interim Action is anticipated to occur via a Nationwide Permit 38 for the Cleanup of Hazardous and Toxic Waste by the U.S. Army Corps of Engineers (USACE).

The proposed Interim Action represents the first phase of a Model Toxics Control Act (MTCA) cleanup to occur at the Site and is consistent with the objectives presented in the Agency Review Draft Remedial Investigation and Feasibility Study (RI/FS) for the Site. The RI/FS is currently being revised based on Ecology comments and a revised Agency Review Draft RI/FS and subsequent Public Review Draft RI/FS will be submitted to Ecology for their approval. Although the Agency Review Draft RI/FS has not been finalized or approved by Ecology and the cleanup levels (CULs) proposed in this Work Plan are preliminary, it is anticipated that the actions performed under this Work Plan will constitute the final remedial actions in these areas and will be consistent with the final cleanup standards that will be presented in the Final RI/FS, which will be approved by Ecology, and the Final Cleanup Action Plan (CAP) that will be issued by Ecology in the future, both of which will go through the public review process. Ecology has not made a final decision on the MTCA cleanup, but has expressed support for the Interim Action as a first phase of the Site cleanup under the new alternative proposed by the Port. All in-water and upland work for the proposed Interim Action is expected to be performed under an amendment to the existing AO with project oversight by Ecology. This proposed cleanup action is being performed in compliance with the requirements of MTCA and Sediment Management Standards (SMS) regulations.

The extents of the proposed Interim Action are shown on Figure 1.2 and include upland and sediment cleanup actions. The cleanup of several sediment units will be conducted through a combination of dredging, excavation, upland disposal, and backfilling with clean material. Demolition and removal of several in-water structures is included as both a source control measure under MTCA and as a necessary step to perform a more permanent remedy under MTCA (i.e., to allow sediment removal as opposed to in-place sediment containment via capping). The Interim Action that will be conducted in a portion of the uplands includes soil removal, backfill, and source control by removal of contaminated material that could recontaminate sediments.

1.1 SCOPE AND PURPOSE OF THE INTERIM ACTION WORK PLAN

The Port submitted an Agency Review Draft RI/FS to Ecology on June 6, 2014, that described the nature and extent of contamination at the Site and identified a preferred alternative for the Site. Since the submittal of the document, Ecology and the Port have been meeting to discuss Ecology's comments on the Agency Review Draft RI/FS and are working toward preparing a Public Review Draft RI/FS that would be submitted for public comment. During this process it was

determined that there was an early opportunity to remove the wooden portion of the Harris Avenue Pier as well as the Carpenter Building and its supporting Pier (including the east marine railway walkway). These structures would be removed as both a source control measure and a necessary step to perform a more permanent remedy under MTCA (i.e., to allow sediment removal as opposed to in-place sediment containment via capping). The removal of these structures was determined by the Port to be a schedule priority after structural assessments were recently conducted (Berger ABAM 2007, 2014). The west marine railway access Walkway would also be removed to provide access for marine construction equipment to allow for the demolition of the Carpenter Building and its supporting Pier. Only the wooden portion of the Harris Avenue Pier and the east and west marine railway access walkways will be re-constructed in order to restore the existing function of the removed structures (i.e., the Carpenter Building and its supporting Pier will not be reconstructed).

Based on the accelerated schedule of the removal of these structures, providing the opportunity to implement a permanent cleanup remedy in these areas, it was determined that the remedial action in the vicinity of these structures would be conducted as an interim action through an amendment to the existing AO.

MTCA distinguishes an interim action from a cleanup action in that an interim action only partially addresses the cleanup of a Site and achieves one of the following purposes (Washington Administrative Code [WAC] 173-340-430(1)):

- "Is technically necessary to reduce the threat to human health and the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance [WAC 173-340-430(1)(a)].
- Corrects a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed [WAC 173-340-430(1)(b)].
- Is needed to complete a site hazard assessment, remedial investigation/feasibility study, or design a cleanup action [WAC 173-340-430(1)(c)]."

An interim action must also meet one of the following general requirements (WAC 173-340-430(2)):

- "Achieve cleanup standards for a portion of the site.
- Provide a partial cleanup (clean up hazardous substances from all or part of the site, but not achieve cleanup standards).
- Provide a partial cleanup and not achieve cleanup standards, but provides information on how to achieve cleanup standards."

Additionally, because the cleanup action has not been finalized, the Interim Action shall not foreclose reasonable alternatives for the cleanup action. This is not meant to preclude the destruction or removal of hazardous substances (WAC 173-340-430(3)(b)).

The proposed Interim Action will address the contamination underneath the failing overwater structures. The Interim Action will allow for proper and complete implementation of the remedial action by removing the overwater structures and the associated creosote-treated pilings. This action will, therefore, provide a more permanent remedy through the full removal of contaminated sediments, as opposed to a less permanent remedy such as capping, which would be implemented if the over water structures were to remain in place. The proposed action meets the requirements of MTCA described above by reducing the threat to human health and the environment through eliminating or substantially reducing one or more pathways for exposure to a hazardous substance, as well as correcting a problem that may become substantially worse if remedial action is delayed.

In December 2014, a Proposed Interim Action Sampling and Analysis Plan/Quality Assurance Program Plan (SAP/QAPP) was submitted to Ecology. This groundwater, soil, and sediments investigation was conducted in February 2015 to collect additional data necessary to support the design of the proposed Interim Action. The results from this investigation and the basis of design (including specific dredge depths) for the proposed Interim Action will be documented in an Interim Action Basis of Design Report.

The proposed Interim Action would be conducted from July 2015 to September 2016. This Work Plan is being submitted to Ecology concurrent with a draft AO Amendment, which will allow the proposed Interim Action to occur under the existing AO, as amended, with Ecology oversight. This Work Plan and the AO Amendment will go through public review concurrently.

The proposed Interim Action is consistent with the work described in the Joint Aquatic Resource Permit Application (JARPA) application submitted to the USACE in December 2014. In brief, the proposed Interim Action would include the following:

- Construction of a temporary walkway/utility support structure to the concrete portion of the Harris Avenue Pier.
- Abatement, removal, and disposal of hazardous materials on structures to be removed.
- Demolition and removal of the wooden portion of the Harris Avenue Pier, the Carpenter Building and its supporting Pier (including the east marine railway access walkway), and the west marine railway access walkway (located west of the marine railway).
- Dredging to cleanup levels (CULs) or remedial action levels (RALs) in the subtidal sediments in Sediment Units 1, 3A, and 3B, and portions of Sediment Units 4A and 7, with upland landfill disposal of dredged materials.
- Removal of approximately 2 feet of contaminated intertidal sediments in Sediment Units 2 and 3B, and a portion of Sediment Unit 4B, with upland landfill disposal of excavated materials. Backfill of these areas with clean fill to match existing grades.
- Soil excavation to approximately 8 to 12 feet below ground surface (bgs) in the vicinity of the former aboveground storage tank (AST).

- Shallow surface soil excavation (less than 4 feet deep) and re-surfacing in the vicinity of the Harris Avenue Pier and the Carpenter Building and its supporting Pier.
- Construction of a sheet pile bulkhead and a new concrete pier in the location of the existing wooden portion of the Harris Avenue Pier to replace existing functions and maintain shipyard operations.
- Construction of two marine railway access walkways on either side of the marine railway to replace existing functions.
- Demolition and removal of the temporary walkway/utility support structure.
- Associated utility work.

1.2 INTERIM ACTION WORK PLAN ORGANIZATION

The remaining sections of this Work Plan present the following material:

- **Section 2.0—Current Interim Action Area Conditions:** describes the site conditions and the areas that will be addressed in the proposed Interim Action.
- **Section 3.0—Interim Action Components:** summarizes the proposed Interim Action for the uplands and the sediments and provides a description of the construction and remediation methods and schedule to implement the proposed Interim Action.
- **Section 4.0—References:** lists references used in the development of this Work Plan.

2.0 Current Interim Action Area Conditions

This section summarizes the current conditions at the Site and identifies the areas that will be addressed through the proposed Interim Action for the Site. Each area addressed in this Work Plan is discussed in further detail in the Public Review Draft RI/FS. Other areas not affected by the proposed Interim Action are also discussed in the Public Review Draft RI/FS.

2.1 SITE DESCRIPTION

The Site, as defined by MTCA Chapter 173-340-200 WAC as the location where contamination has come to lie, consists of portions of the upland and aquatic land owned by the Port and Washington State Department of Natural Resources (DNR). A Port Management Agreement with DNR grants primary property-management authority to the Port for multiple harbor-area parcels, including parcels at the Site, that are owned by the State. The Site is currently leased from the Port to and is occupied by Puglia Engineering (Puglia; operated as Fairhaven Shipyard) and All American Marine, Inc. (All American). The limits of the Site are being determined and finalized as part of the RI/FS process. Key features of the Site are shown on Figure 2.1.

The currently defined area of the Site consists of 10 total acres including approximately 5 acres of uplands and 5 acres of in-water area, as shown on Figure 2.1. The Interim Action will be conducted on a portion of the Site including approximately 0.25 acres of the uplands and 4.2 acres of in-water area (refer to Figure 1.2).

2.2 STORMWATER

Stormwater within the Interim Action area is split between flat gravel areas that allow infiltration and sloped areas that sheet flow to the Bay. As stated in Section 2.1, the uplands Interim Action area comprises just 0.25 acres of the 5-acre upland site. Drainage patterns and stormwater control in the Interim Action area will not change as a result of the Interim Action.

2.3 CLEANUP STANDARDS

This section discusses the cleanup standards in affected media that are being developed in the Agency Review Draft RI/FS for the Site and are applicable to the Interim Action. Cleanup standards consist of (1) CULs defined by regulatory criteria that are protective of human health and the environment, and (2) pathway-specific points of compliance (POCs) that designate the locations on the Site where the CULs must be met. A more thorough description of the development of the cleanup standards, evaluation of site data, and development of the Site contaminants of concern (COCs) and areas of concern (AOCs) is included in the Agency Review Draft RI/FS.

As described in Section 1.0, the Agency-Review Draft RI/FS is being revised based on Ecology comments and the final COCs and cleanup standards are being developed. The revised Agency Review Draft RI/FS and subsequent Public Review Draft RI/FS will be submitted to Ecology for their approval. The cleanup standards presented in this Work Plan represent the

anticipated final cleanup standards for the Site, although they have yet to be approved by Ecology. It is anticipated that the actions performed under this Work Plan will constitute the final remedial actions in the Interim Action areas and will be consistent with the final cleanup standards that will be presented in the Final RI/FS, which will be approved by Ecology, and future Final CAP that will be issued by Ecology, both of which will go through the public review process.

2.3.1 Sediment

The following table summarizes the sediment exposure pathways that are applicable to the Interim Action. The POCs are shown as they relate to each separate exposure pathway.

Exposure Pathway	Point of Compliance
Protection of benthic species.	Upper 12 centimeters (cm) throughout site sediments.
Protection of human health via direct contact and incidental ingestion of intertidal sediment.	Upper 12 cm in the shipyard intertidal sediment area (defined as above 0 feet mean lower low water [MLLW] and beyond the toe of the bank).
Protection of human health via direct contact and incidental ingestion of subtidal sediment.	Upper 12 cm throughout the subtidal zone (defined as sediments below 0 feet MLLW).
Protection of human and ecological health via the consumption of seafood.	Upper 12 cm throughout site sediments; based on surface-weighted area average concentrations (SWACs).

A summary of sediment COCs, POCs, and the proposed CULs and RALs, if appropriate, are provided in Table 2.1. As described above, the cleanup standards presented in this Work Plan represent the anticipated final cleanup standards for the Site, although they have yet to be approved by Ecology.

The intertidal sediments on the north side of the shipyard will require cleanup to meet a POC of 12 cm deep where they are in exceedance of CULs protective of benthic species and shipyard workers. COCs for intertidal sediments include arsenic, copper, and zinc. Contaminants of potential concern (COPCs) for the intertidal sediments include acenaphthene and fluorene to be used as Indicator Hazardous Substances (IHS) for total petroleum hydrocarbon (TPH) impacts.

COCs in subtidal sediments include arsenic, copper, zinc, fluoranthene, pyrene, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and polychlorinated biphenyls (PCBs) for protection of benthic species or direct contact during net fishing (i.e., non-bioaccumulative pathways). Additionally, arsenic, cPAHs, and PCBs are COCs in subtidal sediments for protection of human and ecological health via consumption of seafood (i.e., via a bioaccumulative pathway).

It should be noted that no sediment screening level was developed for petroleum mixtures (TPH). There are no state or national standards for TPH in sediment. In Washington, the aromatic components of TPH, the PAHs, are used as IHS for TPH impacts. The PAHs have been well-studied

and have led to established standards and toxicity factors. Sediment screening levels for the PAHs have been developed and potential TPH impacts to the sediments will be assessed through their use.

The AOC for sediments, AOC 1, has been defined within the primary operational area of the shipyard. AOC 1 extends from Dry Dock No. 1 to just east of the Harris Avenue Pier, and contains the greatest concentrations offshore of the marine railway. This boundary was defined to encompass all point-by-point exceedances of CULs protective of benthic species, intertidal sediment direct contact, and direct contact and incidental ingestion of sediment during net fishing (i.e., the non-bioaccumulative pathways). The eastern boundary of the sediment contamination is not fully delineated and additional data was collected to define this boundary as part of the Proposed Interim Action Site Investigation described in Section 3.3. The in-water Interim Action area is within AOC 1.

