DRAFT FINAL

Site Specific Cleanup Action Plan

Foss Tacoma Redevelopment Sites 8 & 9
1131 & 1119 Dock Street
Tacoma, WA 98402

Consent Decree No. 94-2-10917-6
FSID # 1263

Prepared For:

Foss Waterway Development Authority
& City of Tacoma

January 21, 2016

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1.0 INTRODUCTION

This Site-Specific Cleanup Action Plan (SCAP) has been prepared for Development Sites 8 and 9 (the Site) located at 1131 and 1119 Dock Street, respectively, in Tacoma, Pierce County, Washington (Figure 1). This SCAP was prepared to meet the requirements of the area-wide Consent Decree (CD) between the Washington State Department of Ecology (Ecology) and the City of Tacoma (City) and Foss Waterway Development Authority (FWDA) for remediation and redevelopment of City-owned, upland properties located adjacent to the Thea Foss Waterway (Ecology, 1994 and 2002, CD No. 94-2-10917-6) and the Thea Foss Redevelopment Cleanup Action Plan (CAP) included as Exhibit C to the CD (Ecology, 1994). This SCAP has been prepared for the FWDA to support remediation and redevelopment of the upland portion of Development Sites 8 and 9 and identifies the remedial actions that are to be performed at the Site as part of redevelopment to meet the requirements of the CD and Thea Foss Redevelopment CAP.

Remediation of sediment present at the Site was completed in 2006 under an Administrative Order of Consent (AOC) (EPA, 1994) and CD (EPA, 2003) between the Environmental Protection Agency (EPA) and the City. Therefore, this SCAP does not include the requirements for remedial actions for sediment present at the Site.

The upland portion of the Site is currently used to provide public access and parking as well as access to the Foss Harbor Marina (Figure 2). The Site is proposed to be redeveloped for mixed-use commercial and residential use. Proposed land use plans include construction of a multi-story building or buildings at grade or with below grade parking, residential or commercial development on the ground floor, and residential housing on the upper floors. Proposed land use will also continue to include public access and open space as well as access to the Foss Harbor Marina. The proposed land use will require excavation for construction of building foundations, below grade parking, installation of utilities, as well as replacement of structures that support public access at the Site. Additionally, areas around the building will include asphalt/concrete pavement, landscaping, and open space.

This SCAP presents the cleanup actions required to be performed at the Site to support redevelopment of the Site for mixed commercial and residential land use in accordance with the area-wide CD (Ecology, 1994 and 2002; CD No. 94-2-10917-6) and the Washington State Model Toxics Control Act (MTCA) cleanup regulations [Chapter 173-340 Washington Administrative Code (WAC)]. Specifically, this SCAP has been prepared to:

- Describe the Site background and current conditions including an overview of the Site history and environmental conditions.
- Identify the media of concern and site-specific cleanup levels for the Site.
- Identify the land use and a conceptual redevelopment for the Site.
- Summarize the remedial action requirements specified in the Thea Foss Redevelopment CAP.

- Describe the remedial actions based on a conceptual redevelopment for the Site.
- Identify the estimated costs and assumptions for remedial actions.
- Describe the justification for the cleanup action for a conceptual redevelopment of the Site.
- Identify applicable State and Federal laws pertaining to the remedial actions.

Additionally, this SCAP describes an emergency interim action that was performed to remedy a failing bulkhead located on the shoreline of Development Site 9. The emergency interim action was performed by the City and included excavation and off-site disposal of contaminated soil present behind the failing bulkhead, removing the bulkhead and a wooden esplanade and capping the shoreline slope.

The following sections describe Site conditions, Site history and environmental conditions and summarize the cleanup action alternative specified in the Thea Foss Redevelopment CAP. Also presented are the remedial actions for soil and groundwater containing concentrations of total carcinogenic polycyclic aromatic hydrocarbons (cPAHs), petroleum hydrocarbons, arsenic, lead, and/or nickel at concentrations greater than cleanup levels.

2.0 SUMMARY OF SITE BACKGROUND AND CONDITIONS

2.1. Regulatory Framework

Development Sites 8 and 9 and the Thea Foss Waterway lie within the larger Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site. The CB/NT Superfund site encompasses approximately 10 to 12 square miles of shallow water, shoreline, and adjacent uplands, most of which is highly developed and industrialized land.

In the 1980s the City began to acquire property along the Thea Foss Waterway in an effort to spur environmental cleanup and redevelopment in downtown Tacoma within the CB/NT Superfund Site. Then, in 1994, the City voluntarily entered into an Administrative Order of Consent (AOC) with the EPA (EPA, 1994) for pre-remedial design investigation and remedial design for a portion of the Thea Foss Waterway and a CD (CD No. 94-2-10917-6) with Ecology for cleanup of the area encompassing the adjacent, City-owned upland properties. Cleanup work administered under the AOC (EPA, 1994) with EPA and CD (CD No. 94-2-10917-6) with Ecology are closely related, sharing a common boundary at mean higher high water (MHHW).

Under the AOC (EPA, 1994) as well as a CD (EPA, 2003) with EPA, the City completed remedial design and remediation of sediment within the portion of the Thea Foss Waterway from the "Mouth" of the Waterway (i.e., where the Thea Foss Waterway enters the larger Commencement Bay) to near the 21st Street Bridge, including the Wheeler-Osgood Waterway. The portion of the Thea Foss Waterway remediated by the City encompassed sediment at and below (i.e., waterward) the MHHW line at Development Sites 8 and 9. Remediation of sediment within the Thea Foss Waterway by the City was completed in 2006. The remedial actions performed by the City at the Site are described further in Section 2.2.5 below and the Thea Foss and Wheeler-Osgood Waterways Remediation Project Remedial Action Construction Report (City of Tacoma, 2006a).

The area-wide CD (CD No. 94-2-10917-6) with Ecology for the City-owned upland properties adjacent to the Thea Foss Waterway specifically requires the following remedial actions to be performed at properties subject to the CD:

- Perform a remedial investigation (RI).
- Prepare a SCAP for soil contamination that is consistent with the Thea Foss Redevelopment CAP (i.e., Exhibit C to the CD).
- Remediate soil contamination in accordance with the SCAP.
- Provide and maintain institutional controls and compliance monitoring as required in the CD.

A copy of the original area-wide CD (Ecology 1994; CD No. 94-2-10917-6), First Comprehensive Amendment to the CD (Ecology 2002) and the Thea Foss Redevelopment CAP (Ecology, 1994) are presented in Appendix A.

Environmental investigations of the Hicks-Bull and Coast Iron Works properties that include Development Sites 8 and 9 were performed in the 1980s and 1990s and an RI was performed in 2001 to evaluate the presence of contamination in soil and groundwater resulting from past filling and industrial activities at the Site. The results of the RI are presented in the report titled Draft Site-Specific Remedial Investigation, Thea Foss Upland Properties, Hicks-Bull, Coast Iron Works, and Steam Plant Properties, Tacoma, Washington (City of Tacoma, 2002). A copy of the RI that includes Development Sites 8 and 9 is provided in Appendix B. The RI identifies contaminant releases at Development Sites 8 and 9 that require cleanup at the Site.

This SCAP has been prepared pursuant to the area-wide CD (Ecology 1994 and 2002; CD No. 94-2-10917-6) and Thea Foss Redevelopment CAP (Ecology, 1994) as well as MTCA (Chapter 70.105D RCW) and associated implementing regulations (Chapter 173-340 WAC).

2.2. Site Description and Current Conditions

Development Sites 8 and 9 are located at 1131 and 1119 Dock Street, respectively, in Tacoma, Washington (Figure 1). The Site is comprised of four Pierce County Parcels that include 8950001961, 8950001962, 8950001963 and 8950001964 (Figure 2). Development Sites 8 and 9 are bounded on the west by Dock Street and the Dock Street right-of-way (ROW), on the north by the Murray Morgan Bridge and the East 11th Street ROW, on the east by the Thea Foss Waterway, and on the south by the proposed Central Waterfront Park property (Figure 2).

Parcel 8950001961 comprises upland area on the southern portion of the Site between Dock Street and the Thea Foss Waterway and is approximately 0.92 acres in size (Figure 2). Parcel 8950001962 comprises upland area on the northern portion of the Site between Dock Street and the Thea Foss Waterway and is approximately 0.81 acres in size. Parcel 8950001963 is approximately 0.45 acres in size and is comprised of upland, shoreline, and marine areas on the northern portion of the Site as well as a 10-foot wide marine area that extends along the waterward side of Parcel 8950001964. Parcel 8950001964 is approximately 0.51 acres in size and is comprised of upland, shoreline and marine property located on the southern portion of the Site.

A survey was performed by Sitts & Hill Engineers, Inc. of Tacoma, Washington in April 2013 to document Site conditions. An emergency interim action was subsequently performed along and adjacent to the shoreline on the northern two parcels (parcels 8950001962 and 8950001963) in January through March (January-March) 2014. The drawing from the 2013 survey is provided in Appendix C. Interim action design drawings identifying modifications to the shoreline performed after the 2013 survey are provided in Appendix D. Figure 3 as well as Figures 4A and 4B present the conditions at the time of the April 2013 survey and identify the approximate area where the interim action was performed at the Site in January-March 2014. Post-construction survey of the interim action area has not been completed to date.

The western portion of Development Sites 8 and 9 are uplands between the Dock Street ROW and the Thea Foss Waterway. The upland portion of the Site is generally flat with elevations ranging from approximately +17 feet Mean Low Low Water (MLLW) at the top of the shoreline slope adjacent to the Thea Foss Waterway to the approximate elevation of +19 feet MLLW adjacent to the Dock Street ROW on the western boundary of the Site (Figure 3). The elevation of the western boundary of the Site is approximately 2 feet lower than the elevation of the adjacent concrete sidewalk that runs along the eastern side of the Dock Street ROW. The upland portion of the Site slopes down from the top of the shoreline (i.e., approximate elevation of +17 feet MLLW) to approximate elevations between -6 and -10 feet MLLW in the marine area on the eastern boundary of the Site.

The northern portion of the upland area of the Site (i.e., Development Site 9) is paved with asphalt and is used as a lot for paid parking or reserved parking for the Foss Harbor Marina that is located in the Thea Foss Waterway east of the Site (Figures 2 and 3). Access to the parking lot on the northern portion of the upland area is via two driveways from Dock Street. One driveway is located on the northwest corner of the Site adjacent to the 11th Street ROW and the other driveway is located in the central portion of the Site. Multiple landscape features bounded by concrete curbing are located on the northern portion of the Site in the parking lot area. Additionally, walkway ramps from the upland parking area to the adjacent marina floats are located on the northern and southern portions of Development Site 9.

Multiple utilities are currently present on the northern portion of the Site within the parking lot area that include power, stormwater, sanitary sewer and communications (Figure 4A). Utilities that were present within the interim action excavation area were removed and rerouted/replaced prior to initiation of interim action construction activities. Engineering design plans identifying the utilities that were removed and rerouted/replaced as part of the interim action are presented in Appendix D. Structures associated with the power utilities include below ground lines, junction boxes/vaults, meters and pad-mounted transformers. Structures associated with stormwater utilities include catch basins, manholes and conveyance piping. Structures associated with sanitary sewer utilities include a manhole and conveyance piping. Structures associated with communication utilities include manholes and communication lines. It should be noted that a fiber optic cable has been identified to be present on the northern portion of the Site that passes under the Thea Foss Waterway (City of Tacoma, 2006a). Multiple utilities including power, stormwater, and communications cross the Site between Dock Street and the Thea Foss Waterway shoreline adjacent to the Murray Morgan Bridge and the 11th Street ROW. Utilities also traverse the eastern portion of Development Site 9.

A timber bulkhead previously formed the eastern boundary of the upland area on the northern portion of the Site (i.e., Development Site 9) and a timber esplanade supported by wood piling also extended from the bulkhead over the marine area on Development Site 9 (Figures 2 and 3) prior to implementation of the interim action. The timber bulkhead was installed by the U.S. Army Corps of Engineers (USACE) in the early 1900s (Exeltech, Inc., 2005). The timber bulkhead and esplanade were in poor condition and the potential collapse of the bulkhead was the reason for performing the emergency interim action on the northern portion of the Site in January-March 2014. The timber bulkhead, esplanade and associated timber piling were removed as part of the interim action. The engineering design plans for the emergency interim action are provided in Appendix D.

The shoreline waterward of the timber esplanade on Development Site 9 underwent remediation as part of the City's remedial actions for the Thea Foss Waterway. Remedial actions included dredging and capping the shoreline slope waterward of the face of the timber esplanade to an approximate elevation of -20 feet MLLW in 2004 and 2005. The cap that was placed on the shoreline slope consists of an approximate 18-inch layer of sand and gravel that is armored with an approximate 18-inch layer of riprap. Additionally, the voids of the riprap armoring were filled with sand and rounded gravel habitat mix to enhance the habitat at the Site. The shoreline slope cap was constructed at an approximate 1.5 foot vertical to 1 foot horizontal (1.5V/1H) slope (City of Tacoma, 2006a). Regular monitoring of the remedial action cap is conducted by the City to ensure that the remedial actions continue to remain protective of human health and the environment (City of Tacoma, 2006b). Remedial actions performed by the City for the Thea Foss Waterway are further described in Section 2.3.4.

As part of the emergency interim action, the shoreline above the slope cap placed as part of the remedial action of the Thea Foss Waterway was excavated to create a 2H/1V slope and then capped. The capping that was completed as part of the emergency interim action was similar to capping completed as part of the remedial action of the Thea Foss Waterway. The cap that was placed on the shoreline slope excavated as part of the interim action also consists of an approximate 18-inch layer of sand and gravel armored with an approximate 18-inch layer of riprap and habitat mix was placed to fill the voids of the riprap armoring. Interim action activities performed by the City in response to the failing bulkhead are further described in Section 4.0.

Two buildings are present on the southern portion of the Site (i.e., Development Site 8) that are approximately 13,600 and 500 square feet in size (Figures 2, 3 and 4B). The larger building previously housed the Coast Iron and Machine Works until the 1980s and then was vacant until the Boy Scouts of America began using the building in the early 1990s to support a Sea Scouts program. The larger building has more recently been identified as the Sea Scouts Building. The Sea Scouts program used the building as a meeting and equipment storage facility until 2012. The larger building is currently vacant. The smaller building appears to have been used for wood working as wood debris (i.e., sawdust, wood chips, etc.) was observed to be present on workbench and floor of the building.

The larger building (i.e., Sea Scouts Building) is constructed of wood and has concrete floors. The interior of the building is generally comprised of two large open spaces with several smaller interior rooms. A survey of potential regulated building materials was conducted on the larger building in April 2013 by Pacific Rim Environmental, Inc. of Seattle, Washington. The purpose of the survey was

to provide a preliminary evaluation of the presence and quantity of regulated materials (i.e., asbestos-containing materials, lead-based paint, and universal wastes) present in the building that require mitigation and management prior to and during building demolition. The results of the survey indicated that lead based paint, asbestos-containing material, and universal waste materials (i.e., fluorescent fixtures, ballasts and tubes) are present on/in the larger building. The report presenting the results of the survey is provided in Appendix E.