It is anticipated that the cleanup action that is selected through the RI/FS and Cleanup Action Plan (CAP) process will include active remediation of sediments within AOC 1 and will achieve the cleanup standards throughout the Site for benthic species and intertidal sediment direct contact, as well as direct contact and incidental ingestion during net fishing. This action would thereby address all non-bioaccumulative exposure pathways within the AOC 1 boundary. The RI/FS will likely propose a sediment remedy where all sediments that exceed the cleanup standards for these pathways will either be capped with clean material or dredged to a surface meeting CULs or RALs, as appropriate. The active remediation of sediments within AOC 1 would also reduce the average concentrations of bioaccumulative compounds within the vicinity of the Site and reduce risk in the area.

2.3.2 Groundwater

Groundwater CULs will apply in the perimeter monitoring wells at the Site, including within the proposed Interim Action area. The proposed Interim Action for upland soil will support the groundwater remedy for the Site that will be presented in the Public Review Draft RI/FS. As described above, the cleanup standards presented in this Work Plan represent the anticipated final cleanup standards for the Site, although they have yet to be approved by Ecology. The final cleanup standards will be presented in the Final RI/FS that will be approved by Ecology and will have gone through the public review process. Final groundwater CULs will be presented in the Revised Agency Review Draft RI/FS.

The exposure pathway of concern for groundwater at the Site is protection of surface water quality for marine organisms; all other pathways are in compliance. The POC for this pathway is where groundwater discharges to surface water. COCs in groundwater include arsenic, copper, and two low molecular-weight polycyclic aromatic hydrocarbon (LPAH) IHS for TPH: acenaphthene and fluorene. Zinc is retained as a COPC for the Site. Monitoring will occur at the Site following completion of the site-wide cleanup remedy and will likely be conducted at the existing shoreline monitoring wells. Two new wells were installed as part of the Proposed Interim Action SAP/QAPP.

2.3.3 Soil

The following table summarizes the soil exposure pathways that are applicable to the Interim Action and are being developed as part of the Public Review Draft RI/FS for the entire site. The POCs are shown as they relate to each separate exposure pathway. As described above, the cleanup standards presented in this Work Plan represent the anticipated final cleanup standards for the Site, although they have yet to be approved by Ecology. The final cleanup standards will be presented in the Final RI/FS that will be approved by Ecology and will have gone through the public review process.

Exposure Pathway	Point of Compliance
Protection of human direct contact	Upper 15 feet throughout the Site.
Protection of groundwater quality: unsaturated zone	Unsaturated zone soils (upper 9 feet throughout the Site), based on infiltrating stormwater.
Protection of groundwater quality: saturated zone	Saturated zone soils (9 feet bgs and deeper), based on groundwater migration.
Protection of sediment quality in the nearshore environment via direct runoff of erodible soil	Areas of the uplands where it is reasonable to expect soils to reach the intertidal sediments via erosion and stormwater runoff. Potential for soil within the upper 15 feet throughout the Site.
Prevention of vapor intrusion	Unsaturated zone soils to protect ambient air in structures.

Soil COCs and AOCs vary by exposure pathway, spatially overlap one another, and are defined by different POCs. For each COC, appropriate CULs have been defined for the relevant pathways, along with specification of the area at the Site and the depth at which the CULs apply. A summary of soil COCs and COPCs relevant to each pathway, POCs, and the proposed CULs with the exception of the erosion to sediments pathway are provided in Table 2.2. The final preliminary CULs at the Site will be protective of sediments from erosion and will be determined in coordination with Ecology and will be presented in the Basis of Design Report.

Arsenic is the only COC within the Interim Action area associated with the direct contact exposure pathway for shipyard workers (AOC 3). The POC for direct contact is within the top 15 feet of soil, although there are effectively no exceedances below 2 feet bgs. Additionally, remediation of arsenic for this pathway will also reduce copper and zinc concentrations because they are co-located.

Erosion can currently occur at the sloping shoreline bank, in unpaved areas that drain to the Bay, and in unpaved areas that drain to stormwater conveyance systems and are then discharged to the Bay without treatment. Ecology has requested that the upper 15 feet bgs be used as the POC for this pathway; however, under current site conditions, erosion of soil in stormwater can only occur in the upper 1 or 2 feet. This pathway is currently applicable to the surface soil within AOC 2

and potentially some other unpaved areas outside of the Interim Action area at the Site. Future redevelopment activities could expose subsurface soil in other areas of the Site that may have the potential to erode to sediments or subsurface soil could be relocated or exposed to areas where erosion could occur. The potential future risk of erosion to sediments would be addressed through the development of an Ecology-approved Soil Management Plan specifying soil management procedures for future excavation and protecting the erosion pathway. Appropriate CULs for this pathway are being determined in coordination with Ecology and will be presented in the Basis of Design Report.

Arsenic and copper are COCs for the protection of groundwater. TPH is also being remediated for protection of groundwater (arsenic dissolution) and, potentially, may be re-instated as a COC for groundwater protective of surface water (marine aquatic species) as part of finalizing the Final RI/FS. Zinc has been retained as a COPC for this pathway. Groundwater monitoring will be conducted to verify the quality of groundwater at the Site.

2.4 AREAS OF CONCERN TO BE ADDRESSED IN THE INTERIM ACTION

To address the soil, groundwater, and sediment exposure pathways and CULs, RALs, AOCs were developed as part of the Agency Review Draft RI/FS. The Interim Action will address a portion of four of the AOCs; AOC 4B is outside of the extent of the Interim Action area and is not discussed below, but is discussed in detail in the Agency Review Draft RI/FS. The AOCs that will be partially addressed by the Interim Action are discussed below. Note that these discussions are based on the Agency Review Draft RI/FS, which has not yet been approved by Ecology as either a full representation of site conditions or a full evaluation of cleanup alternatives.

2.4.1 AOC 1

AOC 1 encompasses the active sediment remediation area. This AOC was divided into sediment units in the Agency Review Draft RI/FS. These sediment units were developed because each unit has characteristics unique to the application of specific remedial technologies and cleanup actions. The sediment units are illustrated on Figure 2.2.

2.4.2 AOC 2

AOC 2 is defined based on current shipyard conditions and includes upland unpaved soil that has the potential to erode to sediments. The cleanup action in AOC 2 will target arsenic, copper, and zinc in soil to prevent erosion of contaminated soil to sediments at concentrations greater than sediment CULs or RALs, as appropriate. All other unpaved soil on-site currently drains internally to the Site or infiltrates, without the physical possibility of erosion to sediments. Remediation of AOC 2 soil will also address direct contact by shipyard workers, meeting those requirements for AOC 3 described below. The upland AOCs are illustrated on Figure 2.3.

2.4.3 AOC 3

AOC 3 includes the remainder of the soil at the Site. The cleanup action in AOC 3 will address direct contact by shipyard workers of metals-contaminated soil.

2.4.4 AOC 4A

AOC 4A is defined as soil impacted by petroleum hydrocarbons that are primarily associated with releases from a historical diesel AST. The goal of remediation is the protection of groundwater through the removal of a mass of TPH above and within the zone of seasonal and tidal water table fluctuation. Long-term compliance will be assessed by monitoring for arsenic and the two LPAHs (acenaphthene and fluorene) in groundwater at the shoreline wells.

3.0 Interim Action Components

The proposed Interim Action represents the first phase of cleanup to occur at the Site and is consistent with the objectives of the Agency-Review Draft RI/FS submitted in June 2014. This proposed first phase of cleanup is based on a revised remedial alternative proposed by the Port that has been discussed with Ecology; the parties are in general agreement with the approach. The Agency-Review Draft RI/FS is being revised according to Ecology's comments. It is anticipated that the actions performed under this Work Plan will constitute the final remedial actions in these areas and will be designed as the final action to meet all cleanup standards that will be presented in the Final RI/FS, which will be approved by Ecology, and future Final CAP that will be issued by Ecology, both of which will go through the public review process.

This section describes the proposed Interim Action work that will be completed in the sediments and uplands of the Site. This Interim Action is designed to be the final cleanup action for the Site in the areas where it is implemented. Subsequent phases of cleanup in other areas of the Site are anticipated and will be identified in the Public Review Draft RI/FS. Within the Interim Action area, the preferred alternative for sediments involves the cleanup of sediment units through a combination of dredging, excavation, upland disposal, and backfilling with clean material. Demolition and removal of several in-water structures is included as both a source control measure under MTCA and as a necessary step to perform a more permanent remedy under MTCA (i.e., to allow sediment removal as opposed to in-place sediment containment via capping). Within the Interim Action area, the preferred alternative for the uplands includes removal or capping of shallow metals-contaminated soils, backfilling, and final grading and a focused deeper excavation in the former AST area. Although Ecology has not made a final decision on the MTCA cleanup, they have expressed support for the Interim Action proposed by the Port. The Interim Action is expected to be performed under the existing AO, as amended, with Ecology oversight. A JARPA application for the proposed Interim Action was submitted to the USACE in December 2014.

3.1 PROPOSED INTERIM ACTION MTCA CLEANUP AND ASSOCIATED STRUCTURE ADJUSTMENTS PROJECT

The uplands and sediment Interim Action areas are shown on Figure 1.2. The Interim Action area will cover a portion of each of the AOCs described in Section 2.4 and will include approximately 4.2 acres of sediments and 0.25 acres of the uplands. Within AOC 1, all of Sediment Units 1, 2, 3A, and 3B, and a portion of Sediment Units 4A, 4B, and 7 will be addressed with the Interim Action. A portion of AOC 2, AOC 3, and AOC 4A will be addressed in the uplands.

As described in Section 1.1, a Proposed Interim Action SAP/QAPP was submitted to Ecology and was implemented in February 2015. This investigation will provide the additional sediment and uplands data necessary to support the design of the proposed Interim Action to delineate the depth and extent of dredging and excavation. The results from this investigation will be documented in an Interim Action Basis of Design Report, which will document activities associated with the collection, transportation, and laboratory analysis of groundwater, soil, and

sediment samples. The Basis of Design Report will additionally include specific requirements for the design of the proposed Interim Action including defined dredge and excavation depths and a confirmational sampling plan. This investigation is described in further detail in Section 3.3.

The Interim Action described in the subsequent text will include the following:

- Construction of a temporary utility corridor and walkway to the concrete portion of the Harris Avenue Pier.
- Abatement, removal, and disposal of hazardous materials on structures to be removed.
- Demolition and removal of the wooden portion of the Harris Avenue Pier, the Carpenter Building and its supporting Pier (including the east marine railway access walkway), and the west marine railway access walkway (located west of the marine railway).
- Dredging to CULs or RALs, as appropriate, in the subtidal sediments in Sediment Units 1, 3A, and 3B, and portions of Sediment Units 4A and 7, with upland landfill disposal of dredged materials.
- Removal of approximately 2 feet of contaminated intertidal sediments in Sediment Units 2 and 3B, and a portion of Sediment Unit 4B, with upland landfill disposal of excavated materials. Backfill of these areas with clean fill to match existing grades.
- Excavation to approximately 8 to 10 feet bgs in the vicinity of the former AST.
- Shallow surface soil excavation (less than 4 feet deep) and re-surfacing in the vicinity of the Harris Avenue Pier and the Carpenter Building and its supporting Pier.
- Construction of a sheet pile bulkhead and a new concrete pier in the location of the existing wooden portion of the Harris Avenue Pier to replace existing functions and maintain shipyard operations.
- Construction of two marine railway access walkways on either side of the marine railway to replace existing functions.
- Demolition and removal of the temporary utility corridor and walkway.
- Associated utility work.

Although some monitoring requirements are discussed in this document, long-term monitoring at the Site will be developed and described in detail in the CAP. As such, this Work Plan applies to the contamination that is located within the Interim Action Area shown in Figure 1.2, and does not apply to areas of the Site outside that area.

3.2 DESCRIPTION OF AREAS TO BE ADDRESSED BY THE INTERIM ACTION

The following sections provide an overview of the areas that will be addressed as part of the Interim Action.

3.2.1 Sediments: AOC 1

The following sections provide an overview of AOC 1 and the sediment units (refer to Figure 2.2) that will be addressed during the Interim Action. The Interim Action will be conducted in Sediment Units 1, 2, 3A, and 3B, and in a portion of Sediment Units 4A, 4B, and 7.

3.2.1.1 Overwater Structures within AOC 1

The overwater structures are shown on Figures 2.1 and 3.1. The Harris Avenue Pier is a creosote-treated timber structure that is approximately 30 feet wide by 400 feet long. The decking consists of treated 4x12 planks supported by 4x12 stringers and 12x12 edge beams, which in turn are supported on the 12x12 timber pile caps placed on the creosote-treated timber piles. There are typically four piles per bent at the nearshore end, and five piles per bent at the offshore end. However, many replacement piles have been driven to replace those that have been damaged or deteriorated over time, and the original piles have been left in place. The pile bents are braced with timber and steel bracing (BergerABAM 2007).

The Carpenter Building and its supporting Pier and the Harris Avenue Pier were constructed in the early 1900s as part of a fish cannery. Currently, the Carpenter Building is part of the shipyard and houses office space, break rooms, mechanical shops, and general storage. The two-story wood-framed building is approximately 8,424 square feet, with a partial attic level at the north end of the building. The 54-foot by 156-foot building sits directly on the supporting pier (with the pier deck serving as its ground floor) and consists of post-and-beam construction. Toward the south end of the building is a shed roof extension. A catwalk runs along the exterior west face of the building to provide access for shipyard line handlers facilitating ship movements on the marine railway. The first story functions as tool shops, storage rooms, and several office spaces. The northern half of the second story is used as office space, while the southern half has storage and temporary living quarters. The Carpenter Building pier is a timber-framed structure consisting of timber decking spanning timber pile caps, supported by timber plumb piles (BergerABAM 2014).