The second, smaller building located on the southeast corner of larger building (Figures 2, 3 and 4B) is constructed of wood and is currently empty. A survey of potential regulated building materials was also conducted on the smaller building in April 2013 by Pacific Rim Environmental, Inc. The results of the survey indicated that that lead based paint and universal waste materials (i.e., fluorescent fixtures, ballasts and tubes) are present in the smaller building (Appendix E).

The southern portion of the upland area of the Site (i.e., southern portion of Development Site 8) is a combination of gravel/soil and pavement (i.e., asphalt and concrete) and is used for two paid parking areas (Figures 2, 3 and 4B). Access to the parking areas on the southern portion of the upland area is via two driveways from Dock Street. One driveway is located on the southwest corner of the Site adjacent to the proposed Central Waterfront Park property and the other driveway is located in southern portion of the Site. A concrete sidewalk traverses the southern portion of the upland area between the two parking areas that provides public access from the Dock Street ROW to a concrete pile-supported, wood-surfaced esplanade structure constructed over the Thea Foss Waterway on Development Site 8.

The concrete pile-supported esplanade structure present on the southern portion of the Site (i.e., Development Site 8) was constructed in the late 1980s. The upper shoreline slope adjacent to the concrete pile-supported esplanade structure and north of the esplanade is armored with riprap placed over geotextile material. Placement of the geotextile and riprap armoring on the upper shoreline slope was performed in conjunction with construction of the concrete pile-supported esplanade structure (Hart Crowser, 2002).

The lower shoreline slope beneath and waterward of the esplanade and north of the esplanade on Development Site 8 underwent remediation as part of the City's remedial actions for the Thea Foss Waterway. Remedial actions included capping the shoreline slope beneath and waterward of the face of the esplanade on Development Site 8 as well as north and south of the esplanade to an approximate Elevation -20 feet MLLW in 2005. The cap that was placed on the shoreline slope consists of an approximate 18-inch layer of sand and gravel that is armored with approximate 18-inch layer of riprap. Additionally, the voids of the riprap armoring were filled with sand and rounded gravel habitat mix to enhance the habitat at the Site. The shoreline slope cap was constructed at between an approximate 2V/1H and 1.5V/1H slope (City of Tacoma, 2006a). Regular monitoring of the remedial action cap is conducted by the City to ensure that the remedial actions continue to remain protective of human health and the environment (City of Tacoma, 2006b). Remedial actions performed by the City for the Thea Foss Waterway are further described in Section 2.3.4.

A habitat enhancement feature consisting of a benched area planted with riparian plant species was also constructed south of concrete pile-supported esplanade on Development Site 8 by the City as part of remedial actions for the Thea Foss Waterway (Figure 2). The habitat area was constructed

using logs placed horizontally on the surface of the shoreline slope cap at an approximate elevation of +11 feet MLLW. The habitat enhancement area is also monitored by the City.

The area between the west side of the buildings at the Site and the top of the shoreline slope of the Thea Foss Waterway is either soil or concrete pavement (Figures 2, 3 and 4B). Concrete pavement esplanade sidewalk is located along the top of the shoreline slope between northern end of the concrete pile supported esplanade on Development Site 8 and Development Site 9. An approximately 160-foot-long landscaping strip is located in the concrete paved area that contains bushes and relatively mature trees. The remaining portion of the area is soil with grass and brush.

Two monitoring wells (HB-MW02 and HB-MW03) are located on the upland portion of Development Site 8 adjacent to the Thea Foss Waterway. The wells were constructed in March 2001 as a part of the remedial investigation of the Site (City of Tacoma, 2002). The wells are constructed of 2-inch-diameter schedule 40 PVC and have 10-foot well screens. Based on measurements taken in April 2013 the total depths and depths to groundwater, respectively, in the monitoring wells are the following:

- HB-MW02 – 14.59 feet bgs and 8.80 feet bgs; and
- HB-MW03 - 14.24 feet bgs and 8.54 feet bgs.

Monitoring well HB-MW01 was decommissioned prior to initiation of the emergency interim action as the well was located in the interim action excavation area (Figure 3).

2.3. Description of Adjacent Sites

2.3.1. Dock Street ROW

Remedial actions were completed in 2008 within the Dock Street ROW from East 15th Street to 470 feet north of East 11th Street. The remedial actions conducted within the Dock Street ROW were completed pursuant to a CD with Ecology (CD No. 94-10917-6) (City of Tacoma, 2005). The remedial actions included upgrades to infrastructure within and resurfacing of the Dock Street ROW.

An investigation of the Dock Street ROW was performed prior to the remedial actions and upgrades in the Dock Street ROW (City of Tacoma, 2001). Contaminants were identified to be present at concentrations greater than MTCA cleanup levels in soil and groundwater. Contaminants detected at concentrations greater than MTCA cleanup levels in soil included carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and arsenic. Contaminants detected at concentrations greater than MTCA cleanup levels in groundwater include benzene and arsenic.

Upgrades to the infrastructure within the Dock Street ROW consisted of replacing utilities including stormwater, sanitary sewer and water lines. Remedial actions included placing all utilities in a combined utility trench that was lined with geotextile and backfilled with clean bedding material or overexcavating the utility corridor 1 foot and then backfilling with clean bedding material. The Dock Street ROW was also upgraded by resurfacing the street with asphalt and constructing concrete curbs and gutters, sidewalks, and driveway entry pans. The asphalt and concrete surfaces comprise a remedial action cap to physically isolate residual contaminants in soil and to limit infiltration of precipitation within the ROW. Additionally, the surface grade was raised and sloped toward the west to promote surface water flow away from the Thea Foss Waterway and into the reconstructed

stormwater system. All unsuitable soil materials that were encountered during construction were transported to an off-site disposal facility (City of Tacoma, 2001).

2.3.2. 11th Street ROW

A remedial investigation within the 11th Street ROW was conducted by Hart Crowser in 1998. Three soil borings were advanced to 20 feet bgs, two test pits were excavated to depths of between 5 and 6.5 feet bgs, and one monitoring well was installed to a depth of approximately 15 feet bgs beneath the west side of the Murray Morgan Bridge between Dock Street and the Thea Foss Waterway.

Samples collected as part of the remedial investigation in 1998 were analyzed for total metals, toxicity characteristic leaching procedure (TCLP) metals, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), pesticides, and total petroleum hydrocarbons (TPH). One sample, (11ROW-L1) collected as part of the investigation contained lead at a concentration of 4,680 milligrams per kilogram (mg/kg). A TCLP lead analysis on the sample indicated that there is a potential for the presence of characteristic Dangerous Waste at the Site the Site. Additionally, total PCBs, total cPAHs and TPH as heavy oil were detected in fill within the 11th Street ROW at concentrations above screening levels. These contaminant concentrations are likely related to cutting oils and other lubricants that may be present in machined metal observed within the ROW. A groundwater sample collected from R11-MW01 within the 11th Street ROW had detections of dissolved metals exceeding the CD cleanup levels (City of Tacoma, 2002).

Construction activities have recently been completed to restore and upgrade the Murray Morgan Bridge structure. Additionally, utility upgrades were performed in the 11th Street ROW beneath the bridge between Dock Street and the Thea Foss Waterway as part of the project including stormwater infrastructure (i.e., an oil/water separator vault) to treat and convey stormwater from the west side of the bridge deck. Stormwater from the west side of the bridge deck is conveyed to the Thea Foss Waterway through stormwater outfall 6000403 located in the northeast corner of the Site (City of Tacoma, 2013).

2.3.3. 1147 Dock Street Property

The property south of the Site is currently vacant and was recently purchased by the FWDA for the proposed Central Waterfront Park. The northern portion of the 0.7-acre property was previously the location of a steam plant from the 1920s to the 1980s and a warehouse was previously located on the southern portion of the property. The steam plant was demolished in the mid-1980s and the warehouse was demolished by the end of the 1970s. The property has remained unused except for parking since the mid-1980s.

Two 35,000 gallon underground storage tanks (USTs) used for Bunker-C fuel storage were removed in October 1992 from the central portion of the property along with approximately 120 cubic yards of associated petroleum-contaminated soil (Investco Financial Corporation, 1993). In December 1992, additional remedial excavation occurred in the area of the USTs where exceedances of petroleum hydrocarbons and PAHs remained in a sidewall and the base of the previous excavation. The additional remedial excavation removed approximately 20 cubic yards of petroleum hydrocarbon-contaminated soil. Petroleum hydrocarbons were either not detected or were detected at concentrations less than the current MTCA Method A cleanup level in confirmation soil samples

collected as part of the additional remedial excavation. Five additional borings were installed in 1994 to further assess petroleum hydrocarbon contamination on the property. Petroleum hydrocarbons were either not detected or detected at concentrations less than the current MTCA Method A cleanup levels for petroleum hydrocarbons in the samples collected from the soil borings (Looney, 2007).

An Ecology-lead interim remedial excavation of approximately 1,000 tons of mercury-contaminated fill soil was completed on the northern shoreline of the property in 1998. The source of the mercury was reportedly fill materials consisting of consolidated ash and boiler waste. Other contaminants detected in the soil at concentrations greater than MTCA Method A cleanup levels or sediment at concentrations greater than sediment quality objectives (SQOs) on the northern portion of the shoreline included petroleum hydrocarbons, lead, zinc, and cPAHs. Confirmation soil samples were collected from the base and sidewalls of the remedial excavation. Mercury, cPAHs and lead were detected above the MTCA Method A cleanup levels and the SQOs in the samples. A geotextile barrier and several feet of crushed rock armoring were placed in the excavation as a cap in 1998 to prevent contaminant migration from the upland to the Waterway. As part of the remedial action in the Thea Foss Waterway in 2005, additional capping materials consisting of gravel and sand were placed over the previous cap to enhance shoreline marine habitat (Looney, 2007).

Approximately 46 cubic yards of mercury-contaminated soil was also excavated from two locations on the Site in 2005. Confirmation soil samples were collected from the base and sidewalls of each excavation for mercury analysis. Mercury was either not detected or was detected at concentrations less than the current MTCA Method A cleanup level in the confirmation soil samples collected from the two excavations (Looney, 2007).

Ecology entered into an Agreed Order (#DE 3373) in 2007 with a former property owner, Federal Asset Recovery. Ecology granted a No Further Action (NFA) in 2007 for soil and groundwater on the Site based on the results of previous investigations and remedial actions. Additionally, a restrictive covenant was established for the shoreline portion of the property that was capped in 2006 as part of remediation of the Foss Waterway (Ecology, 2007).

2.3.4. Thea Foss Waterway

As stated in Section 2.1, Development Sites 8 and 9 and the Thea Foss Waterway lie within the larger Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site. In 1994, the City voluntarily entered into an AOC with the EPA for investigation and remedial design of the portion of the Thea Foss Waterway from the "Mouth" of the Waterway to near the 21st Street Bridge (EPA, 1994). Remedial actions were subsequently performed under a CD between the City and EPA (EPA, 2003). Remedial actions performed under the AOC and CD with EPA are applicable to the portion of the waterway at and below (i.e., waterward) the MHHW line (EPA, 1994).

Remediation of sediment within the Thea Foss Waterway was completed in 2006. The remedial actions performed by the City are described in the Thea Foss and Wheeler-Osgood Remediation Project Remedial Action Construction Report (City of Tacoma, 2006a). The remedial actions performed in the Thea Foss Waterway are periodically monitored by the City to ensure that the remedial actions are continuing to be protective of the human health and the environment. Monitoring of the remedial actions is being performed under an Operations, Maintenance, and

Monitoring Plan (OMMP) prepared for the Site (City of Tacoma, 2006b). The results of the periodic monitoring are documented in a report that is prepared upon completion of each monitoring event.

Under the AOC and CD, the City completed remedial design and remediation of sediment along the shoreline of Development Sites 8 and 9 and adjacent to Development Sites 8 and 9 within the Thea Foss Waterway. The portion of Development Sites 8 and 9 included in remedial actions for the Thea Foss Waterway are within a portion of the remediation area designated Remedial Area 8 (RA 8). The portion of the Thea Foss Waterway remediated by the City encompassed sediment waterward of the MHHW line at Development Sites 8 and 9 but also extended above the MHHW line to the top of the shoreline slope south of the esplanade on Development Site 8 where a habitat enhancement area was constructed on the shoreline slope (Figure 2). The remedial actions performed at Development Sites 8 and 9 included dredging and/or capping the shoreline as well as placement of habitat mix on the shoreline surface (see Section 2.2).

The remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterway Remediation Project were/are subject to monitoring in 2006, 2008, 2010, 2013 and 2016 as part of the OMMP prepared for the Site (City of Tacoma, 2006b). Monitoring activities include evaluation of the physical integrity of the cap that includes cap inspections and hydrographic survey and evaluation of sediment quality that includes sediment sampling and analysis. The report prepared for monitoring performed in 2010, the most recent year for which a monitoring report was available, identified that the slope cap at Development Sites 8 and 9 was intact based on slope cap integrity monitoring and that chemical concentrations in the sediment samples were less than the cleanup levels (City of Tacoma, 2010).

2.4. Historical Land Use

The historical land use at the Site presented in this section is a summary of the information provided in the RI (City of Tacoma, 2002). A more detailed presentation of the historical land use is presented in the RI that is included as Appendix B. Figure 2, from the RI is reproduced in this SCAP as Figure 5 for reference in the discussion presented below.

Prior to Euroamerican settlement, the Tacoma waterfront and area encompassing the Port of Tacoma were tidelands of the Puyallup River Delta with steep bluffs on the west and east sides of the delta and the Puyallup River valley to the south. The Site is located on the west side of the Puyallup River Delta at the base of a bluff below what is now Downtown Tacoma.