The marine railway is located immediately west of the Carpenter Building. On the west side of the marine railway is a pile-supported 235-foot access walkway. This walkway provides overwater access for line handlers while the marine railway is in use.

3.2.1.2 Sediment Units 1 and 7

Sediment Units 1 and 7 are open water areas on either side of the Harris Avenue Pier. These areas have primarily unencumbered access. Sediment mudline elevations range from 0 feet MLLW to approximately -45 feet MLLW. These are active areas of shipyard operations, where existing water depths are necessary to support shipyard activities. Sediment surfaces are subject to prop wash and ship scour associated with vessel movements.

3.2.1.3 Sediment Unit 2

Sediment Unit 2 includes the shipyard intertidal sediment area above 0 feet MLLW to the toe of the riprap slope. It is east of the Carpenter Building and wooden portion of the Harris Avenue Pier. This is a portion of the shipyard that is not actively utilized.

3.2.1.4 Sediment Unit 3A

Sediment Unit 3A is approximately 30 feet wide and 190 feet long, and is located beneath the wooden portion of the Harris Avenue Pier, north of the Carpenter Building. The sediment surface elevation in Sediment Unit 3A ranges from approximately -10 feet MLLW to approximately -30 feet MLLW.

3.2.1.5 Sediment Unit 3B

Sediment Unit 3B is approximately 100 feet wide and 200 feet long, and is located beneath the remaining section of the wooden portion of the Harris Avenue Pier and the Carpenter Building. Sediment Unit 3B extends from the shoreline at the toe of the slope to approximately -10 feet MLLW and the intersection of Sediment Unit 3A. The shoreline area associated with Sediment Unit 3B is composed of a gently sloping sandy gravel shoreline that includes a concrete transition slab that connects the shoreline with the Harris Avenue Pier.

3.2.1.6 Sediment Unit 4A

Sediment Unit 4A consists of the area beneath and surrounding the offshore in-water portion of the marine railway at sediment mudline elevations below 0 feet MLLW. The marine railway, located in the middle of the north side of the Site, is a structure that provides vessel launching capabilities and vessel removal capabilities for upland work. The marine railway is a structure that extends from the uplands into the water. Immediately west of the marine railway is a timber pile-supported walkway, accessed by shipyard personnel to facilitate ship movement. To provide shipyard personnel access to the east side of the marine railway, a catwalk is mounted on the west edge of the Carpenter Building pier (located in Sediment Unit 3B). Only a small portion of Sediment Unit 4A will be remediated with the proposed Interim Action.

3.2.1.7 Sediment Unit 4B

Sediment Unit 4B consists of the area beneath and surrounding the in-water portion of the marine railway that is within the shipyard intertidal sediment area above elevation 0 feet MLLW. Only a small portion of Sediment Unit 4B will be remediated with the Interim Action.

3.2.2 Uplands: AOC 2, AOC 3, and AOC 4A

The upland AOCs that will be partially remediated in the Interim Action are described in Section 2.4. The surface of the upland Interim Action area is compacted gravel, with a small area of concrete near the existing approach to the Harris Avenue Pier. The surface is in fair condition

and it is primarily flat, with the exception of the northwest corner of the upland Interim Action area, which slopes gently toward the marine railway.

The upland Interim Action area, shown on Figure 2.3, is bounded by the Former Arrowac Fisheries property on the east (shown on Figure 2.1), the side rails and the marine railway on the west, the Bay on the north, and additional gravel surface of the Puglia lease area to the south. The Interim Action area is currently used by Puglia as a drive aisle to the Harris Avenue Pier and for temporary storage of equipment and materials. There are a few buildings or structures within the area that will need to be moved or demolished, as feasible. A trailer with restrooms is present within the Interim Action area and will be moved. There are two transformers and high voltage switch gear within the Interim Action area that will not be moved. There are significant subsurface utilities in the Interim Action area that lead to the existing Harris Avenue Pier. There are also a few pieces of steel or rail track that are no longer used and will be removed. The Interim Action area abuts the marine railway side rail track area, which is a thick concrete pad that supports rail tracks. The integrity of this structure will need to be maintained during the remedial action.

3.3 PROPOSED INTERIM ACTION SITE INVESTIGATION

As mentioned above, a Proposed Interim Action SAP/QAPP was submitted to Ecology for review. The field work described in the SAP was conducted in February 2015. This investigation will provide the additional sediment and uplands data necessary to support the design of the proposed Interim Action to delineate the depth and extent of dredging and excavation.

The primary objective of the investigation will be to collect additional chemistry and physical data to enable design of the proposed Interim Action in the uplands and in the sediments. Detailed objectives include the following:

- Determine the depth of excavation to address metals contamination in surface soils at the Site. It is assumed that the metals contamination is within the upper 2 to 3 feet of the soil and this sampling will confirm the depths of contamination. This information will assist in determining the extent and nature of the remedial action in these areas.
- Verify the depth of the most impacted soil in the vicinity of the former AST to ensure that the excavation in this area removes the most contaminated soil.
- Determine the depth of subtidal sediment removal in order to address contamination in sediments at the Site. It is assumed that the contamination is within the upper 2 feet of the sediments; this sampling will confirm the depths of contamination. This information will assist in determining the extent and nature of the remedial action in these areas.
- Identify the nature of the material below 2 feet in the intertidal sediments. This will determine whether contaminated material remains and institutional controls be considered as an appropriate remedy for the property as part of the final remedy for the Site.

- Determine the chemical nature of the sediments east of AOC 1 to assist in bounding the eastern edge of the Site.
- Install two new monitoring wells (in addition to the activities associated with the proposed Interim Action) at the Site to verify groundwater conditions through a series of quarterly groundwater monitoring events.

The results from this investigation and the design of the proposed Interim Action will be documented in an Interim Action Basis of Design Report.

3.4 DESCRIPTION OF THE SEDIMENT INTERIM ACTION

The Interim Action for sediments includes a combination of dredging and excavation and backfilling/capping. The open water areas of the Interim Action area, including the areas where the wooden portion of the Harris Avenue Pier and the Carpenter Building and its supporting Pier will be demolished will be dredged to CULs or RALs, as appropriate with the intent to meet the final cleanup standards. Contaminated subtidal sediments with concentrations greater than CULs or RALs, as appropriate, within these accessible open water areas will be removed from the aquatic environment and transported off-site for upland landfill disposal. Shipyard intertidal sediment areas with concentrations greater than CULs or RALs, as appropriate, will be excavated, and the excavation will be backfilled with clean fill to maintain existing elevations. Excavated material will be removed from the aquatic environment and transported off-site for upland landfill disposal. Monitoring will be conducted during implementation of the remedy and following completion of the remedy. Following completion of the dredging, the Harris Avenue Pier and marine railway access walkways will be reconstructed in order to replace their existing functions. The cleanup action for sediment is shown on Figure 2.2.

3.4.1 Overwater Structures

The Carpenter Building and its supporting Pier and the wooden portion of the Harris Avenue Pier will be demolished as part of the Interim Action to accomplish a source control action by removing dilapidated creosote-treated structures and to also allow a more permanent MTCA remedy through dredging and removal of contaminated marine sediments (refer to Figures 3.1 and 3.2). The timber building, decking, and pile caps will be removed. To safely demolish the Carpenter Building and its supporting Pier without the need for extensive temporary bracing and below mean higher high water (MHHW) containment/falsework, the building will be systematically dismantled from one end to the other while leaving the entire Pier intact. This allows the pier strength to be maintained while reducing the load and also allows the pier deck to act as a debris containment surface, helping to keep debris and dust out of the water. Due to the long length of the building and pier (204 feet), closer access to the center of the building is preferred to allow use of a reasonably sized derrick barge (small and medium derrick barges would not be able to access all regions of the building from the far end of the pier). With the east side of the Carpenter Building inaccessible due to the temporary walkway, access to the west side of the Carpenter Building is needed. However, the existing marine railway access walkway, at 44 feet from the Carpenter Building, is too close to allow access to typical barges capable of

carrying small cranes (the barge cannot be very narrow or it will overturn from the crane load). Therefore, the temporary removal of the west marine railway access walkway is desired to allow reasonable construction equipment and traditional demolition methods and limit additional in-water structure needed for demolition (i.e., no temporary piles necessary to brace the pier during demolition). The timber piles will be extracted entirely or broken off at the mudline if extraction is not practical. Structural demolition will occur with appropriate best management practices (BMPs) to minimize effects to water quality.

The Carpenter Building and its supporting Pier will not be rebuilt, but the wooden portion of the Harris Avenue Pier and the east marine railway walkway will be replaced following dredging in this area to maintain existing shipyard functions. Note that the concrete portion of the Harris Avenue Pier will remain in place.

A temporary walkway and utility corridor will be installed on the east side of the Harris Avenue Pier to accommodate access to and from the concrete portion of the Harris Avenue Pier during construction (refer to Figures 3.3 and 3.4). This will be a 5-foot-wide pile-supported temporary walkway that will be constructed to provide personnel access to the existing outboard concrete pier. The walkway will support temporary utilities to maintain operations on the existing concrete pier. The temporary walkway will be built along on the east side of the existing wooden portion of the Harris Avenue Pier. The structural system of the temporary access trestle comprises a combination of 12-inch-diameter battered and plumb steel pipe piles, steel pile caps, steel framing, and grating. The utility lines will be connected to the steel framing. The temporary walkway will be removed after the replacement pier construction is complete.

Once remedial actions in the area of the existing over structures are complete, in order to restore existing functions, the wooden portion of the Harris Avenue Pier will be reconstructed in its current footprint using more environmentally friendly materials than the current structure (e.g., existing creosote-treated timber piles will be replaced by fewer steel piles and the new piles will occupy a smaller net footprint than the existing creosote-treated timber piles due to the overall reduction in pile count; refer to Figures 3.3 and 3.5). The Carpenter Building and its supporting Pier will not be replaced. The footprint of the replacement pier will match that of the existing wooden Harris Avenue Pier, approximately 30 feet wide and 400 feet long, and will be situated in the location of the existing pier. The elevation of the replacement pier deck will match the existing deck elevation at the outboard concrete pier, approximately 15 feet MLLW. The structural system of the replacement pier will consist of plumb 18-inch and 24-inch-diameter steel pipe piles, 12-inch fender piles on the outside of both sides of the pier, reinforced concrete pile caps, and precast, pre-stressed concrete haunched deck panels. Expansion joints will be located at the nearshore end of the pier adjacent to the abutment and at the interface with the existing outboard concrete pier.

A new steel sheetpile bulkhead will also be constructed to provide a transition area between the new pier and the upland areas (refer to Figure 3.3). The toe of the new bulkhead will be located upland of MHHW.

The eastern and western marine railway access walkways will be replaced with a new steel pile-supported steel walkways (refer to Figure 3.3). The new western marine railway access walkway will be located approximately 8 feet to the west of its current location and the new eastern marine railway access walkway will be located approximately 4 feet east of its current position. The new eastern and western marine railway access walkways will be constructed in a manner that the decking and piling can be readily removed if necessary to accommodate future cleanup actions in these areas. The replacement walkways will consist of 12-inch-diameter steel pipe piles, steel deck beams, and grated deck walkways.

3.4.2 Subtidal Sediments

Subtidal sediments are defined as sediments below 0 feet MLLW. Within the Interim Action area, this includes Sediment Units 1 and 3A and a portion of Sediment Units 3B, 7, and 4A (refer to Figure 2.2). Sediment Unit 1 is an open water area and is currently accessible to water-borne construction equipment. Sediment Units 3A and 3B are currently covered with over-water structures and will be remediated following demolition of the Carpenter Building and its supporting Pier and wooden portion of the Harris Avenue Pier. Sediment Unit 3B is split between subtidal sediments and intertidal sediments (higher than 0 feet MLLW). Only a portion of Sediment Unit 7 and 4A, as shown on Figure 2.2, will be addressed by the Interim Action. These areas will be actively remediated through dredging to a surface that meets CULs or RALs, as appropriate, addressing all exposure pathways in the following manner:

- Dredging will occur to anticipated depths of 2 to 3 feet, as determined by pre-design sampling, using mechanical dredging equipment and methods. Specific dredge depths will be defined in the Basis of Design Report.
- Although the west marine railway access walkway will be demolished to allow for the Carpenter Building and its supporting Pier demolition and access to dredging, the footprint of the west marine railway access walkway will not be remediated as part of the Interim Action because the surrounding area, including the marine railway, will not be remediated as part of the Interim Action. There would be a high risk of recontamination of the sediments in this small area if the surrounding sediments were not remediated at the same time. This area will be addressed in the revised Agency Review Draft RI/FS, along with the remainder of the Site.
- All contaminated sediments will be removed from the aquatic environment. They will be transported by barge to a suitable transload facility, where they will be transloaded to truck or rail for transportation to an upland landfill for disposal.
- Confirmation monitoring will be conducted following dredging to confirm the exposed surface meets CULs or RALs, as appropriate. A Confirmational Monitoring Plan will be developed during design and will be included in the Basis of Design Report, for Ecology approval. The Confirmational Monitoring Plan will be designed to confirm that the surface that remains after dredging meets CULs or RALs, as appropriate, given allowances for anticipated dredge residuals.

- Dredging within the open water operational areas of the shipyard to meet CULs and RALS is supportive of continued shipyard operations. The dredged surface does not constrain operational depths or vessel movements.