Initially, railroad lines were developed along the base of the bluff west of the present day location of the Site. Beginning in the 1890s through the early 1900s, the tidelands were filled under the ownership of the Tacoma Land Company, a subsidiary of the Northern Pacific Railroad Company with material dredged from the current Thea Foss Waterway along with material removed from the adjacent bluff. The present day alignment of the Thea Foss Waterway was finished in 1905. The parcels south of 11th Street remained relatively undeveloped until 1910 when Northern Pacific Railway transferred the properties to the City of Tacoma. The City began leasing the property to various industries that primarily consisted of machine and metal working shops (Figure 5). A summary of historical land use at the Site includes the following:

- The Hicks-Bull Machine Shop resided on Lots 1 through 3 (Figure 5) comprising the northern portion of the Site between the 1910s and 1937. Dravis Engineering and Machine Works, who bought Hicks-Bull, operated in a similar area from 1937 to 1963 then transferred the facilities to Atlas Foundry who used the buildings that were present on the property at that time for storage. In 1978, the City leased the lots to Moorage Associates (Totem Boat Haven).
- Tacoma Welding Company, Coast Iron and Machine Works, multiple fish and seafood packers, and an auto repair business operated on Lots 3 through 5 from approximately 1914 to 1975. Tacoma Welding Company operated in a building located on Lot 4 adjacent to Dock Street from approximately 1914 to the mid-1930s. An auto repair business subsequently operated in the building for approximately 10 years until 1946. Coast Iron and Machine Works operated in a building on Lot 5 starting in approximately 1914 but later relocated the operations to Lots 7 and 8. The Tacoma Fish Packing Company, Marush Fish and Oyster Company, and Johnny's Seafood operated from buildings on Lots 3 through 5 sometime between approximately 1920 and 1975.
- A steam boiler works and welding facility operated on Lot 6 and a portion of Lot 7 from approximately 1920 to 1955. The boiler works and welding company name changed multiple times during that period (i.e., Tacoma Steam Boiler Works, Tacoma Steam Boiler and Welding Works, etc.).
- Coast Iron and Machine Works occupied a building on Lots 7 and 8 from the early 1930s to the 1980s. The building was most recently used by the Boy Scouts of America for the Sea Scouts program.
- The Pacific Machine Shop occupied Lot 9 from approximately 1918 through 1986. The machine shop building was demolished in 1990.
- The Ryan Fruit Company warehouse is indicated to have operated on the southern portion of Lot 9 and Lots 10 and 11 starting in the 1920s. The William Brothers was identified to have succeeded the Ryan Fruit Company and also performed warehousing but in the late 1940s operated a maintenance garage. In approximately 1966, the Western Fish and Oyster Company operated a retail store built primarily on Lot 10 and the southern portion of Lot 9. Lot 11 was used for parking. The Western Fish and Oyster Company building was demolished in 1990.
- The City established the Tacoma Steam Plant No. 1 on Lots 11 and 12 in 1922. This electrical plant was built as a backup system and was reportedly rarely operated. The plant was demolished by the City in 1985.

3.0 SUMMARY OF SITE CHARACTERIZATION RESULTS

Characterization of Site media was performed as part of multiple investigations completed between 1980 and 2001. Various investigations were performed to evaluate specific areas of the Site and specific media between 1980 and 1998. In 2001, an RI was performed to characterize the nature and extent of impacts to soil and groundwater on the Site. The RI report prepared for the Site (City of Tacoma, 2002) (Appendix B) describes each of the investigations.

The specific objectives of the RI included the following:

- Evaluate fill and soil quality at the Site;
- Evaluate groundwater quality entering the Thea Foss Waterway;
- Identify the vertical and lateral extent of slag and other waste material; and
- Identify potential sources of contamination to soil and groundwater.

This section presents a summary of the characterization results for Site soil and groundwater based on the results presented in the RI (City of Tacoma, 2002). For a detailed description of the results, refer to the RI presented in Appendix B.

The results of characterization of sediment at the Site is not presented in this SCAP as sediment at the Site has been remediated as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project and was completed in 2006. As described above in Sections 2.1 and 2.3.4, the remedial actions for sediment at the Site were performed under an AOC and CD between EPA and the City (City of Tacoma, 2006a). Monitoring of the sediment remedial actions is being performed by the City to ensure that the remedial actions continue to be protective of human health and the environment (City of Tacoma, 2006b).

3.1. Fill and Soil Characteristics and Quality

As part of the RI, 10 test pits were excavated to depths up to 10 feet and five soil borings advanced to approximately 17 feet. Thirty-three soil samples were collected and analyzed for metals, diesel- and oil-range petroleum hydrocarbons, and PAHs. One soil sample was analyzed for benzene, ethylbenzene, toluene and xylenes (BETX). The following is a summary of the fill and soil characteristics and stratigraphy presented in the RI (Appendix B).

The results of the Site investigation identified that fill is present overlying native tideflat deposits comprised of sand containing shells. Based on the results of the RI, the fill ranges from approximately 1 to 12 feet thick and is comprised of a mix of debris and dredged sediment. Debris observed to be present in the fill includes brick, asphalt, concrete, wood, creosote treated wood, burnt wood, coal, slag, ash and cinders. Material interpreted to be dredged fill is comprised of sand with occasional shells. Additionally, creosote-treated piling that likely supported a previous structure were observed to be present at an investigation location on the southern portion of the Site. The fill containing debris was observed to be thickest along the shoreline on the eastern portion of the Site and was not observed in borings advanced in the Dock Street ROW. Figures 8 and 9 from the RI that present cross sections based on observations during the remedial investigation of the Site are reproduced in this SCAP as Figures 6A and 6B.

The results from the remedial investigation identified that metals including arsenic and lead, cPAHs, and oil-range petroleum hydrocarbons were present in fill and soil at concentrations greater than soil cleanup levels. The sample locations where contaminant concentrations were detected in fill and soil greater than cleanup levels as part of the remedial investigation of the Site are shown on Figures 7A and 7B and include the following:

- Total cPAHs were detected at concentrations exceeding soil cleanup levels in fill materials present throughout much of the Site. Total cPAHs concentrations exceeding soil cleanup levels were predominantly detected in fill material containing a mix of debris.

- Lead and arsenic were detected at concentrations exceeding soil cleanup levels predominantly in the central portion of the Site. The highest concentration of lead (i.e., 2,630 mg/kg) and the only detection of arsenic at a concentration greater than the soil cleanup level (i.e., 77.2 mg/kg) was in a sample collected from 3 to 5 feet bgs at test pit location HB-TP05 completed east of the Sea Scouts building on Development Site 8, which was previously used by Coast Iron and Machine Works and by the Tacoma Steam Boiler Works. Lead was also detected at a concentration exceeding soil cleanup levels (i.e., 252 mg/kg) in a sample collected from 1 to 2 feet bgs at test pit location HB-TP10 in the southwest corner of the Site where the former Tacoma Steam Plant resided. The sample was collected of fill consisting of tan ash material.
- Oil-range petroleum hydrocarbons were detected at a concentration exceeding the soil cleanup level (i.e., 4,000 mg/kg) in a sample collected at test pit location HB-TP01 in the northeast corner of the Site. The sample was collected from the surface to 1-foot bgs.

3.2. Groundwater Characteristics and Quality

Groundwater characteristics and quality were evaluated using four monitoring wells present at the Site. Three of the monitoring wells (i.e., HB-MW01 through HB-MW03) were installed as part of the remedial investigation of the Site. Groundwater characteristics and quality were also evaluated using one previously existing monitoring well (i.e., RD3-UMW2A) at the Site. Eleven groundwater samples were collected from the four monitoring wells and analyzed for a combination of: dissolved metals; gasoline-, diesel-, and oil-range petroleum hydrocarbons; PAHs; and BETX. The following is a summary of the groundwater characteristics and quality presented in the RI (Appendix B).

Water level measurements were collected from the four monitoring wells present at the Site during high and low tides and a tidal monitoring study was performed using monitoring well RD3-UMW2A. Based on the water level measurements and tidal study, the minimum groundwater depth at the Site was estimated to be approximately 7 feet bgs and the average depth to groundwater was estimated to be approximately 9 feet bgs. Additionally, the net groundwater flow across the site was identified to be toward the Thea Foss Waterway, with short-term flow reversals that likely occur during high tides.

Groundwater samples collected during the remedial investigation identified that dissolved arsenic, copper, and nickel concentrations were greater than groundwater cleanup levels. Dissolved arsenic and copper detections were attributed to the high salinity of the groundwater and were in the general range of concentrations detected at other upland parcels adjacent to the Thea Foss Waterway with similarly high salinity groundwater. A reference sample of surface water collected at Owen Beach at Point Defiance Park, North Tacoma had dissolved arsenic and copper concentrations higher than the samples collected at the Site indicating that the dissolved arsenic and copper concentrations detected in Site groundwater were partly attributable to the salinity in the groundwater.

Dissolved nickel was detected at concentrations ranging from 25.8 micrograms per liter (µg/L) to 47 µg/L in groundwater collected from monitoring well HB-MW02. The reference sample collected from Owen Beach had a dissolved nickel concentration of 10.8 µg/L. The results for dissolved nickel in the reference sample collected from Owen Beach was consistent with results of other samples collected from the Site. Therefore, groundwater in the vicinity of monitoring well HB MW02 was identified to be the only location where groundwater was impacted by the Site. The highest concentrations of nickel in soil were observed in three test pits (i.e., HB-TP05, HB-TP06 and HB-TP07)

nearest to monitoring well HB-MW02 (Table B-3 in Appendix B) indicating that soil in this area is most likely a source of nickel in groundwater and contributing to nickel in groundwater at concentrations greater than the cleanup level.

3.3. Summary of Site Contaminants and Conditions

Based on the remedial investigation, metals (i.e., arsenic, copper, lead and nickel), cPAHs and petroleum hydrocarbons are present at concentrations greater than cleanup levels at the Site. Contaminants present in Site soil exceeding cleanup levels include arsenic and lead, total cPAHs, and petroleum hydrocarbons. Metals including arsenic, copper, and nickel were detected in groundwater at concentrations exceeding cleanup levels. However, only nickel appears to be present in groundwater at a concentration exceeding the cleanup level as a result of sources in Site soil.

Site contaminants at concentrations greater than cleanup levels are predominantly detected in fill materials containing various debris (Figures 6A, 6B, 7A and 7B). Total cPAHs were detected at concentrations exceeding soil cleanup levels in fill materials present throughout much of the Site. Metals and petroleum hydrocarbons were also detected in fill material containing debris but were generally detected in localized areas.

Dissolved nickel was detected in groundwater at monitoring well HB-MW02 at concentrations ranging from 25.8 µg/L to 47 µg/L (Figure 7B) and greater than a reference sample collected from Owen Beach (i.e., 10.8 µg/L). The highest concentrations of nickel in soil were observed in three test pits (i.e., HB-TP05, HB-TP06 and HB-TP07) nearest to monitoring well HB-MW02 indicating that soil in this area is most likely a source of nickel in groundwater and contributing to nickel in groundwater at concentrations greater than the cleanup level.

The site-specific RI states that "… the site meets the intent of the Consent Decree Cleanup Action Plan with expected contaminant types, land use history, and analyte concentrations". The site-specific RI also states that "The CAP [i.e., Thea Foss Redevelopment CAP] identifies Alternative 3 Remediation of Soils Based on Future Land Use Development as the appropriate alternative for site cleanup all along the Thea Foss waterfront based on the an Area-Wide Feasibility Study" (City of Tacoma 2002). Therefore, based on the results of the RI, the cleanup action requirements of the Thea Foss Redevelopment CAP will be implemented as part of the redevelopment of Development Sites 8 and 9.

4.0 EMERGENCY INTERIM ACTION

This section presents a summary of the tasks performed to implement an emergency interim action at Development Site 9. For a more detailed description of components of the interim action, refer to the interim action documentation provided in Appendix D.

An emergency interim action was performed by the City in January-March 2014 to remedy a failing bulkhead on the shoreline of Development Site 9. The emergency interim action included excavation and off-site disposal of soil and sediment present adjacent to the failing bulkhead, removing the bulkhead and adjacent wooden esplanade and capping of the excavated shoreline slope. Tasks performed to complete the emergency interim action included the following:

- Engineering design and permitting;
- Removing, rerouting and replacing utilities that were in the interim action excavation area;
- Characterizing soil and sediment for off-site disposal;
- Excavation of soil from behind the bulkhead to create a 2H/1V slope;
- Excavation of sediment waterward of the bulkhead down to the existing slope cap;
- Removal of the bulkhead and wooden esplanade; and
- Capping of the shoreline slope.

Engineering design was performed to develop the project plans used to implement the interim action as well as provide the basis for permitting the interim action. Permitting included preparation and submittal of a Joint Aquatic Resources Permit Application (JARPA), State Environmental Policy Act (SEPA) checklist and Biological Evaluation. Project permits and approvals included a Corps of Engineers Nationwide Permit 3, Hydraulic Project Approval and SEPA Determination of Non-significance (DNS). Additionally, a Notification of Intent to Proceed with the Site 9 Emergency Interim Action was submitted by the City to Ecology upon receipt of project permits and approvals. The engineering design plans, permitting submittals and project permits and approvals prepared to perform the interim action are provided in Appendix D. Additionally, photographs of the failing bulkhead prior to the emergency interim action are provided in the JARPA (Appendix D).

Utilities present within the interim action area were removed prior to initiation of interim action excavation activities. Utilities were relocated and replaced west of the interim action excavation area (see engineering design plans in Appendix D). Soil excavated as part of utilities replacement was characterized and disposed of off site. Three samples of the stockpiled soil were analyzed for a combination of total metals, TCLP lead, PAHs, polychlorinated biphenyls (PCBs) and gasoline-, diesel-- and oil-range petroleum hydrocarbons. Additionally, a fish bioassay test was performed on one sample in accordance with Ecology Publication 80-12. Based on the stockpile sample results, the soil was disposed of at the LRI Subtitle D landfill under a Waste Disposal Authorization (WDA) from the Tacoma Pierce County Health Department (TPCHD) (see utility excavation WDA in Appendix D). Approximately 125 tons of soil excavated to install utilities was disposed of at the LRI landfill (Appendix D).

During utility replacement activities, a buried tank was encountered west of the interim action excavation area on the northeast portion of Development Site 9. The tank was approximately 4-feet long and 2-feet in diameter and constructed of steel. The tank was filled with sand indicating that it had previously been closed in place. The buried tank was left in-place at the Site. Ground penetrating radar (GPR) was performed within the upland portion of the interim action excavation area to evaluate the potential presence of additional buried tanks. A report was prepared that identified the location of the tank encountered on the northeastern portion of Development Site 9 as well as a location on the southeastern portion of Develop Site 9 where there was a question as to whether an additional tank was present (see buried tank information in Appendix D). The second location was determined to be a buried concrete slab with a void space present beneath it during the interim action excavation activities (Appendix D).

Also removed from the interim action area prior to initiation of excavation was monitoring well HB-MW01. Monitoring well HB-MW01 was decommissioned by a licensed driller (see well decommissioning report in Appendix D).

Soil and sediment sampling and analysis was performed to pre-characterize the soil and sediment to be excavated from the interim action area for off-site disposal. Soil borings were advanced at 11 locations. Soil samples were collected from at or near the Site surface to depths up to 10 feet bgs. Sediment samples were collected from seven locations from near the sediment surface to depths up to 30 inches. The soil and sediment samples from the interim action excavation area were analyzed for a combination of total metals, TCLP metals, PAHs and diesel- and oil-range petroleum hydrocarbons. cPAHs were detected in soil samples collected from the interim action excavation area at concentrations greater than the soil cleanup level. Additionally, lead was detected in several soil samples at concentrations greater than the soil cleanup level. One sample was also collected from a two to 6-inch thick "oil mat" that was present in the upland portion of the interim action area. The oil-range petroleum hydrocarbon concentration in the sample (7,000 mg/kg) was also greater than the cleanup level. Samples collected of sediment located within the interim action excavation area contained cPAHs and lead at concentrations similar to soil. Based on the pre-characterization sample results, the soil and sediment was approved for disposal at the LRI Subtitle D landfill under a WDA from the TPCHD (see interim action soil and sediment pre-characterization and WDA in Appendix D).