3.4.3 Intertidal Sediments

Sediment Units 2 and 3B (higher than 0 feet MLLW) and a small portion of Sediment Unit 4B encompass the shipyard intertidal sediment areas. These areas are defined as being at elevations above 0 feet MLLW and these areas will be remediated through excavation and backfilling. Sediment Unit 2 is located east of the Carpenter Building and its supporting Pier and Harris Avenue Pier. This is a portion of the shipyard that is not actively utilized. Sediment Unit 3B is the area underneath the Carpenter Building and its supporting Pier and Sediment Unit 4B is the intertidal sediment area in the vicinity of the marine railway. Only a small section of Sediment Unit 4B located to the east of the marine railway will be excavated. These areas will be actively remediated through excavation of approximately 2 feet of sediment, followed by backfilling to return the areas to existing grade. These sediment units will be addressed in the following manner:

- Approximately 2 feet of contaminated sediment will be excavated from the intertidal areas using standard excavation equipment. Equipment may be operated either from land or from barges.
    - The excavation extent will be offset from the existing rip rap slope in Sediment Unit 2 by approximately 6 feet for structural stability and protection. In this area, a toe berm may be added to provide improved structural support to the riprap slope, and also to provide a barrier to contaminated sediments. This bulkhead toe berm would provide a cap to contaminated sediment in this area. The excavation extent in Sediment Unit 3B will extend to the top of the existing ecology block bulkhead and a new bulkhead will be built. The excavation extent for the small portion of Sediment Unit 4B will extend as close to the uplands pavement as feasible.
    - The proposed Interim Action sampling will confirm excavation depths, and determine where in the intertidal sediment area institutional controls may be necessary, requiring maintenance of the backfill areas. Specific depths and areas of institutional controls will be defined in the Basis of Design Report.
    - Excavated material will be transported off-site for upland landfill disposal.
- A sheetpile wall bulkhead will be installed at the eastern edge of Sediment Unit 3B. This bulkhead will replace the existing ecology block wall and separate the uplands from sediments.
- Backfill and bulkhead toe berm materials will be selected during the design phase to resist wave action and erosional forces, and to provide ancillary habitat benefit.

- In the future, as part of the final remedy, institutional controls may be placed in the intertidal sediment area wherever contaminated sediment may remain in place beneath the bulkhead toe berm.

3.5 DESCRIPTION OF THE UPLAND INTERIM ACTION

The proposed Interim Action for the uplands is described below and is consistent with the preferred alternative (Alternative 3) of the Agency-Review Draft RI/FS. The remedial action will remediate soil and groundwater within the Interim Action area (refer to Figure 2.3) using one or more of the following technologies:

- Excavation and off-site disposal of soil within the Interim Action area based on the sampling discussed in Section 3.3.
- Gravel capping in select areas where residual levels of contamination greater than industrial CULs will remain on-site.
- Bioremediation of saturated soil in the former AST area following excavation.

Together, these individual technologies will manage the exposure pathways to contamination within the Interim Action area.

Following completion of the proposed Interim Action sampling discussed in Section 3.3 and evaluation of the analytical results, the horizontal and vertical extents of the Interim Action excavation will be finalized in the Interim Action Basis of Design Report. One of the following remedial actions will be selected for various areas of the Interim Action area:

- No action for areas where sampling indicates that CULs are being met. CULs address the direct contact pathway throughout AOC 3, the leaching to groundwater pathway throughout AOC 2 and AOC 3, and the erosion to sediments pathway in AOC 2.
- Excavation and off-site disposal of surface soil that exceed CULs, followed by backfill with compacted gravel. This will involve a 1-foot minimum excavation in AOC 3, and a 2-foot minimum excavation in AOC 2. For the areas where the depths of excavation listed above will not meet the CULs, a permeable geotextile indicator layer will be placed between the contaminated soil and the gravel cap as an engineering control.
- Deeper excavation and off-site disposal extending to the depths indicated by the sampling results to reach CULs. While CULs are anticipated to be met within a 2-foot excavation depth in most areas of the Site, other areas may require deeper excavation. Deeper excavation also could be selected as a means to reduce the scope of restrictions on future excavation work, minimize the extent of geotextile placement, or support groundwater remedial objectives through the additional removal of metals-contaminated soil.

The determination for when excavation would be considered for removal of surface soil would be evaluated in the Interim Action Basis of Design Report based on the results of the Interim Action sampling (refer to Section 3.3), and shipyard operational conditions. The determination

for excavation would be based on the overall goal of removing the most contaminated surface soil to maximize the benefit to groundwater, human health, and the environment. The majority of the contaminated soil is anticipated to be present within the top 2 feet. The selected action will be determined with Ecology in the Interim Action Basis of Design Report.

Excavation and off-site disposal of soil will also be conducted to address TPH contamination in the former AST area. This action will restore the natural redox conditions in the subsurface and reduce arsenic in groundwater. Excavation of this area will include the following:

- Source area excavation and off-site disposal at a landfill of TPH-contaminated soil from the subsurface beneath the historical AST, as shown in Figure 2.3. The excavation depth is expected to be between 8 and 12 feet bgs. The excavation is targeted under the historical AST location because existing data indicate the highest concentration of TPH is present in this area. The excavation extent shown is defined by existing infrastructure, accessibility, existing data, and the groundwater level.
- A bioremediation amendment will be placed in the source area excavation during backfilling for the in situ treatment of residual groundwater contamination. The bioremediation amendment will be mixed with the saturated soil in the excavation. The bioremediation amendment, such as a slow oxygen release compound, will enhance the biological and chemical degradation of residual groundwater contamination (including compounds released from the soil treatment). The bioremediation amendment will be expected to treat groundwater for a period of 9 to 12 months following application.
- The excavated area will be backfilled with soil and the surface will be backfilled with compacted gravel.

3.6 BEST MANAGEMENT PRACTICES

The project involves in-water and uplands remediation. Furthermore, work will occur from both land- and water-based equipment. The following two sections present typical BMPs that will be followed during remediation.

3.6.1 Uplands Best Management Practices

The following BMPs may be used as part of the upland Interim Action work and will be finalized during development of the construction documents:

- BMPs will be implemented to prevent tracking soil onto paved areas, roadways, and off-site areas. Tracking of soil from active portions of the work area onto other areas of the property or public roads will not be allowed. For earthwork equipment exiting the work area, soil will be removed from the tires and body of trucks and equipment so that it is not deposited outside the work area.

- Dust control methods will be applied as needed to minimize the generation of dust from construction operations and to prevent air-borne dust from dispersing into the atmosphere. Water trucks, hoses, or spray nozzles for application of water may be used.
- Workers will follow the decontamination procedures described in the site-specific Health and Safety Plan. Tools, equipment, and heavy machinery that contact contaminated soil must be decontaminated before they contact clean backfill or are taken out of the active work area.
- The Contractor will perform the work in such a way as to minimize escape of materials and pollution into the surrounding environment. Fuel and oil spills will be addressed in a timely manner so as not to allow released fluids to infiltrate or leave the work area. All pollutants, including waste materials and construction debris, that occur on-site will be handled and disposed of in a manner that does not cause contamination of soil, surface water, or stormwater. All vehicles and construction equipment will be regularly inspected to detect any leaks or spills. Spill prevention measures, such as drip pans, will be used when conducting maintenance and repair of vehicles or equipment on-site.
- A Temporary Erosion Sediment Control (TESC) plan and water management plan will be prepared and implemented, as necessary. The TESC plan would address methods to install, maintain, and upgrade all erosion prevention, containment, and countermeasure BMPs during construction. This would include TESC surface runoff, stabilization of open excavation areas, and stockpile management.
- Stockpiling of soil and open excavation areas will be minimized. If contaminated soil is stockpiled on-site instead of being direct loaded for off-site transport and disposal, it would be stockpiled on plastic sheeting and covered with plastic and secured from blowing wind. Materials to be stockpiled would be contained within an area bermed with a temporary curb.

3.6.2 In-Water Work Best Management Practices

The following BMPs may be employed during implementation of the in-water work, but will be finalized during development of the construction documents:

- In-water work will occur during the joint regulatory agency-approved fish protection work windows for the project as negotiated during the regulatory process for the project.
- Turbidity and other water quality parameters will be monitored to ensure construction activities are in compliance with Washington State Surface Water Quality Standards (173-201A WAC) and in accordance with the Ecology-issued Water Quality Certification.

- Appropriate BMPs will be employed to minimize sediment loss during dredging. BMPs may include eliminating multiple bites while the bucket is on the seafloor and not stockpiling dredged material on the seafloor.
- If determined to be necessary based on sediment sampling results, enhanced BMPs may also be implemented to further control turbidity. Enhanced BMPs may include, but are not limited to:
  - Slowing the velocity (i.e., increasing the cycle time) of the ascending loaded clamshell bucket through the water column.
  - Pausing the dredge bucket near the bottom while descending and near the water line while ascending.
- Barges will be managed such that the dredged sediment load does not exceed the capacity of the barge. The load will be placed in the barge to maintain an even keel and avoid listing. If determined to be necessary based on sediment sampling results, hay bales and/or filter fabric may be placed over the barge scuppers to help filter suspended sediment from the barge effluent.
- Dredge vessel personnel will be trained in hazardous material handling and spill response and will be equipped with appropriate response tools, including absorbent oil booms. If a spill occurs, spill cleanup and containment efforts will begin immediately and will take precedence over normal work.
- The Contractor will inspect fuel hoses, oil or fuel transfer valves, and fittings on a regular basis for drips or leaks in order to prevent spills into the surface water.
- The Contractor shall be responsible for the preparation of a Spill, Prevention, Control, and Countermeasure (SPCC) Plan to be used for the duration of the project and will include the following information:
  - The SPCC Plan shall identify construction planning elements and recognize potential spill sources at the work site. The SPCC Plan shall outline responsive actions in the event of a spill or release and shall describe notification and reporting procedures. The SPCC Plan shall outline contractor management elements such as personnel responsibilities, project site security, site inspections, and training.
  - The SPCC Plan will outline what measures shall be taken by the Contractor to prevent the release or spread of hazardous materials(either found on-site and encountered during construction but not identified in contract documents, or any hazardous materials that the Contractor stores, uses, or generates on-site during remediation activities). These items include, but are not limited to, gasoline, diesel, oils, and chemicals. Hazardous materials are defined in Revised Code of Washington (RCW) 70.105.010 under "hazardous substance."
  - The Contractor shall maintain at the job site the applicable equipment and material designated in the SPCC Plan.

The following pile removal BMPs adapted from U.S. Environmental Protection Agency guidance (USEPA 2007) and Washington State Department of Natural Resources (WDNR) guidance (2007) will also be employed for pile removal:

- The removal of the creosote-treated piles shall be consistent with conditions issued as part of the Derelict Creosote Pile Removal Project Hydraulic Project Approval, issued to the WDNR Northwest Region (Control Number 106389 – 3, Issued August 8, 2007).
- The Contractor will initially vibrate the pile to break the friction bond between pile and soil.
- To help minimize turbidity, the Contractor will engage the vibrator to the minimum extent required to initiate vertical pile movement, and will disengage the vibrator once the pile has been mobilized and is moving upward.
- The piles will be removed in a single, slow, and continuous motion to the extent possible.
- Pile cutoff will be an acceptable alternative where vibratory extraction or pulling is not feasible. If a pile is broken or breaks during vibratory extraction, a chain may be used, if practicable, to attempt to entirely remove the broken pile. If the entire pile cannot be removed, the pile will be cut at the mudline.
- Upon removal from the substrate, the pile will be moved expeditiously from the water to a barge, and then offloaded for disposal or recycling if possible.

For placement of clean backfill material, the following measures will be observed:

- The placement of material will generally occur starting at lower elevations and working to higher elevations.
- Set volume, tonnage, lead line measurements, and bathymetry information or similar will be used to confirm adequate coverage during and after material placement.
- Imported materials will be pre-approved by Ecology and consist of clean, granular material free of roots, organic material, contaminants, and all other deleterious material.

3.7 MONITORING

Compliance monitoring requirements associated with implementation of the Interim Action consist of protection monitoring during remediation activities, performance monitoring to ensure Interim Action remediation is in accordance with the project plans and design, and confirmation monitoring following remedy completion to confirm the long-term effectiveness of the remedy.

3.7.1 Protection Monitoring

Protection monitoring will be conducted during remedy construction to confirm the protection of human health and the environment. Protection monitoring requirements will be described in a Health and Safety Plan addressing worker activities during the proposed Interim Action remediation and a Water Quality Monitoring Plan addressing turbidity in the surrounding waters during the proposed Interim Action.

3.7.2 Performance Monitoring

Performance monitoring activities will be conducted for both the uplands and sediment prior to design and during remediation. Performance monitoring for the uplands will consist of the following:

- The pre-remedial design soil sampling that is described in Section 3.3 will augment the performance monitoring that is typically conducted during remediation.
- Soil sampling will be conducted during remediation to ensure that the excavation meets the cleanup action goals. This sampling will be described in a post-excavation confirmational sampling plan that will be developed as part of the Interim Action Basis of Design Report.
- Quality control monitoring for remediation activities will be conducted, such as survey confirmation of excavation extent.

Performance monitoring for the sediments will consist of the following:

- The pre-remedial design sediment sampling that is described in Section 3.3 will augment the performance monitoring that is typically conducted during remediation.
- Sediment sampling will be conducted during dredging to ensure contaminated sediment removal complies with remedial goals. This sampling will be described in a post-dredge confirmational sampling plan that will be developed as part of the Interim Action Basis of Design Report.

3.7.3 Confirmation Monitoring

Confirmation monitoring activities will be conducted for both the uplands and sediment following completion of the remedy. This monitoring could involve groundwater monitoring and long-term monitoring to ensure stability of the backfilled intertidal sediment area. This monitoring will be determined as part of future documents.

3.8 CULTURAL RESOURCES

Historical Research Associated, Inc. provided recommendations for the type of future site activity that would require additional archaeological observations. They recommended further archaeological monitoring only during remedial activities associated with the removal of contaminated soils, concentrating in the southeastern portion of the Site and the locations where

concrete was observed at the approximate interface between historic-period fill and undisturbed native soils and an additional 3 feet below this contact into native materials (HRA 2011 and Floyd|Snider 2011).

A Monitoring and Inadvertent Discovery Plan will be completed to address monitoring protocols and procedures to follow in the event of an inadvertent discovery of an archaeological resources and/or human remains during proposed remedial excavations. In general, if apparent archaeological artifacts are encountered, the Port would be notified immediately. The Port would notify Ecology, Washington Department of Archaeology and Historic Preservation (DAHP), the Lummi Nation, and Nooksack Tribe, and would invite the parties to attend an on-site inspection with a professional archaeologist contracted by the Port. If confirmed, an archaeologist will document the discovery in a report submitted to DAHP so that they may control access to information regarding potential sensitive-site locations, in accordance with RCW Chapter 27.53.

In the event of an inadvertent discovery of potential human remains, work would immediately be halted in the discovery area, and the apparent remains would be covered and secured against further disturbance. The City of Bellingham Police Department and Whatcom County Medical Examiner would be immediately contacted, along with DAHP and authorized Tribal representatives. A treatment plan would be developed by a professional archaeologist in accordance with applicable state law.

3.9 REPORTING

Following completion of the Interim Action, the Port will prepare and submit to Ecology an Interim Action Construction Completion Report. The report will summarize the Interim Action completed and monitoring results. The report will include the following details:

- Field documentation for the remediation, including relevant field notes, field observations of contamination, and photographs.
- Analytical testing results and associated field documentation. This will include tables and maps displaying the chemical test results and laboratory reports from the chemical testing laboratories for all analytical samples tested.
- Final upland and sediment survey information.
- Extent and depth of upland and sediment Interim Action.
- Documentation and maps showing locations where contamination was left in place.

The Interim Action Construction Completion Report will be submitted to Ecology within 60 days following completion of the Interim Action.

3.10 INTERIM ACTION SCHEDULE AND CONSTRUCTION PHASING

3.10.1 Interim Action Schedule

The following schedule is anticipated for implementation of this Work Plan:

Event or Document	Anticipated Calendar Date
Submit Agency Review Draft Interim Action Work Plan	January 13, 2015
Conduct Proposed Interim Action Sampling	February 2015
Prepare Interim Action Basis of Design Report	February–April 2015
Prepare Construction Documents for the Interim Action	February–April 2015
Submit Public Review Draft Interim Action Work Plan	March 2015
Public Comment on the AO Amendment and Public Review Draft Interim Action Work Plan	March–April 2015
Execute AO Amendment and Approve Interim Action Work Plan	May 2015
Bid and Award Process	April–June 2015
Begin Interim Action Remediation	July 2015
Project Complete	September 2016
Submit Interim Action Completion Report	October 2016

3.10.2 Sequencing of Interim Action Activities

Because the project will be conducted in an active shipyard environment and because existing structures will need to be demolished prior to removing contaminated sediments, the project will follow specific sequencing. The project is anticipated to generally adhere to the following sequencing:

- The project will begin with simultaneous cleanup of Sediment Units 1 and 2. Cleanup of Sediment Units 1 and 2 is estimated to take 25 working days.
- Following cleanup of Sediment Units 1 and 2, a temporary walkway will be constructed from shore to the concrete portion of the Harris Avenue Pier. Temporary utilities will be installed. Installation of the temporary walkway and utility corridor is estimated to take 25 working days.
- When the temporary walkway and utilities are active, demolition of the Carpenter Building and its supporting Pier, marine railway access walkways, and Harris Avenue Pier will occur. Demolition is estimated to take 55 working days.

- Following demolition, cleanup of Sediment Units 3A and 3B, and portions of Sediment Units 4A, 4B, and 7 will occur, with subtidal work from water-based derrick and intertidal cleanup from upland excavators. Cleanup of these areas is estimated to take 30 working days.
- With in-water cleanup complete, construction of the Harris Avenue Pier and marine railway access walkways will begin, starting with pile driving. Pile driving is estimated to take 20 working days.
- Immediately following pile driving, construction of the pier deck and marine railway access walkways will occur and is estimated to take 60 working days.
- Simultaneous with the pile driving, the Interim Action upland cleanup will begin. The upland cleanup is estimated to take 60 working days.
- As appropriate with the upland cleanup schedule, the upland bulkhead will be constructed, which is estimated to take 30 working days.
- Following completion of the remediation work and construction of the new pier and marine railway access walkways, utilities will be installed. Following this action, the new pier and marine railway access walkways will be operational. Utility installation is estimated to take 40 working days.
- Finally, at the start of the 2016 in-water work window, the temporary walkway will be completely removed and fender piles will be installed along the sides of the Harris Avenue Pier. These actions are estimated to take 35 working days.

3.10.3 In-Water Work Windows

In-water work will primarily occur during the USACE- and Washington Department of Fish and Wildlife (WDFW)-approved in-water work windows. The allowable in-water work windows for the project are based on the presence of juvenile salmonids (regulated by WDFW) and Chinook salmon and bull trout (regulated by USACE). Table 3.1 provides a summary of the proposed in-water work windows for the project.

4.0 References

BergerABAM. 2007. *Harris Avenue Shipyard Engineering/Predesign Report*. Prepared for the Port of Bellingham. June.

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Port of Bellingham
Harris Avenue Shipyard

Interim Action Work Plan

Tables

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Table 2.1
Sediment Cleanup Levels and Remedy Evaluation

		Parameter	Area	SCO mg/kg	SCO Basis	CSL mg/kg	CSL Basis	CUL mg/kg	RAL mg/kg	Point of Compliance	Rationale for CULs and RALs
Non-Bioaccumulatives	COCs	Copper	Intertidal and Subtidal Sediments	390	Benthic SQS	390	Benthic CSL	390	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Non-Bioaccumulatives	COCs	Zinc	Intertidal and Subtidal Sediments	410	Benthic SQS	960	Benthic CSL	410	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Non-Bioaccumulatives	COCs	Fluoranthene	Subtidal Sediment	1.7	Benthic SQS	2.5	Benthic CSL	1.7	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Non-Bioaccumulatives	COCs	Pyrene	Subtidal Sediment	2.6	Benthic SQS	3.3	Benthic CSL	2.6	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Non-Bioaccumulatives	COPCs	Acenaphthene	Intertidal Sediment	0.5	Benthic SQS	0.5	Benthic CSL	0.5	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Non-Bioaccumulatives	COPCs	Fluorene	Intertidal Sediment	0.54	Benthic SQS	0.54	Benthic CSL	0.54	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Bioaccumulatives	COCs	Arsenic	Beach Intertidal Sediment	57	Benthic SQS	93	Benthic CSL	57	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Bioaccumulatives	COCs	Arsenic	Shipyard Intertidal Sediment	20	Natural Soil Background	82	Shipyard Worker at $1.0x10^{-5}$ Risk	20	NA	0 to 12 cm	CUL = SCO; no RAL proposed.
Bioaccumulatives	COCs	Arsenic	Subtidal Sediment	11	Natural Background	14	Site Specific Regional Background	14	20	0 to 12 cm	CUL = CSL (Regional background); use a RAL = 20 mg/kg to avoid patchy exceedances scattered around the estimated regional background.
Bioaccumulatives	COCs	PCBs	Subtidal Sediment	Unknown	Natural Background	Unknown	Site Specific Regional Background	CSL based on Estimated Regional Background or greater PQL	0.13	0 to 12 cm	The RAL is based on the benthic SQS of 0.13 mg/kg; also protective of net fishing.
Bioaccumulatives	COCs	cPAHs TEQ	Subtidal Sediment	0.016	Natural Background	0.084	Site Specific Regional Background	CSL based on Estimated Regional Background or greater PQL	0.50	0 to 12 cm	The RAL is based on direct contact from net fishing screening level (10^{-5} risk); also protective of benthic species.

Abbreviations:

cm Centimeters.
COC Chemical of concern.
COPC Chemical of potential concern.
cPAH Carcinogenic polycyclic aromatic hydrocarbon.
CSL Cleanup screening level.
CUL Cleanup level.
mg/kg Milligrams per kilogram.
NA Not applicable.
PCB Polychlorinated biphenyls.
PQL Practical Quantitation Limit.
RAL Remedial Action Level.
SCO Sediment Cleanup Objective.

Table 2.2
Soil Cleanup Levels

Chemicals of Concern for Soil	Units	Direct Contact (POC = 0–15 ft bgs) AOC Definition: AOC 3 Site-wide, 0–4 ft bgs, where exceedances are present		Protection of Groundwater (POC = 0–8 ft bgs) AOC Definition: AOC 3 Site-wide, 0–4 ft bgs, where exceedances are present		Special Considerations for TPH AOC Definition: AOC 4A and 4B	
		Proposed CUL	COC for this Pathway?	Proposed CUL	COC for this Pathway?	AOC 4A	AOC 4B
Metals						AOC 4A is defined to address diesel contamination associated with a historical AST. Intent is a mass removal or treatment action. The goal is to decrease oxygen demand in the area allowing for improvement in water quality and to decrease the amount of C8-C12 aliphatics in the vadose zone to reduce the potential for vapor intrusion.	AOC 4B is defined to address TPH contamination in the shoreline area. Current conditions are compliant and require no action, but additional data focused on two new wells are needed to confirm conditions. Collected soil and groundwater data will include arsenic, copper, zinc, TPH, and LPAHs.
Arsenic	mg/kg	88	Yes	88	Yes (AOC 4A)		
Copper	mg/kg		No	390	Yes		
Zinc	mg/kg		No	960	COPC[1]		
Polychlorinated Biphenyls (PCBs)							
Total PCBs	mg/kg		No		No		
Semivolatile Organic Compounds (SVOCs)							
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)							
Summed cPAH TEQ[2,3]	mg/kg		No		No		
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (LPAHs)							
2-Methylnaphthalene	mg/kg		No		No		
Naphthalene	mg/kg		No		No		
Acenaphthene	mg/kg		No		No		
Acenaphthylene	mg/kg		No		No		
Anthracene	mg/kg		No		No		
Fluorene	mg/kg		No		No		
Phenanthrene	mg/kg		No		No		
Non-Carcinogenic High Molecular Weight Polycyclic Aromatic Hydrocarbons (HPAHs)							
Benzo(g,h,i)perylene	mg/kg		No		No		
Fluoranthene	mg/kg		No		No		
Pyrene	mg/kg		No		No		
Total Petroleum Hydrocarbons (TPH)							
Diesel-Range Hydrocarbons	mg/kg		No		No		
Oil-Range Hydrocarbons	mg/kg		No		No		

Notes:

Pathway in compliance.

1 Zinc is retained as a COPC due to groundwater uncertainty until data from two new shoreline wells are available for assessment.

2 Calculation of cPAH TEQ concentrations was performed using the California Environmental Protection Agency 2005 TEFs as presented in Table 703-2 of WAC 173-340-900 (Ecology 2007).

3 Calculated using detected cPAH concentrations plus one-half the reporting limit for cPAHs that were not detected.

Abbreviations:

AOC Area of concern.
AST Aboveground storage tank.
bgs Below ground surface.
COC Chemicalof concern.
COPC Chemical of potential concern.
CUL Cleanup level.
CSL Cleanup screening level.
Ecology Washington State Department of Ecology.
ft Feet.
mg/kg Milligrams per kilogram.
PAH Polycyclic aromatic hydrocarbon.
POC Point of compliance.
TEF Toxicity equivanent factor.
TEQ Toxicity equivalent.
WAC Washington Administrative Code.

Table 3.1
Project In-Water Work Windows[1]

Species	Month												Approved Work Windows by Species
	J	F	M	A	M	J	J	A	S	O	N	D	
Juvenile salmonids (WDFW)													Below OHWM,[1] in dry: July 15 to July 31[2] In-water: August 1 to March 14
Chinook salmon (USACE)													July 2 to March 2
Bull trout (USACE)													July 16 to February 15
Combined in-water work windows													August 1 to February 15

Notes:
- No in-water work allowed.
- In-water work allowed.
- In-water work below OHWM in dry conditions allowed.

1 Created by Anchor QEA for the JARPA.
2 Work below the OHWM is allowed in the dry July 16 to July 31 for juvenile salmonids.

Abbreviations:

JARPA	Joint Aquatic Resource Permits Application.
OHWM	Ordinary high water mark.
USACE	U.S. Army Corps of Engineers.
WDFW	Washington State Department of Fish and Wildlife.