Excavation of sediment in front of the bulkhead as well as soil behind the bulkhead was performed to create an approximate 2H/1V slope from the top existing slope cap installed as part of remediation of the Thea Foss Waterway to the top of the shoreline slope in the interim action area. Excavation was performed in 25 to 50 foot wide swaths starting from the south end of the interim action area and proceeding to the north. Soil and sediment excavation was performed during low tides so that the excavation was performed in the dry (i.e., when the soil and sediment were not covered by water). A containment boom was also deployed to encompass the interim action area during construction activities. Capping of the shoreline slope with slope cap filter material (i.e., mix of sand and gravel) was performed upon completion of excavation of each swath. The portion of the bulkhead and esplanade present in each swath was also removed. All of the material (i.e., soil, sediment, bulkhead, and esplanade) that was removed was transferred to the upland and disposed of off site at the LRI landfill. Approximately 4,085 tons of contaminated soil and sediment excavated as part of the emergency interim action were disposed of at the LRI landfill (Appendix D).

The excavated slope was capped with an approximate 18-inch layer of slope cap filter material comprised of sand and gravel and armored with an approximate 18-inch layer of riprap. Habitat mix was placed to fill the voids of the riprap armoring. Approximately 3,500 tons of slope cap filter material, rip rap and habitat mix were placed to complete the cap. Additionally, 15 root wads were anchored to the slope at an approximate elevation of +10 feet MLLW to enhance the habitat at the Site. Physical and chemical testing was performed on the capping material prior to use at Development Site 9. Chemical testing included analysis for total metals, semi-volatile organic compounds, PCBs and pesticides (see capping material testing results in Appendix D).

5.0 CLEANUP ACTION REQUIREMENTS

5.1. Thea Foss Redevelopment Cleanup Action Plan

The Thea Foss Redevelopment CAP included in the CD for remediation of City-owned upland properties adjacent to the Thea Foss Waterway, consistent with MTCA, requires that remedial actions be performed to protect human health and the environment, comply with cleanup standards and other applicable or relevant and appropriate requirements (ARARs), as well as provide for compliance monitoring. Additionally, the Thea Foss Redevelopment CAP, the CD and MTCA specify that remedial actions should recognize land use planning and the ultimate use of the Site.

The feasibility study process for the City-owned properties evaluated multiple remedial alternatives to address potential risks to human health and the environment from soil contamination present at the City-owned upland properties including Development Sites 8 and 9. Based on comparative analysis, the alternative selected by Ecology specified in the Thea Foss Redevelopment CAP is Remediation Based on Future Land Use Development (identified as Alternative 3 in the CAP) (Ecology, 1994). The Thea Foss Redevelopment CAP identified three land use scenarios and specific remedial actions that are to be performed based on the land use scenario. The land use scenarios identified in the CAP include the following:

- Scenario 1: Proposed redevelopment with ground floor residential use;
- Scenario 2: Proposed redevelopment for commercial/retail, open space, or upper story residential uses; and
- Scenario 3: Proposed industrial use for properties located on the east side of the Thea Foss Waterway.

The Thea Foss Redevelopment CAP also identified cleanup levels for soil and groundwater at the City-owned upland properties that are protective of human health and the environment and in consideration of Site use.

As specified in the CAP, the site-specific cleanup levels and required remedial actions to be performed at Development Sites 8 and 9 are based on the land use and the proposed redevelopment to occur at the Site. Redevelopment at Development Sites 8 and 9 will include Scenario 1 and/or Scenario 2 land use. The following sections identify the land use and conceptual redevelopment for Development Sites 8 and 9 and the site-specific cleanup levels and summarize the remedial actions specified in the Thea Foss Redevelopment CAP.

5.2. Land Use and Proposed Redevelopment Plan

Development Sites 8 and 9 are located within an area that is zoned S-8, Shoreline District – Thea Foss Waterway under City of Tacoma Municipal Code Chapter 13.10 (City of Tacoma, 2003). The intent of the "S-8" Shoreline District is to improve the environmental quality of Thea Foss Waterway and provide continuous public access to the waterway as well as encourage the reuse and redevelopment of the area for the following (City of Tacoma, 2003):

- Mixed-use, pedestrian oriented development;
- Residential development;

- Marinas, related facilities, and waterborne transportation;
- Water-oriented commercial uses and maritime activities; and
- Water-oriented public parks and public facilities.

Proposed redevelopment plans for Development Sites 8 and 9 are consistent with the intent of the S-8 Shoreline District zoning as well as the Master Redevelopment Strategy for the Thea Foss Waterway (FWDA, 2012). Redevelopment is anticipated to consist of mixed use including a combination of the following:

- Construction of a multi-story building or buildings with commercial development or residential use on the ground floor and residential use on the upper floors.
- Construction of the multi-story building or buildings on the existing Site surface or with below grade structures including below grade parking.
- Public access to the Thea Foss Waterway as well as access to the Foss Harbor Marina.
- Public open space and/or park area.

The actual extent of each general type of land use identified above (i.e., commercial, residential, public access and a public park) will be determined based on the market conditions at the time of redevelopment. The actual redevelopment that is constructed will be based on the design prepared by a developer of the Site.

Redevelopment will require excavation for construction that may include a building or buildings and associated infrastructure including foundations, below ground parking, installation of utilities, as well as replacement of structures that support public access at the Site. Where redevelopment consists of residential use on the ground floor, all fill and soil is required to be excavated to the mean-high groundwater level as specified in the Thea Foss Redevelopment CAP.

Areas around and beneath the building or buildings would include asphalt/concrete pavement for walkways and vehicle access and parking. Areas around the building or buildings would also include landscaping and open spaces (i.e., lawn area). A park could also be developed to provide a larger open space for the public.

- Replacement of structures that provide public access to the waterway and public open space will be part of Site redevelopment. The esplanade structure on Development Site 8 will be maintained and access to the esplanade on Development Site 8 and between the esplanades on Development Sites 8 and 9 will be integrated into redevelopment for the Site. Plans have been prepared for replacement of the esplanade structure on Development Site 9. The plans include installing a new concrete pile supported and surfaced esplanade adjacent to and over the new shoreline slope created as part of the emergency interim action.

The current plans for the replacement esplanade on Development Site 9 are provided in Appendix F.

The Site is currently used to provide access to the Foss Harbor Marina. Access to Foss Harbor Marina floats is currently provided by two walkways located at the north and south ends of Development Site 9 that connects the upland to the marina floats and facilities. Walkways will be maintained

and/or reconstructed to continue to provide access to the Foss Harbor Marina as part of redevelopment and Site use.

The land use and redevelopment described above provide the basis for the site-specific cleanup levels and the remedial actions required to be performed at Development Sites 8 and 9 under the Thea Foss Redevelopment CAP.

5.3. Site Cleanup Standards

The Thea Foss Redevelopment CAP specifies site-specific cleanup standards based on the requirements of MTCA (Chapter 173-340 WAC) and the proposed Site redevelopment. Additionally, the CAP identified maximum contaminant concentrations for soil. Table 1 presents the cleanup standards for soil and groundwater for individual constituents identified in the CAP as well as the individual maximum contaminant concentrations for soil that are applicable to Development Sites 8 and 9 based on the land use and proposed redevelopment. The cleanup standards presented in this SCAP have been updated from the cleanup levels presented in Thea Foss Redevelopment CAP based on updates to the cleanup levels in MTCA as well as other applicable state and federal criteria (Table 1). The following sections further describe the cleanup levels for soil and groundwater.

5.3.1. Soil Cleanup Standards

The cleanup standards for the Site soils are based on protection of groundwater and surface water, and on estimates of reasonable maximum exposure expected for protection of human health based on Site use. The residential use scenario as defined in MTCA represents the reasonable maximum exposure scenario for direct contact at Development Sites 8 and 9 because of the proposed redevelopment for residential use. The cleanup standards for residential use are the MTCA Method B cleanup levels. For contaminants for which Method B cleanup levels are not established, the MTCA Method A cleanup levels for unrestricted land use are used.

The CAP identified maximum soil concentrations that were characterized as the upper limit for site-wide contaminant concentrations for which the remedial technologies specified in the CAP are applicable (Table 1). The CAP identified that there were upland Sites adjacent to the Thea Foss Waterway where materials including slag are present in soil that may contain contaminants greater than the maximum soil concentrations identified in the CAP but also identified that the materials could be readily removed from soil at the Sites. Therefore, the CAP identified that the presence of the material doesn't exclude a Site from applicability under the CAP (Ecology, 1994).

5.3.2. Groundwater Cleanup Standards

The cleanup standards for Site groundwater are based on protection of marine surface water including protection of aquatic life (i.e., marine chronic criteria specified in Chapter 173-201A WAC and 40 CFR 131) and the protection of human health from consumption of aquatic organisms (40 CFR 131) (Table 1). Protection of surface water is applicable for Site groundwater since groundwater at the Site was determined to be non-potable as specified in the Thea Foss Redevelopment CAP (Ecology, 1994).

Consistent with MTCA (WAC 173-140-720), shallow groundwater at Development Sites 8 and 9 is not considered a potable water source as shallow groundwater from the Site is not currently being

used for potable water and is not suitable as a future potable water source due to the high potential for saline water intrusion as a result of groundwater extraction. It is also unlikely that a contaminant in the shallow groundwater will be transported to an area where groundwater is a current or potential future source of potable water (Ecology, 1994).

5.4. Remedial Actions for the Proposed Redevelopment and Site Use

Remedial actions required under the Thea Foss Redevelopment CAP for the proposed redevelopment and Site use at Development Sites 8 and 9 include the following:

- Remediation of excavated soil;
- Isolation of contaminants below soil and pavement caps;
- Over-excavation or lining of the excavation area with geotextile and backfilling with clean soil in areas where repeated excavation may occur;
- Establishment of institutional controls where residual contamination remains on site; and
- Compliance monitoring.

The following sections further describe each of the remedial actions required for the Site.

5.4.1. Remediation of Excavated Soil

Remediation is required for all contaminated soil removed from excavations performed at the Site. Treatment of excavated contaminated soil is preferred, whenever practicable, but actual treatment process options are dependent on the contaminant characteristics and type of excavated material. Soil that is treated and reused on site must meet cleanup levels presented in Table 1.

The results of the remedial investigation indicate that fill and soil is present at the Site that contains cPAHs, metals and petroleum hydrocarbons at concentrations greater than the cleanup levels. Additionally, fill/soil is present with lead concentrations greater than the maximum soil contaminant concentration and fill/soil is present that is a source contributing to nickel in groundwater at concentrations greater than the groundwater cleanup standards that must be excavated to meet the requirements of the Thea Foss Redevelopment CAP. Fill and soil excavated from the Site containing contaminant concentrations greater than the maximum soil concentrations and/or cleanup levels and/or contributing to concentrations in groundwater greater than the groundwater cleanup levels will require treatment based on its chemical characteristics and type. Alternatively, excavated material that is not practical to treat may be disposed of off site at an appropriate disposal facility.

5.4.2. Isolation Beneath Soil or Pavement Caps

Where residential use is not proposed for the ground floor, caps consisting of soil or pavement are required to isolate contaminants left on site and to prevent exposure.

A cap comprised of soil constructed to isolate contaminated soil present at the Site must consist of 3 feet of clean soil cover. Remedial actions could include excavating and treating up to 3 feet of soil to meet MTCA Method B standards followed by reuse as backfill.

Pavement comprised of asphalt or concrete can be used for isolating contaminated soil to be left on site. A building or structure can also be used to cap contaminated Site soils. Building foundations may rest on contaminated soil, but backfill around the foundation must be clean or soil treated to meet the site-specific cleanup levels.

5.4.3. Over-Excavation or Lining of Excavation Areas

In utility corridors or other areas where repeated excavation is anticipated to occur in the future and contaminants are present at concentration greater than the cleanup standards, over-excavation and backfilling with clean soil or lining the excavation with geotextile fabric before backfilling with clean soil is required to limit future exposure to contaminated soil by utility or other workers.

Utility trenches are required to be constructed to state and city standards. Additionally, the CAP requires that all utility trenches excavated through soil with contaminant concentrations exceeding the cleanup level be over-excavated to allow for a minimum 1-foot perimeter of clean soil outside the standard trench dimensions or the utility trench is required to be lined with geotextile fabric. The utility trenches are also required to be backfilled with clean or treated soil meeting the cleanup standards.

5.4.4. Institutional Controls

Institutional controls are required in areas of the Site where residual contamination remains following remedial actions to control future land use and disturbance of soil, provide for long-term maintenance of caps (i.e., soil and pavement caps), to prohibit use of groundwater for potable water and to provide compliance monitoring.

5.4.5. Compliance Monitoring

Compliance monitoring is required to confirm that human health and the environment are protected during the construction and operation and maintenance of the cleanup action. Compliance monitoring will also be required to confirm that cleanup actions have attained the cleanup standards prescribed in the cleanup action plan and ensure the long-term effectiveness of the remedial action including the long-term integrity of any isolation systems as well as other requirements for isolation technologies.

6.0 SITE-SPECIFIC CLEANUP ACTION PLAN

This section presents the site-specific cleanup action plan for Development Sites 8 and 9 based on the requirements of the CD and CAP for a conceptual redevelopment plan for the Site that includes mixed use including a combination of the following:

- Construction of a multi-story building on the existing Site surface that is used for commercial development on the ground floor and residential use on the upper floors.
- Construction of a multi-story building with residential use on the ground floor and residential use on the upper floors and with below ground parking.
- Public and vehicle access to the Thea Foss Waterway and Foss Harbor Marina.
- Public access along the shoreline.

- Utility corridors.
- Public open space or park area.

Figure 8 presents a Site map that depicts a conceptual redevelopment plan and Figure 9 presents a cross section through the Site that depicts a conceptual representation of the remedial actions required to be performed as part of the cleanup action.

As stated in Section 4.2, the actual extent of each type of land use identified above (i.e., commercial, residential, public access and public park) will be determined based on the market conditions at the time of redevelopment and design prepared by a developer of the Site. The specific engineering design for remedial actions to be performed at Development Sites 8 and 9, based on the actual redevelopment to be constructed at the Site, will be presented in an Engineering Design Report (EDR) and construction plans and specifications. The EDR will be prepared in accordance with MTCA requirements. The EDR and construction plans and specifications will provide specific design requirements and procedures for completing the remedial actions at the Site.

The following sections provide additional descriptions of the actions that would be required to be performed as part of redevelopment of Development Sites 8 and 9 based on the conceptual redevelopment plan.