Port of Bellingham
Harris Avenue Shipyard

Interim Action Work Plan

Figures

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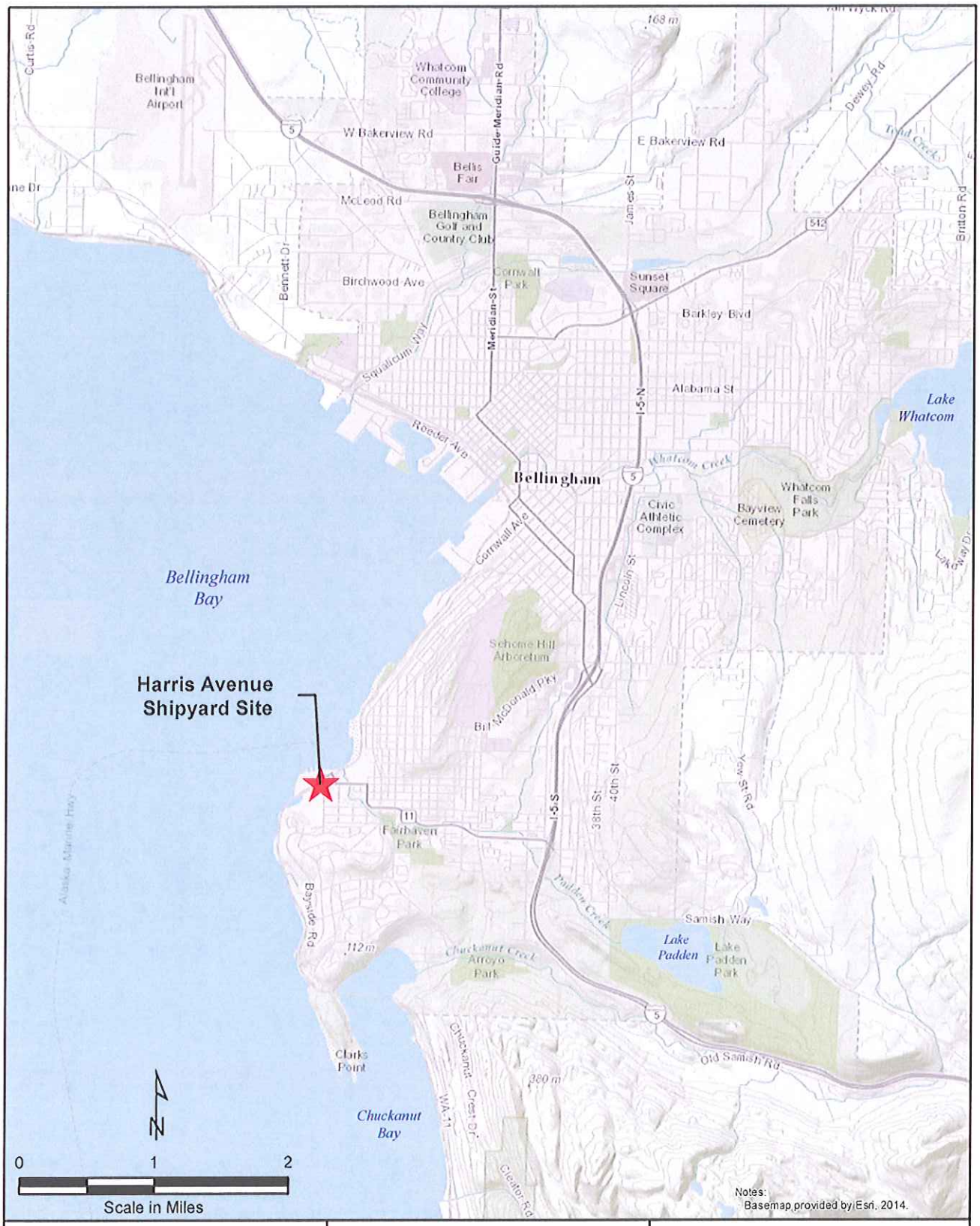

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Interim Action Work Plan
Harris Avenue Shipyard
Bellingham, Washington

Figure 1.1
Vicinity Map

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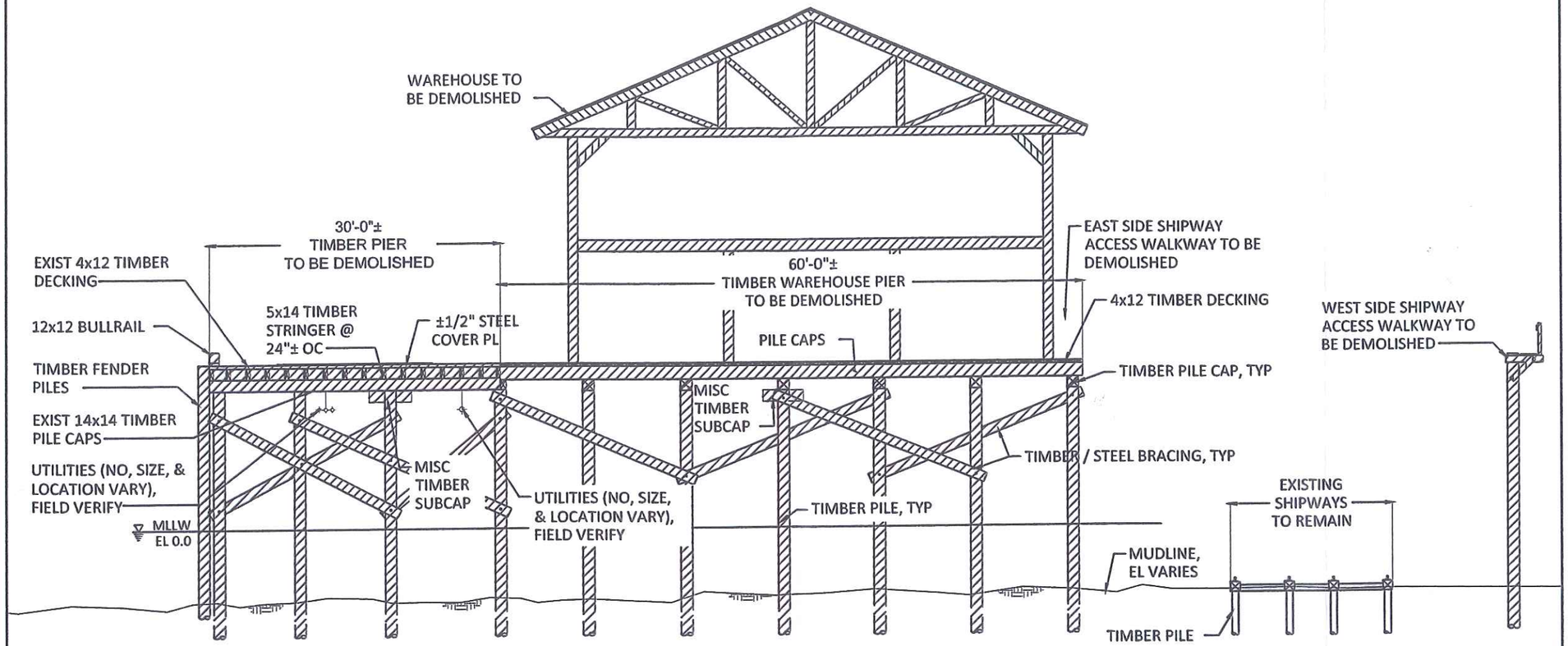
12/3/2014



SOURCE: DRAWING PREPARED BY CAD FILES PROVIDED BY BERGER ABAM, 10-15-2014

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Bellingham, Washington

Figure 3.1
Typical Cross Section

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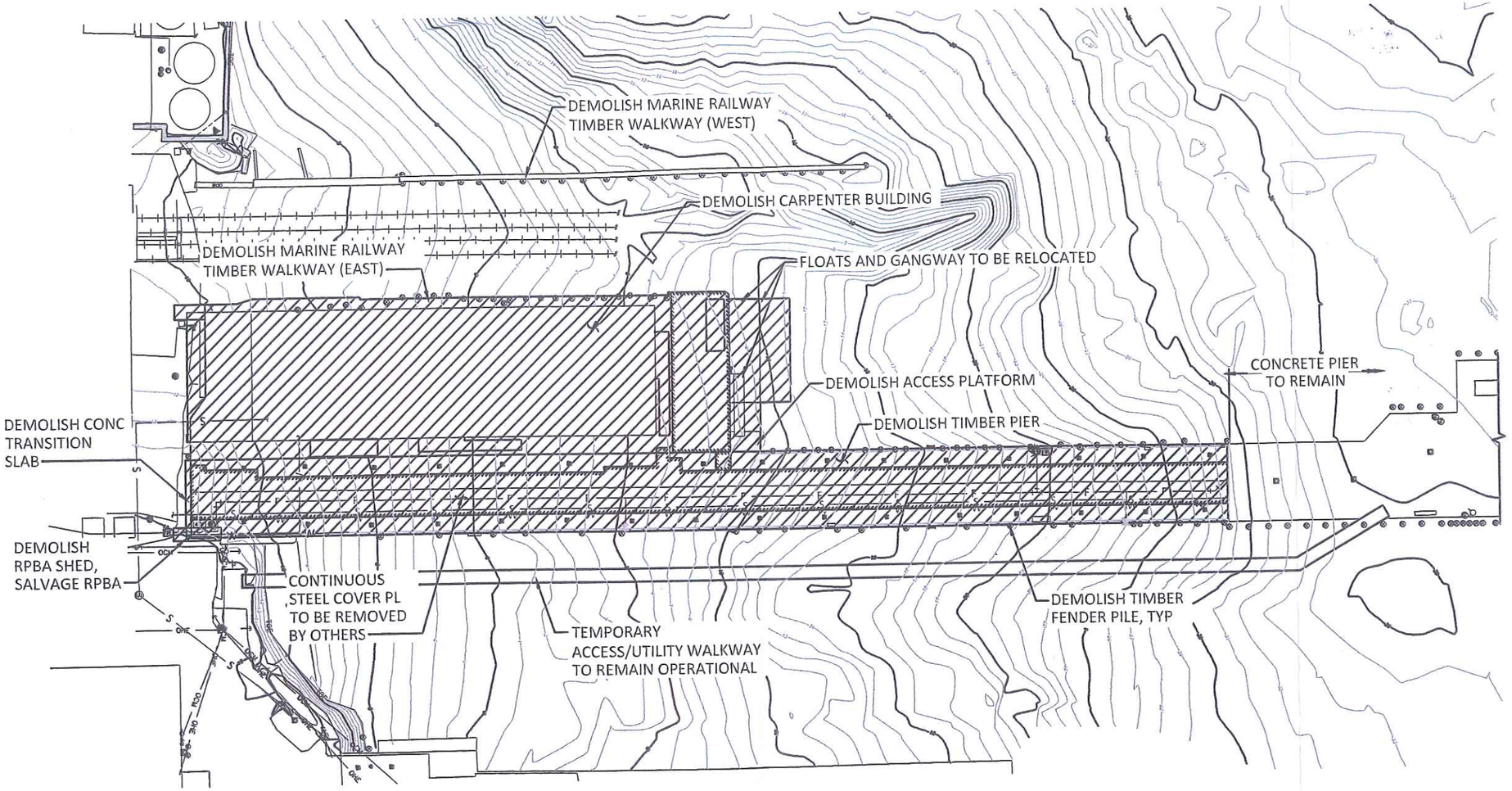
1/8/2015



SOURCE: DRAWING PREPARED BY CAD FILES PROVIDED BY BERGER ABAM, DATED 7-30-2014.
NOTE: GEOMETRY AND LOCATIONS OF FEATURES ARE APPROXIMATE, FIELD VERIFY DIMENSIONS AND LOCATIONS OF WORK

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Figure 3.2
Demolition Plan

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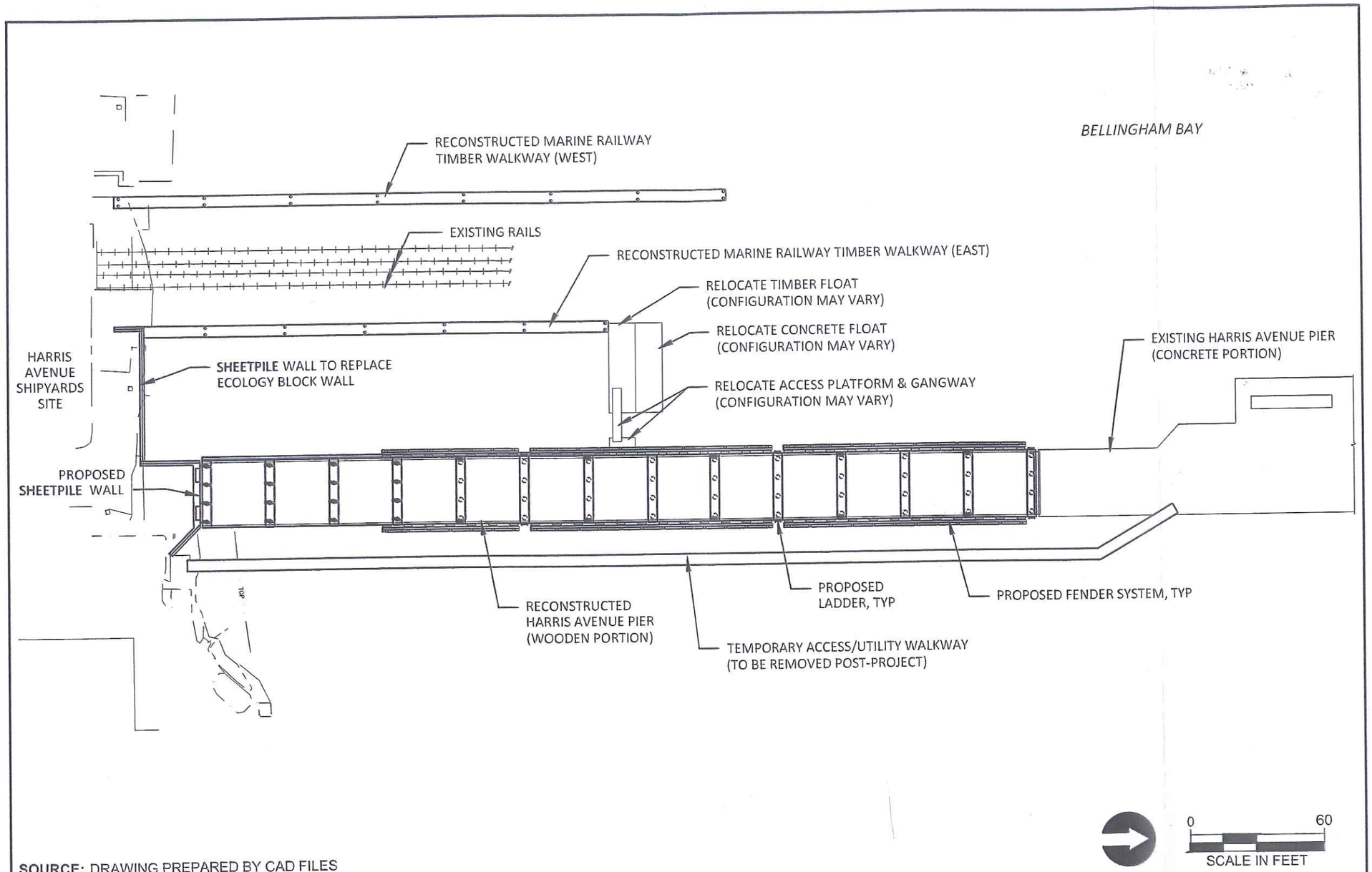
1/8/2015



SOURCE: DRAWING PREPARED BY CAD FILES PROVIDED BY BERGER ABAM, DATED 7-30-2014.