6.1. Site Preparation and Demolition

Redevelopment and remedial actions at the Site to support the conceptual redevelopment plan will require site preparation and demolition activities that may include the following:

- **Demolition of the two buildings present on the southern portion of the Site.** The existing buildings will likely need to be demolished to allow for Site redevelopment and implementation of remedial actions. Regulated building materials as well as other components of the existing buildings are required to be managed and disposed of in accordance with all local, state and federal regulations.
- **Demolition of pavement present at the surface over a majority of the Site.** The existing asphalt and concrete pavement will need to be demolished to the extent necessary to allow for Site redevelopment and remedial actions. The demolished asphalt pavements are required to be removed from the Site and are anticipated to be recycled or disposed of at appropriate disposal facilities. Demolished concrete pavements from the Site may be removed from the Site and recycled or disposed of at appropriate disposal facilities or may be reused onsite, where appropriate (ex., in the vadose zone), as base course beneath pavement and buildings.
- **Demolition of piling associated with existing and former Site structures.** Piling that are associated with existing or former Site structure(s), where present, will need to be demolished to extent necessary to support construction of buildings or other structures and completion of remedial actions. Demolished piling will need to be disposed of at an appropriate disposal facility.
- **Demolition of utilities.** In areas where excavation to support redevelopment and remedial actions requires removal of existing utilities, the utilities will be required to be demolished and/or decommissioned in accordance with applicable requirements. Utilities that are trunkaded at the

limits of an excavation and have the potential to provide a transport pathway for soil or water (ex., stormwater and sanitary sewer pipes, etc.) will be required to be plugged. Grout will need to be placed in the ends of utility pipes that are trunkaded to prevent transport of Site media, including soil and groundwater, in the remaining portion of the pipes. The demolished components of existing utilities within the excavation will need to be disposed of at an appropriate disposal facility.

- **Demolition of other remnant structures.** Remnant structures including previous building support structures (i.e., concrete footings, pilings, etc.), concrete pads, utilities, as well as other structures (ex., buried tanks, piping, etc.) may be present beneath the surface of the Site and may be encountered during remedial actions and redevelopment activities. Remnant structures that are encountered will need to be demolished to the extent necessary to support completion of remedial actions and redevelopment and the demolished structures will need to be managed and recycled and/or disposed of at appropriate recycling and/or disposal facilities.
- **Decommissioning or modification of existing monitoring wells.** Existing monitoring wells at the Site may need to be decommissioned prior to remedial actions and redevelopment activities at the specific monitoring well locations. However, the existing monitoring wells could be protected and the well casings and protective casings could be modified (i.e., raised) to account for changes in the Site surface as a result of redevelopment activities. Decommissioning and/or modification to the monitoring wells are required to be performed by a licensed driller in accordance with state regulations.

6.2. Remediation of Excavated Soil

Redevelopment of the Site, as identified in the conceptual redevelopment plan, may include excavation of soil for the following;

- Removal of all fill and soil with contaminant concentrations greater than the site-specific cleanup standards down to the mean-high groundwater level where residential use will occur on the ground floor;
- Construction of building foundations and structures;
- Below grade parking;
- Installation of utilities; and
- Grading the site.

Remedial actions at the Site are also required to include remedial excavation and removal of fill and soil on the eastern portion of the Site with lead concentrations greater than the maximum soil contaminant concentration and fill and soil that is a source contributing to nickel concentrations in groundwater that are greater than the groundwater cleanup standard to comply with the Thea Foss Waterway Redevelopment CAP.

The extent of excavation to install building foundations and structures will be dependent on the design of the building to be constructed. Excavation to construct below grade parking is to be performed to the depth of the mean-high groundwater level. Installation of utilities will include excavation of utility trenches and corridors in accordance with the requirements of the CAP and Site

grading will be needed to facilitate stormwater conveyance as well as transition between surface features on the Site (i.e., between building access areas and esplanade structures) and between Site surface features and surface features on adjacent Sites (i.e., between esplanade structures on the Site and on adjacent Sites). Additionally, Site grading will be required to facilitate transition between different cap types (i.e., soil cap and pavement caps) utilized to contain contaminated soil (Figure 9).

As previously stated, remediation is required for all soil with contaminant concentrations greater than site-specific cleanup standards removed from excavations performed at the Site. The CAP specifies that excavated soil with contaminant concentrations greater than the cleanup standards can't be relocated on site and capped. Contaminated soil that is treated to meet the cleanup levels presented in Table 1 or soil present at the Site that meets the cleanup levels as well as other Site redevelopment considerations (ex., geotechnical requirements) can be reused on site.

Fill and soil present at the Site has been identified to contain cPAHs, metals, and petroleum hydrocarbons at concentrations greater than the cleanup standards. Additionally, fill/soil with lead concentrations greater than the maximum soil contaminant concentration and fill/soil that is a source contributing to nickel concentrations in groundwater at concentrations greater than the groundwater cleanup standards is present on the eastern portion of the Site. Nickel concentrations in fill/soil present in the area of monitoring well location HB-MW02 were the highest detected at the Site. A conceptual redevelopment plan that includes excavation of all fill/soil down to the mean-high groundwater table is anticipated to remove lead detected at a concentration greater than the maximum contaminant concentration (i.e., 2,630 mg/kg in a sample collected from test pit location HB-TP05; Figure 7B) and fill/soil with the highest concentrations of nickel (i.e., sampling locations HB-TP04, HB-TP05, HB-TP06 and HB-TP07; Figure 7B; Table B-3 in Appendix B) contributing to nickel in groundwater at monitoring well HB-MW02 (Figure 7B).

Additional characterization will be required to evaluate fill and soil at the Site for treatment, off-site disposal, or on site reuse and to confirm the limits of soil with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration on the eastern portion of the Site. The specific procedures for performing additional characterization for evaluating and determining appropriate treatment and/or disposal and for confirming the area with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration will be identified in a Compliance Monitoring Plan included in the EDR prepared for performing remedial actions and redevelopment construction activities. The Compliance Monitoring Plan will be prepared in accordance with MTCA requirements (WAC 173-340-410). Possible approaches include performing insitu characterization prior to remedial and redevelopment construction and/or characterization during construction.

Pre-construction insitu characterization could include advancement of test pits and/or soil borings in the proposed excavation and remedial action areas and sampling and analysis of various fill and soil at the Site. Analysis would include Site contaminants as well as analytes and analyses required by potential treatment and disposal facilities including compliance with the Dangerous Waste Regulations (Chapter 173-303 WAC). The results of the insitu characterization would be compared to site-specific cleanup standards, requirements specified by potential disposal facilities, as well as

evaluated for potential treatment. Additional testing including geotechnical analyses could be performed to evaluate potential reuse onsite of soil meeting the site-specific cleanup standards.

Characterization during remedial and redevelopment construction would include excavation, stockpiling, and sampling and analysis to evaluate treatment, disposal, and reuse and sampling and analysis to confirm the extent of fill and soil with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration on the eastern portion of the Site. A combination of the results from previous remedial investigations and field screening during remedial and redevelopment construction could be used to segregate fill and soil for evaluation for treatment, off-site disposal, or on site reuse as well as confirm the extent of fill and soil with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration. Field screening would include, but not be limited to, evaluation for the following:

- Fill of various types that would have similar contaminant characteristics and/or similar disposal designations including debris such as: asphalt; concrete; creosote-treated wood; slag; ash, cinders, burned debris; coal; or other material types;
- Fill and soil having visual signs of contamination including, but not limited to, staining, oxidation or discoloration as well as olfactory indication of contamination (i.e., odor);
- Fill and soil with oil residue or other indications of petroleum contamination (i.e., sheen, tar, etc.);
- Fill and soil that register "hits" or signs of potential contamination on field screening devices (i.e., organic vapor analyzer).

Similar to insitu characterization, analysis of stockpiled materials and fill/soil sampled to confirm the extent of elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration would include Site contaminants as well as analytes and analyses required by potential treatment and disposal facilities. The results would be compared to site-specific cleanup standards, requirements specified by potential disposal facilities, as well as evaluated for potential treatment. Additional testing including geotechnical analyses could be performed to evaluate potential on site reuse of soil meeting the site-specific cleanup levels.

The evaluation of the applicability of treatment, off-site disposal, or on site reuse will be based on fill and soil type and characteristics and the results of sampling and analysis. The following will be considered when evaluating treatment and off-site disposal of excavated fill and soil:

- Thermal desorption is potentially applicable for cPAH and petroleum hydrocarbon contaminated soil with relatively low levels of metals and minimal to no debris. This is a preferred remediation method as contaminants are permanently destroyed in the process of treatment. Thermal desorption can either be conducted on Site or performed at an off-site treatment facility.

- Subtitle D landfill disposal is potentially applicable for contaminated fill and soil that does not designate as hazardous or Dangerous Waste (Chapter 173-303 WAC) based on the results of analysis and testing or designation based on material type (i.e., creosote-treated wood). Disposal at a specific Subtitle D landfill is subject to the landfill's approval.

- Subtitle C landfill disposal is potentially applicable for contaminated fill and soil that designates as hazardous or Dangerous Waste. Fill and soil that designates as hazardous or Dangerous Waste is required to be managed in accordance with the Dangerous Waste regulations (Chapter 173-303 WAC). Disposal at a Subtitle C landfill is subject to the landfill's approval. Fill or soil designating as hazardous or Dangerous Waste based on the presence of leachable metals may require treatment by stabilization prior to disposal. Stabilization can be performed by the landfill prior to disposal or could be performed on Site prior to disposal.

- On site reuse is potentially applicable for soil that contains contaminant concentrations less than the site-specific cleanup standards and that is not a source of or contributing to groundwater concentrations greater than the cleanup standards. Additionally, soil reused on Site will need to meet other redevelopment considerations (i.e., geotechnical requirements). In general, soil reused on Site should contain minimal debris and be free of organic materials (i.e., wood) and large debris (i.e., concrete).

6.3. Isolation Beneath Soil or Pavement Caps

Soil or pavement caps will be required in redevelopment areas where soil remains with contaminant concentrations greater than site-specific cleanup standards. Asphalt and concrete pavement is anticipated to be utilized to isolate contaminated soil in public access areas including esplanade areas, sidewalks, and vehicle driveways and parking. Soil is anticipated to be utilized to isolate contaminated soil in areas where vegetation (i.e., grass, bushes, etc.) will be installed including open space and landscape areas (Figures 8 and 9).

Asphalt and concrete pavement installed to cap contaminated soil will be constructed for the intended purpose (i.e., esplanade, vehicle driveway and parking, etc.) in accordance with local and state requirements. Additionally, concrete structures including building foundations or concrete slabs can also provide isolation and containment of residual contaminated soil.

Soil caps are required to be comprised of 3 feet of imported or Site soil meeting the site-specific cleanup standards. Analytical testing will be required to confirm that imported or Site soil used for Site caps meet the site-specific standards. The sampling and analysis of soil used for Site caps will be described in a Compliance Monitoring Plan included in the EDR prepared in accordance with MTCA requirements (WAC 173-340-410). The testing will include analysis for Site contaminants to ensure compliance with the site-specific cleanup standards as well as other physical testing as necessary to support the proposed use.

Locations or areas of transition between the cap types (i.e., pavement types or soil to pavement) will be constructed to meet the requirements of the CD and CAP as well as local and state requirements for the intended use. Areas of transition between cap types will be constructed to ensure isolation and containment of residual contaminated soil.

All contaminated soil that is excavated to install Site caps will be required to be remediated as described in Section 5.4.2. Excavation of soil for installation of Site caps is anticipated to include removal of soil to allow placement of base course materials (i.e., gravel) prior to paving and Site grading to support stormwater conveyance as well as transition between Site structures and Site surface features and between Site surface features and surface features on adjacent Sites.

6.4. Over-Excavation or Lining of Excavation Areas

Utility trenches and corridors excavated as part of Site redevelopment are required to be constructed to meet state and local standards for the utilities to be installed. Additionally, as specified in Section 5.4.3, utility trenches and corridors or other areas with contaminant concentrations greater than the cleanup standards where repeated excavation is anticipated to occur in the future, over-excavation and backfilling with clean soil or lining the excavation with geotextile fabric before backfilling with clean soil is required to limit future exposure to contaminated soil by utility or other workers. Fill and soil with contaminant concentrations greater than site-specific cleanup standards that are excavated to install utilities are required to be treated or disposed as described in Section 5.3.1.

6.5. Institutional Controls

Institutional controls will be required as contamination will remain following remedial actions and redevelopment of the Site. The institutional controls are required to be implemented to control future land use and excavations, provide for long-term maintenance of caps (i.e., soil and pavement caps), prohibit use of groundwater for potable water, and to provide compliance monitoring. Institutional controls will be implemented in accordance with MTCA requirements (WAC 173-340-440).

6.6. Compliance Monitoring

Compliance monitoring consists of protection monitoring, performance monitoring and confirmational monitoring. Protection monitoring is conducted to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of a cleanup action. Performance monitoring is conducted to confirm that the remedial action has attained cleanup standards. Confirmational monitoring (soil, groundwater, and/or sediment) is conducted to confirm the long-term effectiveness of the remedial action once cleanup standards or other performance standards have been attained. Compliance monitoring will be performed according to the MTCA criteria specified in WAC 173-340-410 and -360(8) and the requirements of the CD and CAP.

Protection monitoring will be performed during construction to ensure that site workers are appropriately trained in health and safety and that appropriate health and safety plans and procedures are implemented during remedial actions. Additionally, appropriate erosion and sedimentation controls and site drainage control measures will be implemented to ensure that no discharge occurs to the Thea Foss Waterway during remedial activities.

Performance monitoring will be performed to ensure construction quality control measurements and monitoring are performed in accordance with the EDR and plans and specifications as well as all sampling and analysis necessary to evaluate compliance with cleanup standards and to evaluate treatment, disposal, and reuse. Additionally, performance monitoring will be performed to monitor and ensure compliance with environmental requirements related to permits and substantive requirements for remedial actions and redevelopment.

Confirmational monitoring will include groundwater sampling and analysis to verify compliance with site-specific groundwater cleanup standards. The groundwater monitoring will be performed after

completion of remedial actions to verify that remedial actions performed at the Site results in contaminant concentrations in groundwater being less than the cleanup standards.

The protection, performance, and confirmational monitoring to be performed during and after remedial actions and redevelopment at the Site will be described in a Compliance Monitoring Plan prepared in accordance with MTCA requirements (WAC 173-340-410) and submitted as part of the EDR.

7.0 CLEANUP ACTION EVALUATION CRITERIA

This section presents a description of the threshold requirements for cleanup actions and the additional criteria used to evaluate cleanup actions under MTCA. This section also describes how the remedial actions to be performed at the Site meet the evaluation criteria.

7.1. Threshold Requirements

Remedial actions performed under MTCA must comply with basic threshold requirements. Remedial actions that do not comply with the threshold requirements are not considered suitable remedial actions under MTCA. As identified in CAP and MTCA [WAC 173-340-360(2)(a)], the four threshold requirements for remedial actions are that they must:

- Protect human health and the environment;
- Comply with cleanup standards;
- Comply with applicable state and federal laws; and
- Provide for compliance monitoring.

Each of the threshold requirements are discussed in the following sections.

7.1.1. Protection of Human Health and the Environment

The results of remedial actions performed under MTCA must ensure that both human health and the environment are protected.

The cleanup action specified in this SCAP protects human health and the environment by eliminating direct contact with contaminants in soil present at the Site. Contaminated soil at the Site will be isolated below pavement and soil caps as well as buildings. Additionally, contaminated soil that is excavated will be treated or disposed at an appropriate off-site disposal facility reducing the volume of contaminated material present at the Site.

Nickel has been detected in groundwater at a concentration greater than the site-specific cleanup level at monitoring location HB-MW02 (Figure 5). Fill and soil with the highest concentrations of nickel was observed in three test pits (i.e., HB-TP05, HB-TP06 and HB-TP07) nearest to monitoring well HB-MW02 indicating that soil in this area is the likely source of nickel in groundwater. The remedial actions performed at the Site will remove the fill and soil that is the likely source of nickel in groundwater. Confirmational monitoring of groundwater will verify that the remedial actions at the Site are protective of groundwater and surface water in the Thea Foss Waterway.

7.1.2. Compliance with Cleanup Standards

Compliance with cleanup standards requires that cleanup standards are met at the applicable points of compliance.

Where a remedial action involves containment of soil with contaminant concentrations exceeding cleanup standards, the remedial action may be determined to comply with cleanup standards, provided the requirements specified in WAC 173-340-740(6)(f) are met. The selected cleanup action will comply with the cleanup standards specified in the CAP and WAC 173-340-740(6)(f) as the cleanup action is protective of human health and the environment, includes implementation of institutional controls that limit activities that could interfere with the long-term integrity of the caps, and includes compliance monitoring to ensure the long-term integrity of the caps.

7.1.3. Compliance with Applicable State and Federal Laws

Remedial actions conducted under MTCA must comply with state and federal laws that are applicable or relevant and appropriate requirements (ARARs). Applicable state and federal laws include legally applicable requirements and those requirements that Ecology determines to be relevant and appropriate (WAC 173-340-710). The ARARs that have been identified to be applicable or potentially applicable to the remedial actions to be performed as part of the cleanup action and redevelopment of Development Sites 8 and 9 are presented in Table 2.

As the remedial actions at Development Sites 8 and 9 are being conducted under a CD with Ecology, the remedial actions meet the procedural exemption provisions of MTCA (WAC 173-340-710[9]) and therefore, are not required to follow the procedural requirements of most State and local laws that would otherwise apply to the action. The remedial action will, however, comply with the substantive requirements of the applicable State and local laws. The exemption is not applicable if Ecology determines that the exemption would result in the loss of approval from a federal agency that may be necessary for the state to administer any federal law. The laws that are subject to the procedural requirements exemption include the following:

- Washington Shoreline Management Act - The Washington Shoreline Management Act (RCW 90.58) and its implementing regulations establish requirements for substantial developments occurring within water areas of the state or within 200 feet of the shoreline. The Site remedial actions will comply with substantive requirements set forth by the City, but a shoreline permit will not be required for the remedial action components of the Site redevelopment.
- Washington Hydraulic Code - The Washington Hydraulic Code (WAC 220-110) establishes regulations for the construction of any hydraulic project or the performance of any work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh water of the State. The code requires that a Hydraulic Project Approval (HPA) permit (administered by the Washington Department of Fish and Wildlife) be obtained for any activity that could adversely affect fisheries and water resources. Although an HPA permit will not be required for planned remedial actions, substantive timing restrictions and technical requirements under the code are potentially applicable to any remedial actions and shoreline restoration activities performed below MHHW.

7.1.4. Provision for Compliance Monitoring

The remedial action must include compliance monitoring in accordance with WAC 173-340-410. As stated above, a Compliance Monitoring Plan will be prepared and submitted as part of the EDR. The Compliance Monitoring Plan will identify the monitoring requirements for each of the elements of the remedial actions.

7.2. Additional Evaluation Criteria

The CAP identifies additional criteria that are to be evaluated for remedial actions performed on Development Sites 8 and 9. The additional evaluation criteria include the following:

- Short-term effectiveness;
- Long-term effectiveness;
- Permanent reduction of toxicity, mobility, or volume;
- Implementability and technical feasibility; and
- Cost.

Each of the additional evaluation criteria are discussed in the following sections.

7.2.1. Short-Term Effectiveness

The short-term effectiveness considers how the cleanup action impacts human health and the environment during the construction phase and prior to the attainment of cleanup standards.

Human health risks associated with remedial action construction include worker and community exposure to contaminants in Site media (i.e., soil and groundwater) during excavation and other remedial actions as well as physical injury from construction activities. Exposure to contaminated Site media during construction will be addressed through development and implementation of site-specific health and safety plans as part of the remedial action construction plans. Health and safety plans will identify the risks associated with the remedial actions to be performed at the Site and the procedures to address the identified risks.

Risks to the environment associated with remedial action construction include the potential for contaminant discharges to the Thea Foss Waterway. The potential for releases to the Thea Foss Waterway will be addressed through development and implementation of temporary erosion and sediment controls (TESC) and a Construction Stormwater Pollution Prevention Plan (SWPPP) that identifies best management practices (BMPs) to prevent off-site transport of Site media. The TESC and SWPPP will be prepared as part of development of the EDR and project plans and specifications.

7.2.2. Long-Term Effectiveness

The long-term effectiveness of the cleanup action is evaluated in terms of the magnitude of residual risk and the adequacy and reliability of the cleanup action.

The residual risk at the Site will be substantially reduced by removal and treatment and/or disposal at an appropriate disposal facility of contaminated fill and soil. Additionally, the long-term risk of exposure to contaminants in fill and soil will be substantially reduced by isolating the contaminated

fill and soil at the Site beneath pavement and soil caps. The risk to future workers will also be reduced by constructing utility trenches and corridors with clean backfill.

Compliance monitoring and implementation of institutional controls will ensure the long-term reliability and adequacy of the cleanup action. As stated above, compliance monitoring will include periodic review of the remedial actions to evaluate the integrity of the cap surfaces to ensure isolation of the fill and soil remaining on Site with contaminant concentrations greater than the cleanup standards. Groundwater monitoring will also be performed to ensure that groundwater at the Site is protective of surface water in the Thea Foss Waterway. Institutional controls including deed restrictions will limit activities that would affect the remedial actions (i.e., excavation of the capped areas) and prohibit groundwater extraction and for use as potable water.

7.2.3. Permanent Reduction of Toxicity, Mobility, or Volume

This evaluation criterion addresses the preference for treatment technologies that permanently and significantly reduce toxicity, mobility, and volume of the hazardous substances present at the Site.

All contaminated, excavated fill and soil will require treatment or off-site disposal. Treatment will be utilized, if appropriate based on the contaminant types and material characteristics, to reduce the toxicity, mobility, and volume of contaminated Site fill and soil. Off-site disposal at an appropriate disposal facility will reduce the overall volume of contamination present at the Site and the potential mobility of contaminants in fill and soil.

7.2.4. Implementability and Technical Feasibility

Implementability and technical feasibility includes consideration of whether the remedial actions are technically possible considering, but not limited to, the following:

- Administrative and regulatory requirements;
- Availability of required materials, facilities, or services;
- Access for construction and monitoring; and
- Integration with existing facility operations and other remedial actions.

The remedial actions to be performed at the Site have been implemented and used reliably elsewhere including at other upland properties adjacent to the Thea Foss Waterway to remediate contaminated soil with similar characteristics and therefore, are proven to be technically feasible and implementable. The administrative and regulatory requirements are manageable and there are readily available materials, facilities, and service providers to complete the remedial actions. The remedial actions that were selected in the CAP that are to be implemented at Development Sites 8 and 9 are designed to be integrated with the land use and redevelopment at the Site.

7.2.5. State and Community Acceptance

Acceptance of the cleanup action will be evaluated based on review of the Draft SCAP. The draft SCAP will be submitted for public comment. Based on the information gathered from the public, Ecology arrive at the final cleanup action for Development Sites 8 and 9. The final cleanup action will be documented in the final SCAP prepared by Ecology.

7.2.6. Cost

The estimated cost to implement the remedial actions at Development Sites 8 and 9 based on the conceptual redevelopment plan presented in Section 5.2 and as shown on Figures 8 and 9 is presented in Table 3. Table 3 includes the assumptions used to develop the remedial action cost estimate. The actual remedial action costs will be determined based on the actual redevelopment that is constructed and design prepared by a developer of the Site.

8.0 IMPLEMENTATION OF THE CLEANUP ACTION

Implementation of the cleanup action will require development of remedial design documents and plans and preparation of permit applications and agency approval, where applicable, prior to remedial action construction. Remedial design documents, plans, and permits and agency approval will be developed based on the actual development plans put forth by the future developer of the Site following approval of this SCAP.

An EDR will be prepared that includes the information required under MTCA [WAC 173-340-400(4)(a)] and shall include sufficient information for the development and review of construction plans and specifications. The following information shall be included in the EDR, as appropriate:

- Goals of the cleanup action including specific cleanup or performance requirements;
- General information on the Site including a summary of information as necessary to reflect the current conditions;
- Identification of who will own, operate, and maintain the cleanup action during and following construction;
- Site maps showing existing site conditions and proposed location of the cleanup actions;
- Characteristics, quantity, and location of materials to be treated or otherwise managed;
- A schedule for final design and construction;
- A description and conceptual plan of the actions and processes required to implement the cleanup action;
- Engineering justification for design and operation of the cleanup actions including design criteria for all components of the cleanup action, expected treatment and containment efficiencies, and demonstration that the cleanup action will achieve compliance with cleanup requirements;
- Design features for control of hazardous materials, spills, and accidental discharges;
- Design features to assure long-term safety of workers and local residences;
- Methods for management or disposal of any treatment residual and other waste materials containing hazardous substances generated as a result of the cleanup action;
- Site specific characteristics that may affect design, construction, or operation of the cleanup action;

- A general description of construction testing that will be used to demonstrate adequate quality control;
- A general description of compliance monitoring that will be performed during and after construction to meet the requirements of MTCA (WAC 173-340-410);
- A general description of construction procedures proposed to assure that the safety and health requirements of MTCA (WAC 173-340-810) are met;
- Information needed to fulfill the applicable requirements of the State Environmental Policy Act (SEPA) (Chapter 43.21C RCW);
- Any additional information needed to address the applicable state, federal and local requirements including the substantive requirements for any exempted permits; and
- Any Site access issues which need to be resolved to implement the cleanup action.

Construction plans and specifications will be prepared that detail the cleanup actions to be performed and will be prepared in conformance with currently accepted engineering practices and techniques. The construction plans and specifications will include the following information, as applicable:

- A general description of the work to be performed and a summary of the engineering design criteria from the EDR;
- Location map and existing Site conditions map;
- A copy of any permits and approvals;
- Detailed plans, procedures, and material specifications necessary for construction of the cleanup action;
- Specific quality control tests to be performed to document the construction, frequency of testing, acceptable results, and other documentation methods;
- Additional information to address applicable state, federal, and local requirements including the substantive requirements for any exempted permits;
- A compliance monitoring plan prepared under MTCA (WAC 173-340-410) describing monitoring to be performed during construction as well as a sampling and analysis plan meeting MTCA requirements (WAC 173-340-820);
- Provisions to assure safety and health requirements of MTCA (WAC 173-340-810) are met.

Permits and approvals and any substantive requirements for exempted permits, if required for construction or to otherwise implement the cleanup action, shall be identified and where possible, resolved before, or during, the design phase to avoid delays during construction and implementation of the cleanup action.

All aspects of construction will be performed and documented in accordance with MTCA requirements [WAC 173-340-400(6)] including approval of all of the plans listed above prior to commencement of work, oversight of construction by a Professional Engineer licensed in the State of Washington, and submittal of a Construction Completion Report that documents all aspects of the cleanup and includes an opinion

of the engineer as to whether the cleanup was conducted in substantial compliance with the CAP, the EDR and the construction plans and specifications.

8.1. Anticipated Schedule for Design and Implementation

The schedule for development of an EDR, plans, and specifications and implementation of the cleanup action is not known at this time. The schedule for the cleanup action will be based on redevelopment of the Site.

9.0 LIMITATIONS

We have prepared this report for the exclusive use of the Foss Waterway Development Authority for Site Specific Cleanup Action Plan for Development Sites 8 and 9 in Tacoma, Washington. Foss Waterway Development Authority may distribute copies of this report to regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. The conclusions and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to this report.

Please refer to the appendix titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

10.0 REFERENCES

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APPENDIX A
Area-Wide Consent Decrees and Thea Foss Redevelopment Cleanup Action Plan

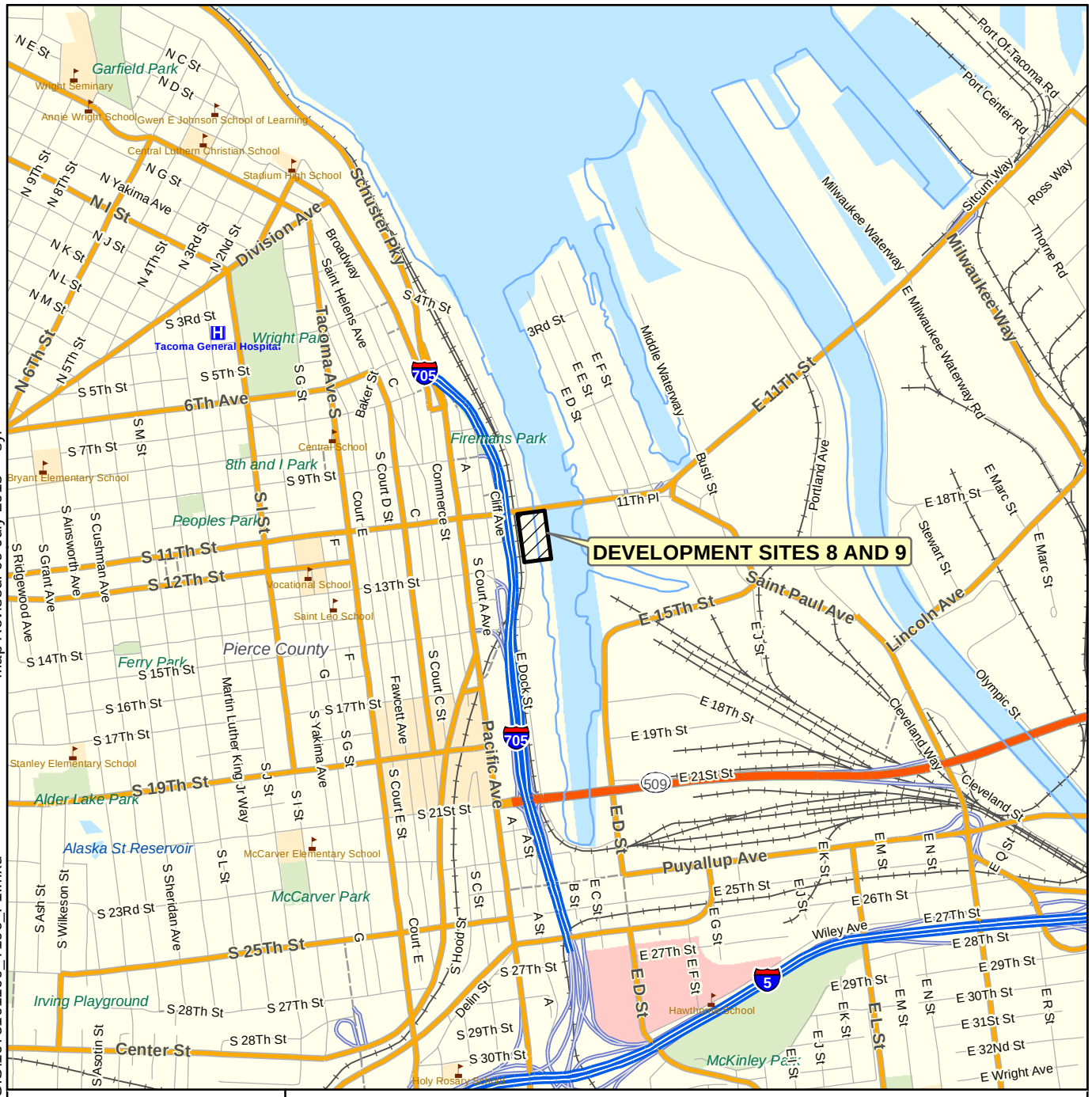
APPENDIX B
Draft Site-Specific Remedial Investigation Report