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Harris Avenue Shipyard
Bellingham, Washington

Figure 3.3
Harris Avenue Pier Replacement
Plan View

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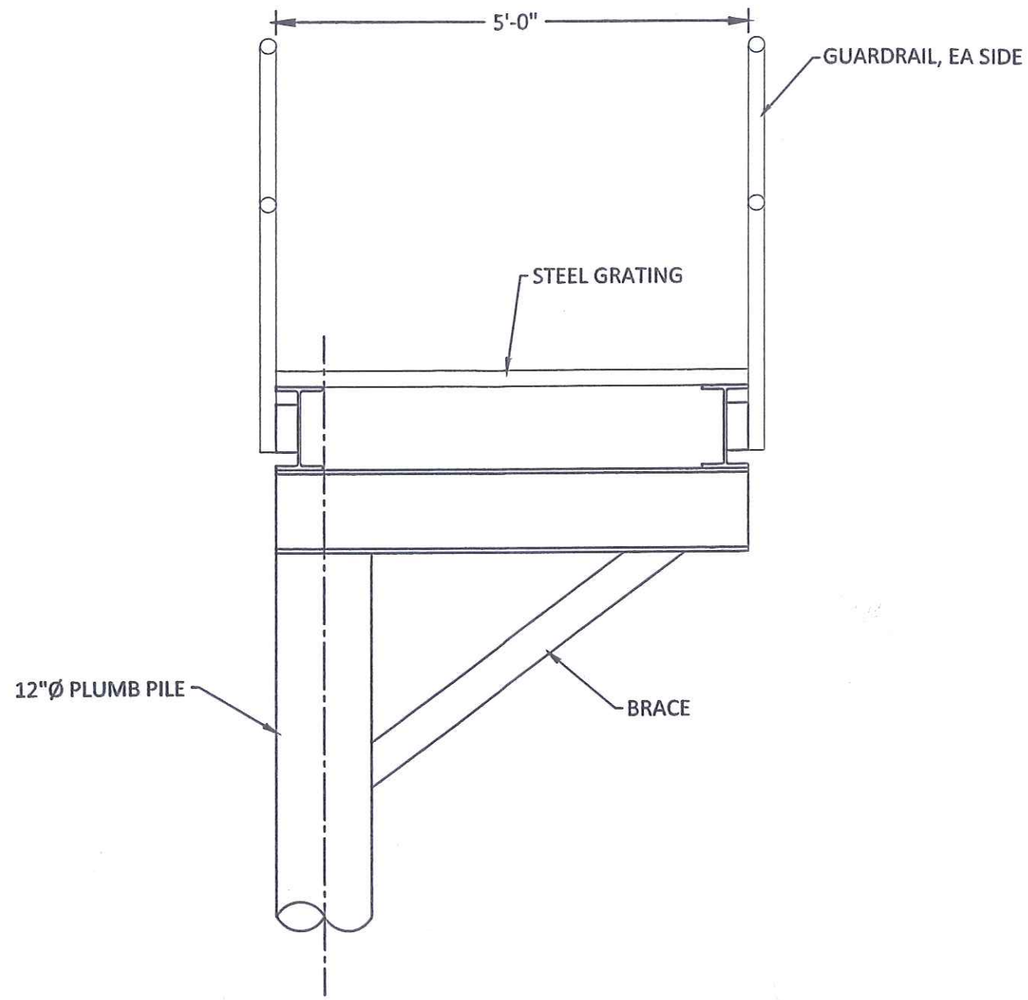
1/8/2015



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0 2
SCALE IN FEET

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Harris Avenue Shipyard
Bellingham, Washington

Figure 3.4
Temporary Walkway Detail

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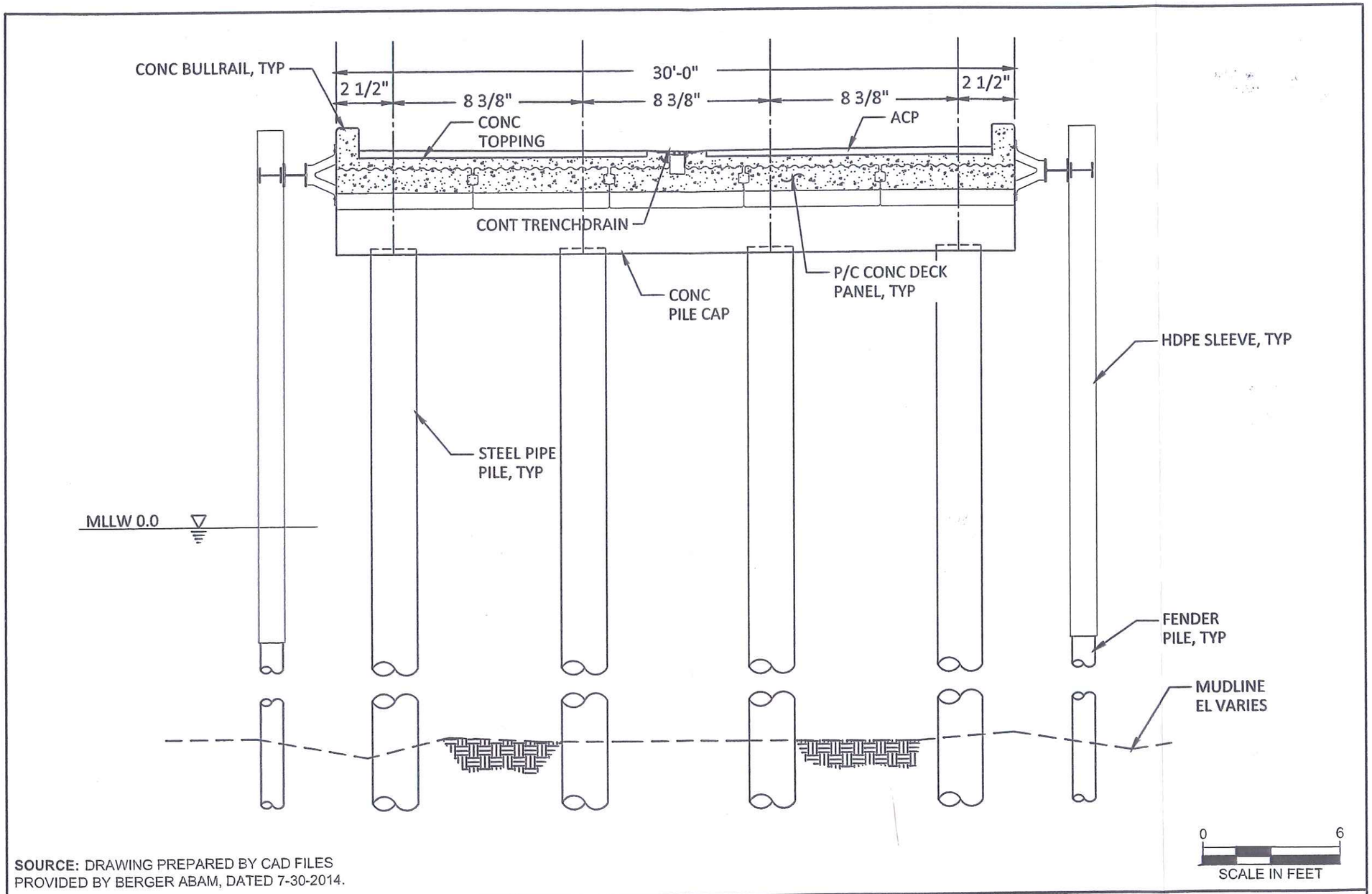

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Harris Avenue Shipyard
Bellingham, Washington

Figure 3.5
Harris Avenue Pier Replacement
Typical Cross Section

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1/8/2015

Legend

- Existing Paved Area
- Compliance Monitoring Well
- AOC 1
- AOC 2
- AOC 3
- AOC 4A and AOC 4B
- Interim Action Area
- Harbor Line
- Riprap

Note:
· Aerial image provided by City of Bellingham, 2013.

Abbreviations:
AOC = Area of Concern.
AST = Aboveground storage tank.

0 50 100 200
Scale in Feet

Sediment Unit 1
Sediment Unit 2
Sediment Unit 3A
Sediment Unit 3B
Sediment Unit 5
Sediment Unit 7
Sediment Unit 4A
Sediment Unit 4B
MARINE RAILWAY ACCESS WALKWAY
Sediment Unit 8
Sediment Unit 6
Sediment Unit 9
Sediment Unit 10
MW-06
MW-09
MW-11 (Proposed)
MW-02A
MW-12 (Proposed)
MW-07
MW-08
Former AST
AOC 4A
AOC 4B
OUTER HARBOR LINE
INNER HARBOR LINE
Bellingham Bay

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Interim Action Work Plan
Harris Avenue Shipyard
Bellingham, Washington

Figure 1.2
Interim Action Area

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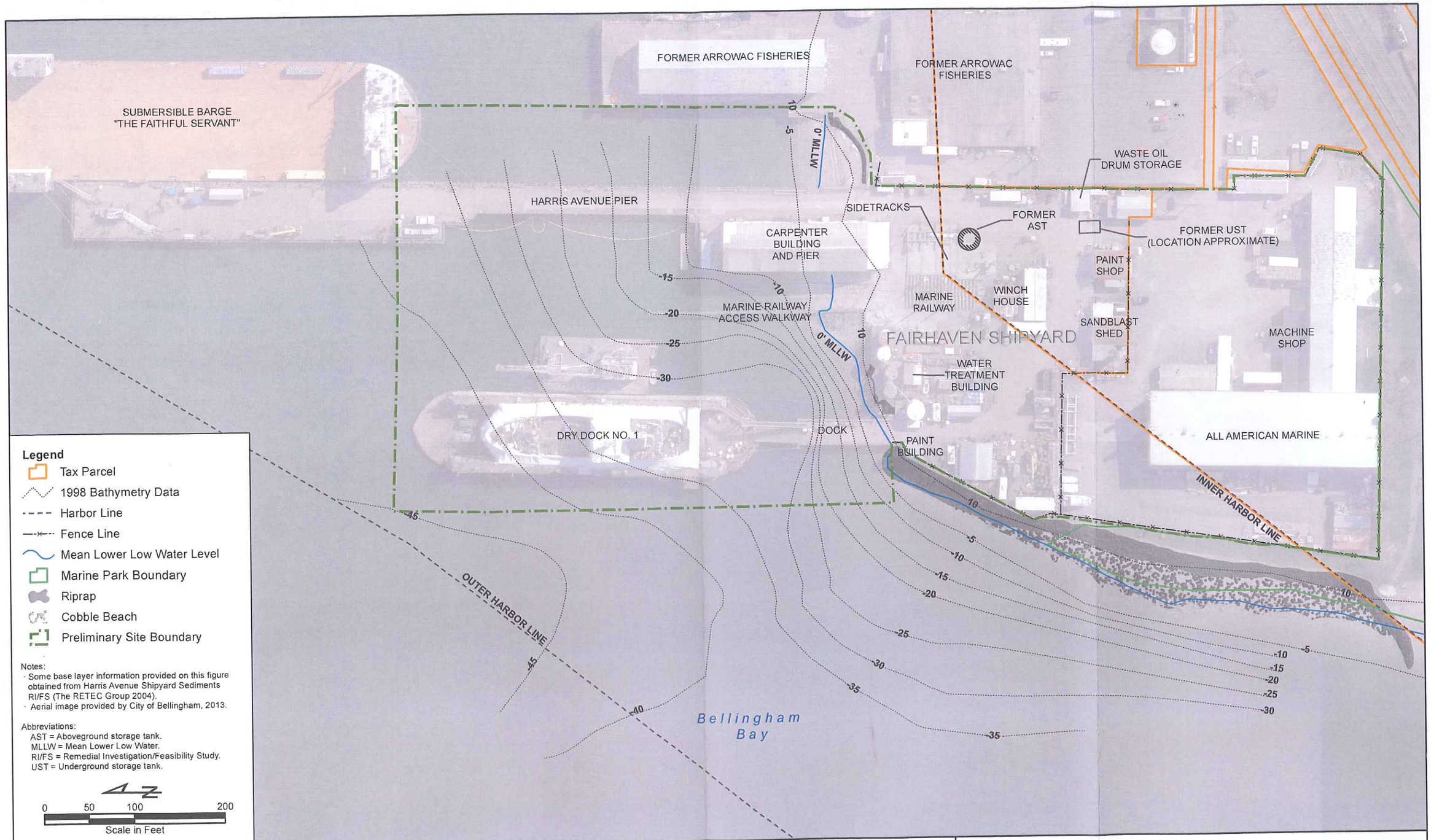
12/3/2014



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Interim Action Work Plan
Harris Avenue Shipyard
Bellingham, Washington

Figure 2.1
Site Map and Key Features

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1/13/2015

Legend

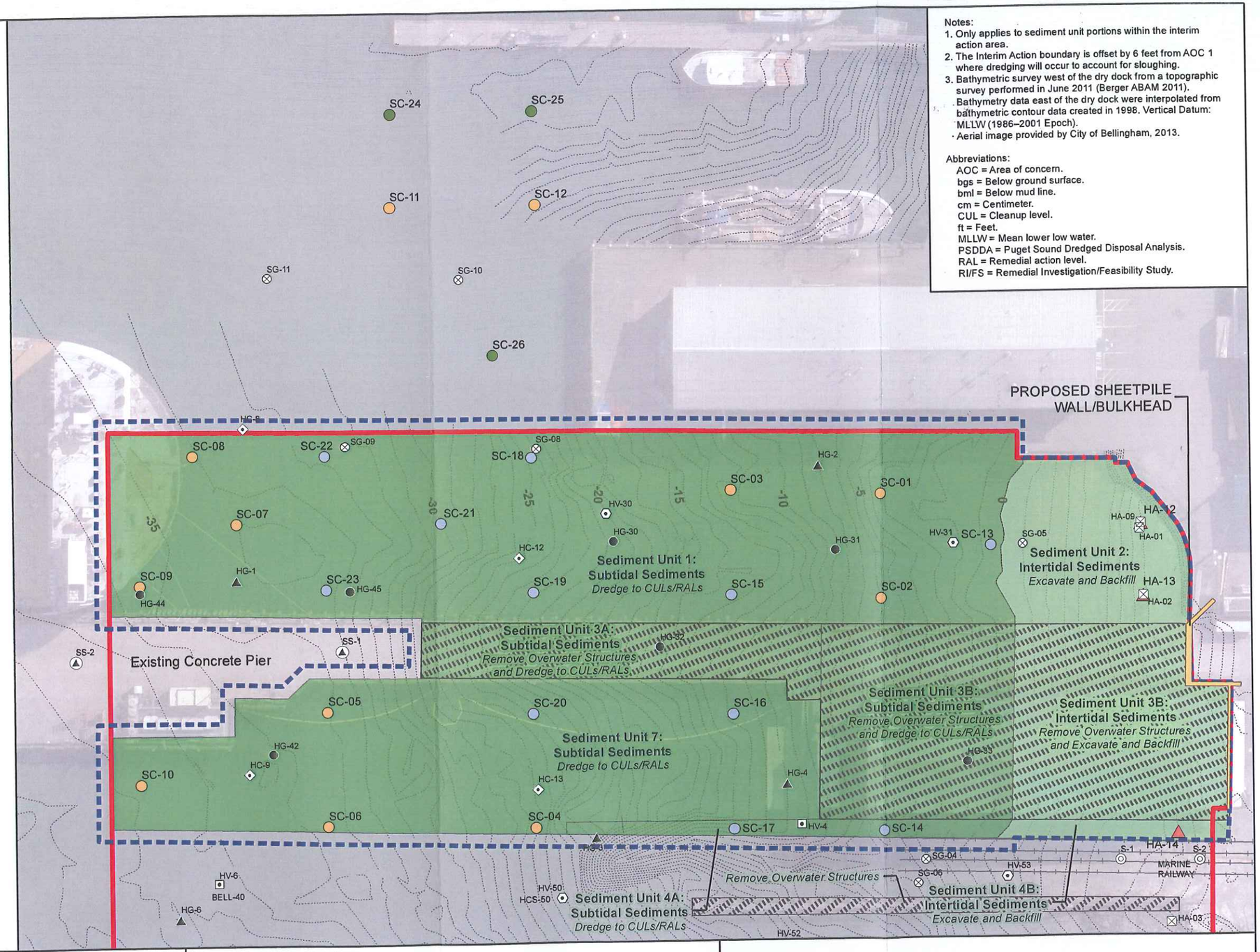
Sediment Interim Action Components

- **Remove Overwater Structures**
  Demolition of existing piers and buildings.
- **Subtidal Sediments: Dredge to CULs/RALs** (Sediment Units: 1, 3A, 3B, 4A[1], 7[1])
  Dredge, 3-foot average depth, to CULs/RALs. Pre-design sampling will confirm dredge depth. Dredged material to be disposed upland (landfill).
- **Intertidal Sediments: Excavation and Backfill** (Sediment Units: 2, 3B, 4B[1])
  Excavation, approximately 2-foot thickness, with backfill to maintain existing grades. Material selected for hydrodynamic stability and ancillary habitat benefit.
- Proposed Pre-Design Surface Sediment Sample Location (0–12 cm bml)
- Proposed Pre-Design Sediment Core Sample Location (0–6 ft bml)
- Proposed Pre-Design Surface Sediment (0–12 cm bml) and Sediment Core (0–6 ft bml) Sample Location
- Proposed Pre-Design Intertidal Sediment Sample Location (0–4 ft bgs)
- Floyd|Snider Grab Sample Location (2011, 2013)
- Floyd|Snider Hand Auger Location (2011, 2013)
- GeoEngineers Grab Sample Location (1996)
- RETEC PSDDA Vibracore Sample Location (2004)
- RETEC Phase 2 Grab Sample Location (1998)
- RETEC Phase 2 Vibracore Sample Location (1998)
- RETEC RI/FS Grab Sample Location (2000, 2003)
- RETEC RI/FS Offshore Sample Location (2005)
- RETEC RI/FS Vibracore Sample Location (2000)
- Sediment Interim Action Area[2]
- AOC 1
- 1998/2011 Bathymetry Data[3]
- Riprap
- Marine Railway

0 25 50 100
Scale in Feet

Notes:
1. Only applies to sediment unit portions within the interim action area.
2. The Interim Action boundary is offset by 6 feet from AOC 1 where dredging will occur to account for sloughing.
3. Bathymetric survey west of the dry dock from a topographic survey performed in June 2011 (Berger ABAM 2011). Bathymetry data east of the dry dock were interpolated from bathymetric contour data created in 1998. Vertical Datum: MLLW (1986–2001 Epoch).
- Aerial image provided by City of Bellingham, 2013.

Abbreviations:
AOC = Area of concern.
bgs = Below ground surface.
bml = Below mud line.
cm = Centimeter.
CUL = Cleanup level.
ft = Feet.
MLLW = Mean lower low water.
PSDDA = Puget Sound Dredged Disposal Analysis.
RAL = Remedial action level.
RI/FS = Remedial Investigation/Feasibility Study.



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Interim Action Work Plan
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Figure 2.2
Sediment Interim Action

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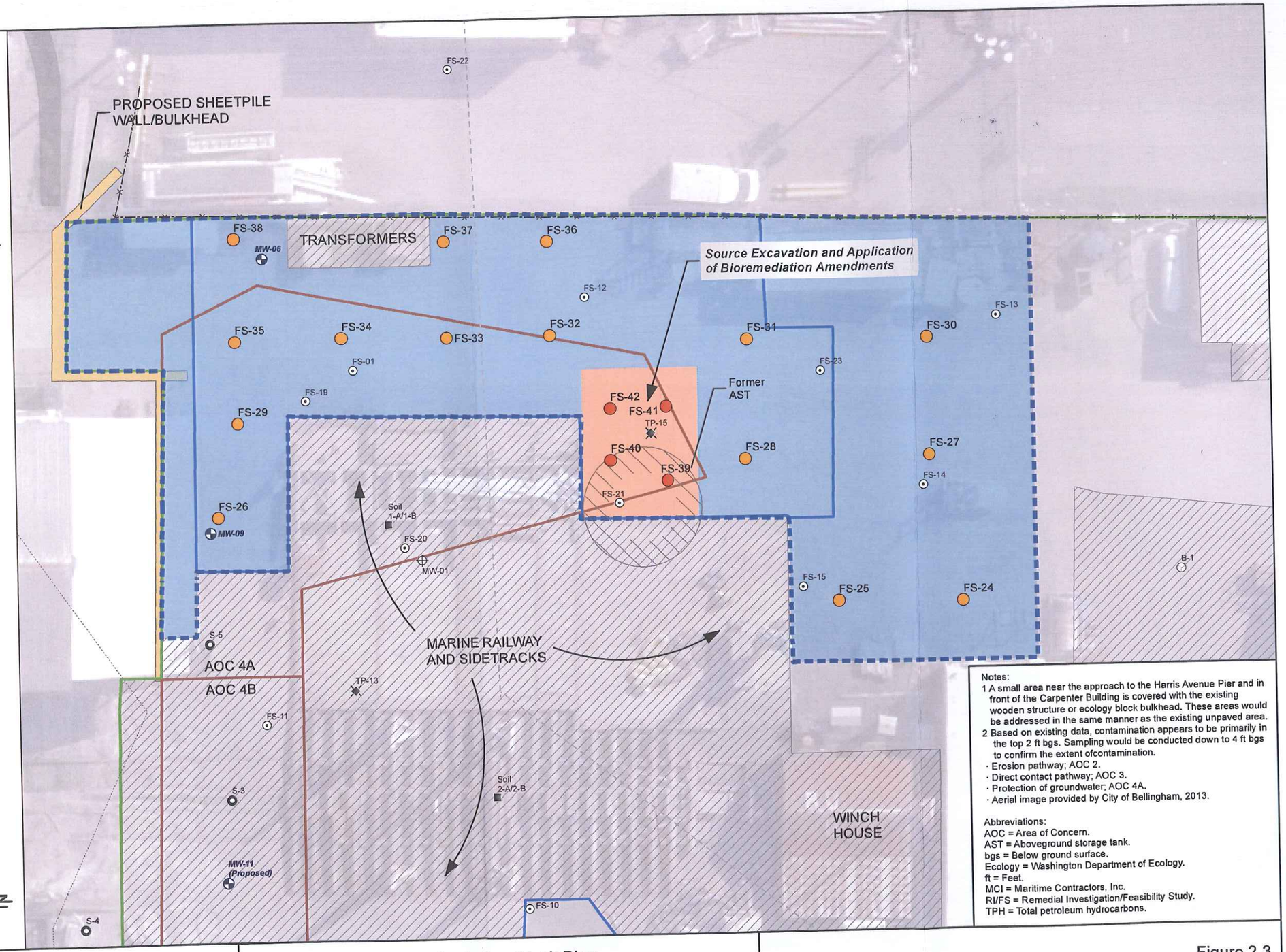
1/9/2015

Legend

Upland Interim Action Components

- TPH Source Area: Excavation to approximately 10 feet and application of bioremediation amendments prior to backfilling.
- Existing Unpaved Area:[1] Grid sampling[2] with application of one of the following remedies in each grid area:
  - No action.
  - Excavate to cleanup levels.
  - Excavate 1 foot (AOC 3) or 2 feet (AOC 2); place geotextile and gravel cap.
- Proposed Pre-Design Shallow Soil Grid Sample Location (0–4 ft bgs)
- Proposed Pre-Design Deep Soil Grid Sample Location (0–10 ft bgs TPH Source Area)
- Compliance Monitoring Well
- Floyd|Snider Geoprobe Location (2011, 2013)
- MCI and Ecology Upland Grab Sample Location (1993)
- RETEC Monitoring Well
- RETEC Phase 2 Boring Location (1998)
- RETEC Phase 2 Test Pit Location (1998)
- RETEC RI/FS Offshore Sample Location (2005)
- RETEC RI/FS Upland Sample Location (2005)
- Existing Paved Area
- Upland Interim Action Area
- AOC 2
- AOC 3
- AOC 4A and AOC 4B
- 1998 Bathymetry Data
- Fence Line
- Harbor Line
- Riprap

0 10 20 40
Scale in Feet



Notes:
1 A small area near the approach to the Harris Avenue Pier and in front of the Carpenter Building is covered with the existing wooden structure or ecology block bulkhead. These areas would be addressed in the same manner as the existing unpaved area.
2 Based on existing data, contamination appears to be primarily in the top 2 ft bgs. Sampling would be conducted down to 4 ft bgs to confirm the extent ofcontamination.
- Erosion pathway; AOC 2.
- Direct contact pathway; AOC 3.
- Protection of groundwater; AOC 4A.
- Aerial image provided by City of Bellingham, 2013.

Abbreviations:
AOC = Area of Concern.
AST = Aboveground storage tank.
bgs = Below ground surface.
Ecology = Washington Department of Ecology.
ft = Feet.
MCI = Maritime Contractors, Inc.
RI/FS = Remedial Investigation/Feasibility Study.
TPH = Total petroleum hydrocarbons.

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Interim Action Work Plan
Harris Avenue Shipyard
Bellingham, Washington

Figure 2.3
Upland Interim Action

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12/17/2014