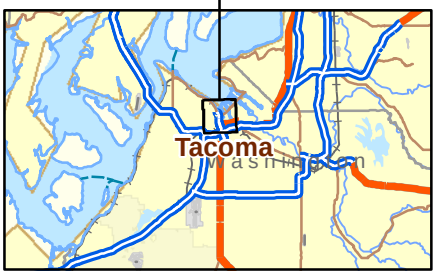
APPENDIX C
Sitts & Hill Survey Drawing

APPENDIX D
Emergency Interim Action Documentation

APPENDIX E
Regulated Building Material Survey Report

APPENDIX F
Replacement Esplanade Plans for Development Site 9





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Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, State Plane South, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 1

Office: TACO Path: W:\Tacoma\Projects\10\10751011\GIS\1075101100_T100_F1.mxd Map Revised: 09 July 2013 syi

Notes:
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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

LEGEND

PARCEL BOUNDARY LINE

ROW ROW RIGHT OF WAY LINE

APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

N E S W

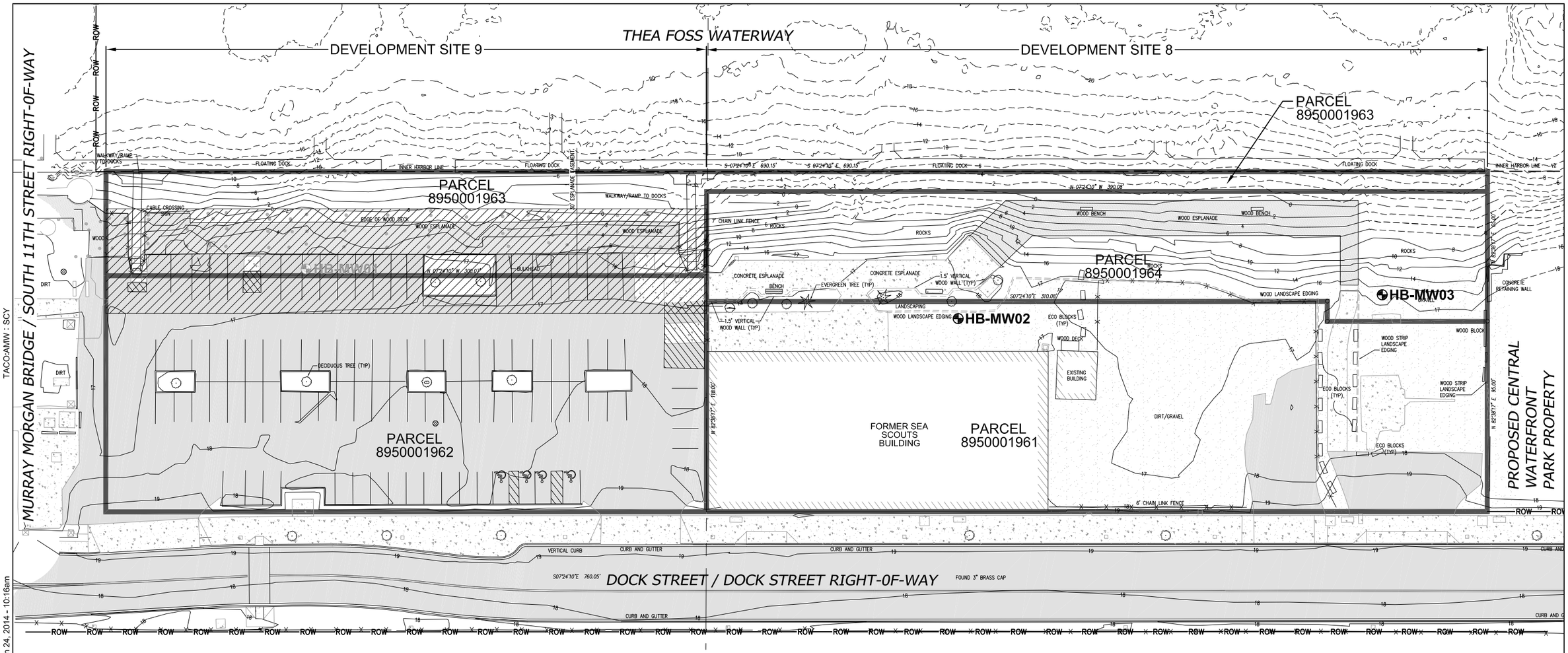
60 0 60
Feet

Site Aerial

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 2



LEGEND

- PARCEL BOUNDARY LINE
- RIGHT OF WAY LINE
- INNER HARBOR LINE
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW)
- MAJOR CONTOUR (MLLW)
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.
- **HB-MW02** MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE

50 0 50
Feet

Notes:
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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

Site Plan

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 3

THEA FOSS WATERWAY

DEVELOPMENT SITE 9

DEVELOPMENT SITE 8

COMM PAINT MARK, AS MARKED BY APS LOCATES NOVEMBER 15, 2011, AND FIELD LOCATED BY SITTS & HILL ENGINEERS ON NOVEMBER 21, 2011. SITTS & HILL ENGINEERS WAS MADE AWARE THAT APS LOCATES WAS UNABLE TO GET ADEQUATE SIGNALS ON THE U/G COMM LINE DUE TO IT BEING ENCASED IN A STEEL CONDUIT. SITTS & HILL MAKES NO GUARANTEES TO THE ACCURACY OF THE PAINT MARK IN RELATION TO THE ACTUAL U/G UTILITY.

S 82°38'17" W 1882.18'

MURRAY MORGAN BRIDGE / SOUTH 11TH STREET RIGHT-OF-WAY

WALKWAY/RAMP TO DOCKS

FLOATING DOCK

INNER HARBOR LINE

FLOATING DOCK

30' ESPLANADE EASEMENT

S 07°24'10" E 690.15'

S 07°24'10" E 690.15'

PARCEL 8950001963

WALKWAY/RAMP TO DOCKS

CABLE CROSSING SIGN

EDGE OF WOOD DECK

WOOD ESPLANADE

WOOD ESPLANADE

7' CHAIN LINK FENCE

6 ROCKS

BRIDGE COLUMN

WOOD

DIRT

ARC LIGHTS (TYP)

COLUMN (TYP)

N 07°24'10" W 306.07'

BULKHEAD

CONCRETE ESPLANADE

BENCH

EVERGREEN TREE (T

1.5' VERTICAL WOOD WALL (TYP)

MATCHLINE (SEE FIGURE 4B)

FENCE/GATE POST (TYP)

COMMUNICATION MANHOLE (TYP)

DECIDUOUS TREE (TYP)

BOLLARD (TYP)

POWER METER (TYP)

DIRT

UTILITY CONDUIT PAD

PARCEL 8950001962

EXTRUDED CURB IN PARKING LOT (TYP/2AL)

HANDICAP PARKING (TYP)

SOUTH 12TH STREET VIEW CORRIDOR

POWER VAULT (TYP)

COMMUNICATION VAULTS (TYP)

POWER TRANSFORMER (TYP)

CATCH BASIN (TYP)

SIGN (TYP)

WATER VAULT (TYP)

SURVEY CONTROL POINT (TYP)

BRIDGE FOOTING(TYPICAL)

FOUND MONUMENT (TYP)

GATE VALVE (TYP)

COMMUNICATION VAULT

VERTICAL CURB

CURB AND GUTTER

CURB AND GUTT

FOUND 3" BRASS CAP

DOCK STREET / DOCK STREET RIGHT-OF-WAY

S07°24'10"E 760.05'

STORM DRAIN MANHOLE (TYP)

UTILITY POLE (TYP)

TELEPHONE / TV RISER (TYP)

GUY ANCHOR (TYP)

JUNCTION BOX (TYP)

CURB AND GUTTER

ROW

Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- ROW — ROW — RIGHT OF WAY LINE
- INNER HARBOR LINE
- SD — SD — BURIED STORM DRAIN LINE
- SS — SS — BURIED SANITARY SEWER LINE
- BP — BURIED POWER LINE
- OHP — OVERHEAD POWER LINE
- W — W — BURIED WATER LINE
- TEL — BURIED COMMUNICATION LINE
- GAS — GAS — BURIED GAS LINE
- MU — MU — UNKNOWN UTILITY CONDUIT
- X X X X — CHAIN LINK FENCE
- 13 — MINOR CONTOUR (MLLW)
- 10 — MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.
- **HB-MW02** MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

N E S W

40 0 40

Feet

Site Conditions - Development Site 9

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 4A

TACO-AMW : SCY

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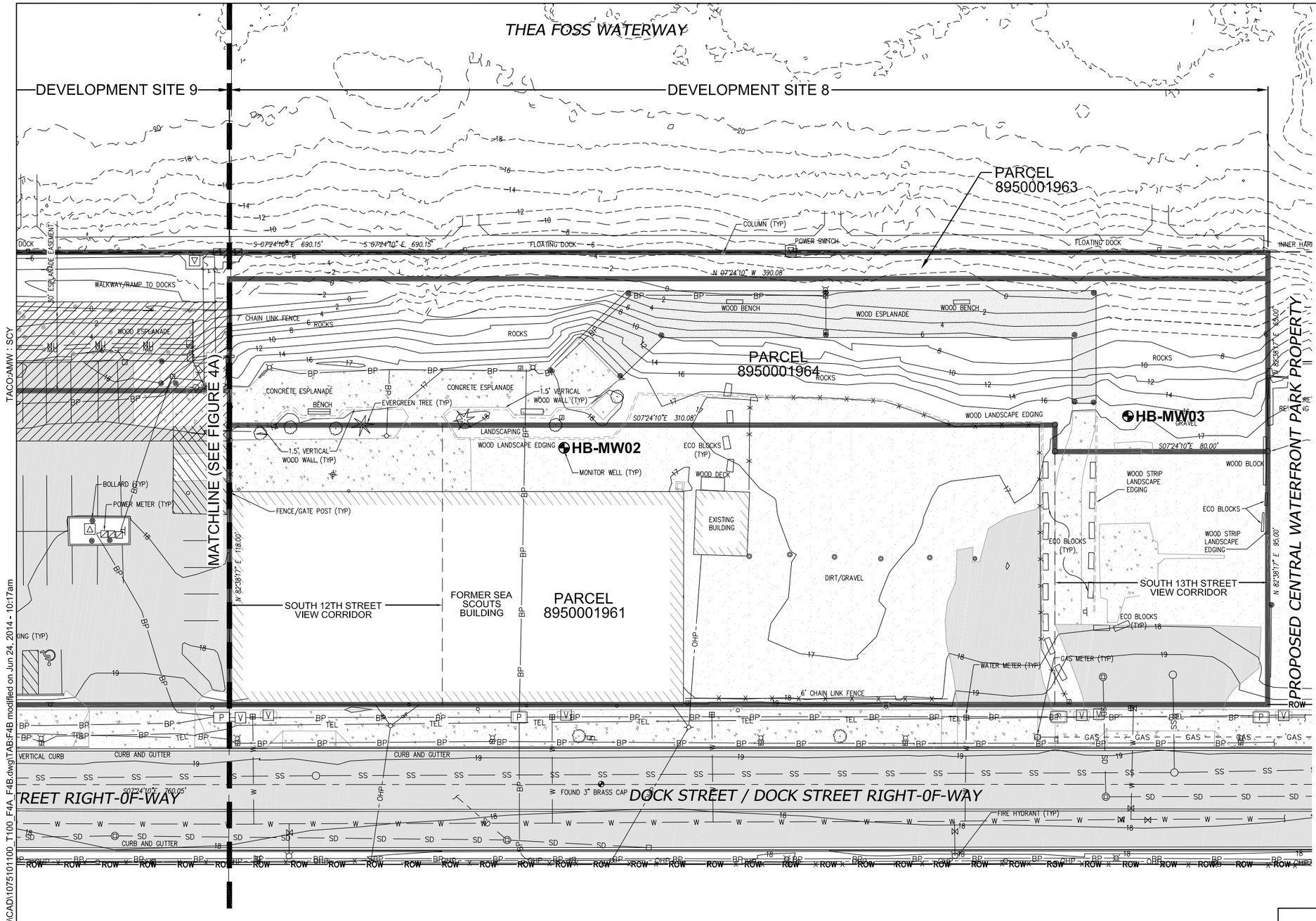

Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- ROW — ROW — RIGHT OF WAY LINE
- INNER HARBOR LINE
- SD — SD — BURIED STORM DRAIN LINE
- SS — SS — BURIED SANITARY SEWER LINE
- BP — BURIED POWER LINE
- OHP — OVERHEAD POWER LINE
- W — W — BURIED WATER LINE
- TEL — BURIED COMMUNICATION LINE
- GAS — GAS — BURIED GAS LINE
- MU — MU — UNKNOWN UTILITY CONDUIT
- X X X X CHAIN LINK FENCE
- 13 MINOR CONTOUR (MLLW)
- 10 MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE

APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

HB-MW02 MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

40 0 40
Feet

Site Conditions - Development Site 8

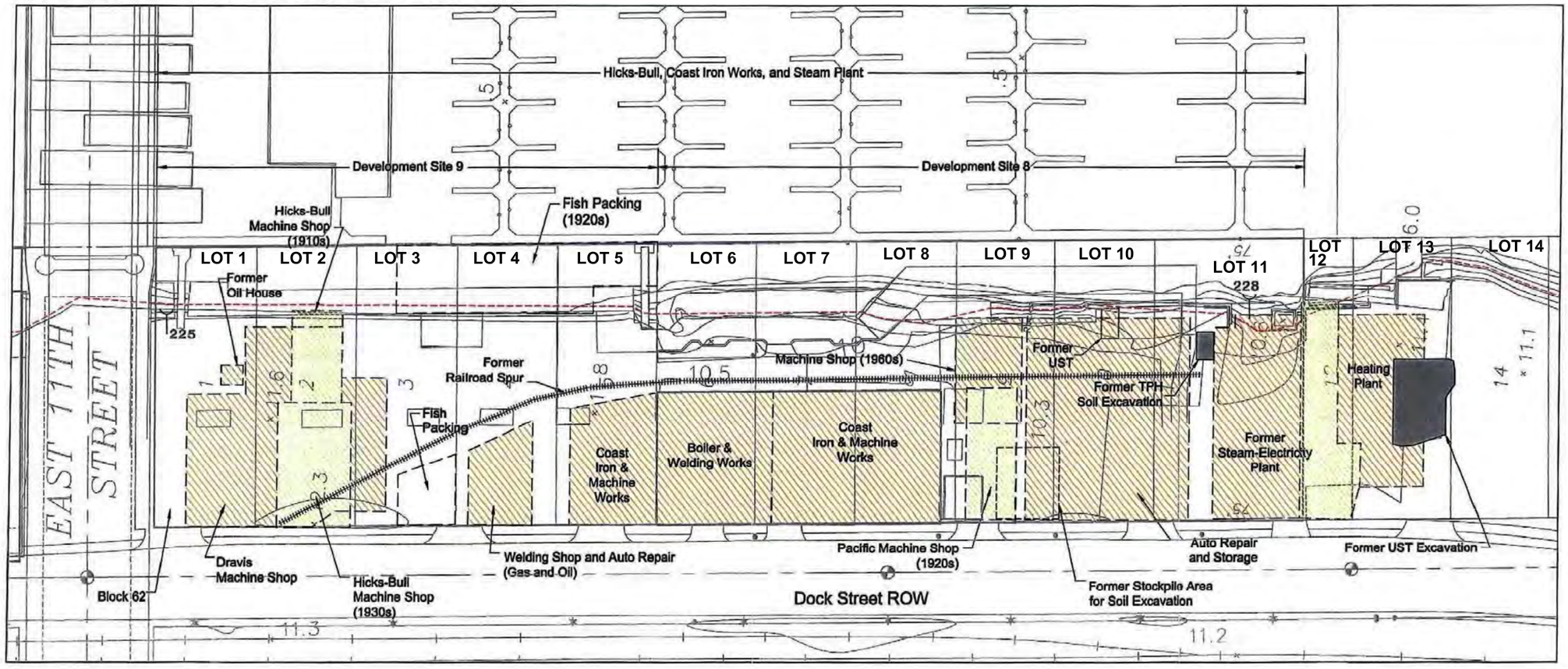
Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 4B

Significant Historical Features Map

Hicks-Bull, Coast Iron Works, and Steam Plant



NOT TO SCALE

LEGEND

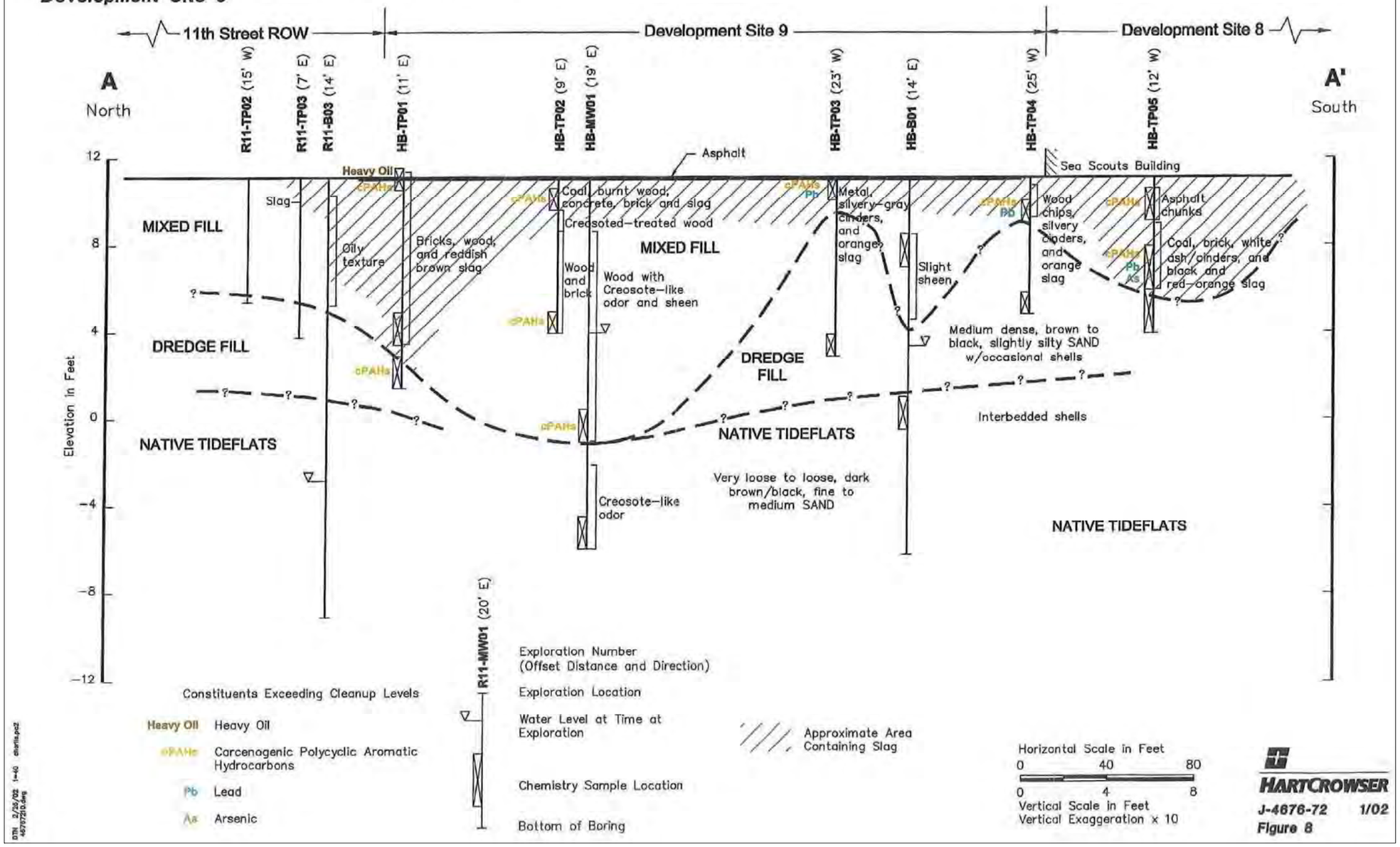
LOT 1 FORMER CITY OF TACOMA LEASE LOTS

Historical Land Use	
Development Sites 8 and 9 Tacoma, Washington	
GeoEngineers	Figure 5

Reference: Figure 2 from the draft Hicks-Bull, Coast Iron Works, and Steam Plant Properties Site-Spefic Remedial Investigation Report, dated February 26, 2002.

Generalized Subsurface Cross Section

Development Site 9



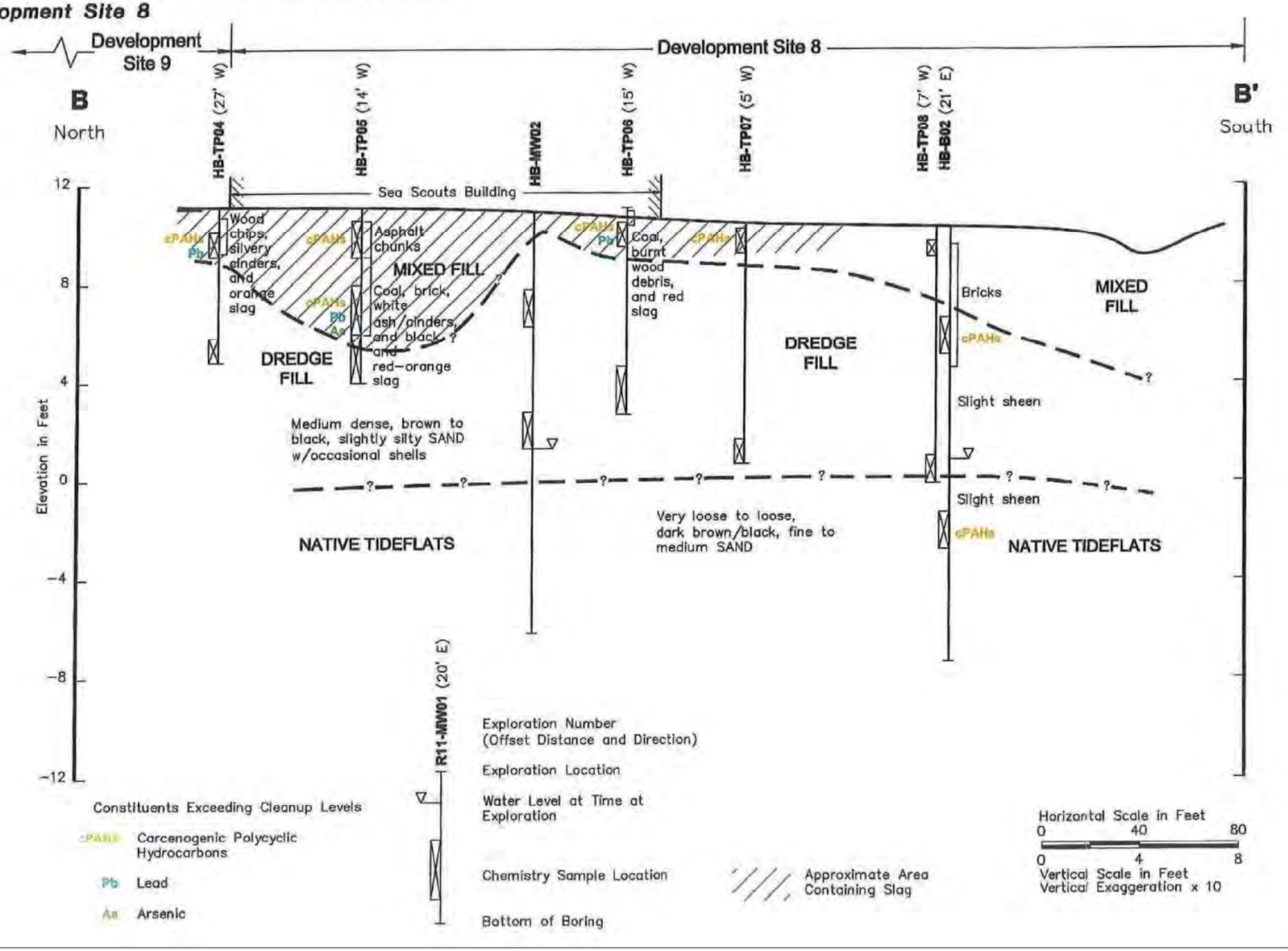
NOT TO SCALE

Cross Section - Development Site 9	
Development Sites 8 and 9 Tacoma, Washington	
GeoEngineers	Figure 6A

Reference: Figure 8 from the draft Hicks-Bull, Coast Iron Works, and Steam Plant Properties Site-Spefic Remedial Investigation Report, dated February 26, 2002.

Generalized Subsurface Cross Section

Development Site 8



NOT TO SCALE

Cross Section - Development Site 8	
Development Sites 8 and 9 Tacoma, Washington	
GeoEngineers	Figure 6B

Reference: Figure 9 from the draft Hicks-Bull, Coast Iron Works, and Steam Plant Properties Site-Spefic Remedial Investigation Report, dated February 26, 2002.

THEA FOSS WATERWAY

DEVELOPMENT SITE 9

DEVELOPMENT SITE 8

PARCEL 8950001963

PARCEL 8950001962

MURRAY MORGAN BRIDGE / SOUTH 11TH STREET RIGHT-OF-WAY

DOCK STREET / DOCK STREET RIGHT-0F-WAY

SOUTH 12TH STREET VIEW CORRIDOR

MATCHLINE (SEE FIGURE 7B)

10 - 11.5	cPAHs	0.571 mg/kg

1 - 2	cPAHs	3.219 mg/kg
1 - 2	Lead	696 mg/kg

0.5 - 2	cPAHs	4.298 mg/kg
3 - 5	cPAHs	1.233 mg/kg
3 - 5	Lead	2,630 mg/kg*
3 - 5	Arsenic	77.2 mg/kg

0.5 - 1.5	cPAHs	0.728 mg/kg
6 - 7	cPAHs	0.478 mg/kg

0.2 - 1	Heavy Oil	4,000 mg/kg
0.2 - 1	cPAHs	0.413 mg/kg
8.5 - 10	cPAHs	0.503 mg/kg

0.5 - 1.5	cPAHs	0.155 mg/kg
0.5 - 1.5	Lead	694 mg/kg

HB-MW01 HB-TP01 HB-TP02 HB-B01 HB-TP04 HB-TP05 HB-TP03

Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- ROW ROW RIGHT OF WAY LINE
- INNER HARBOR LINE
- CHAIN LINK FENCE
- 13 MINOR CONTOUR (MLLW)
- 10 MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

HB-MW02 MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

HB-TP01 TEST PIT NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

HB-B01 BORING NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

DEPTH IN FEET | ANALYTE | CONCENTRATION IN mg/kg

0.5 - 2	cPAHs	4.298 mg/kg
3 - 5	cPAHs	1.233 mg/kg
3 - 5	Lead	2,630 mg/kg*
3 - 5	Arsenic	77.2 mg/kg

* INDICATES CONCENTRATION EXCEEDS CONSENT DECREE MAXIMUM SOIL CONCENTRATION

CALLOUT BOXES SHOW CHEMICALS OF CONCERN DETECTED AT CONCENTRATIONS GREATER THAN THE CONSENT DECREE CLEANUP LEVELS DURING THE REMEDIAL INVESTIGATION AND ASSOCIATED DEPTH BELOW EXISTING GROUND SURFACE (CITY OF TACOMA, 2002)

Notes:
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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

cPAHs	CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
ULU	UNRESTRICTED LAND USE
MTCA	MODEL TOXICS CONTROL ACT
mg/kg	MILLIGRAMS PER KILOGRAM

N W E S

40 0 40
Feet

Summary of Exceedances in Soil and Groundwater - Development Site 9

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 7A

THEA FOSS WATERWAY

DEVELOPMENT SITE 9

DEVELOPMENT SITE 8

PARCEL 8950001963

PARCEL 8950001964

PARCEL 8950001961

1 - 2	cPAHs	3.219 mg/kg
1 - 2	Lead	696 mg/kg

0.5 - 2	cPAHs	4.298 mg/kg
3 - 5	cPAHs	1.233 mg/kg
3 - 5	Lead	2,630 mg/kg*
3 - 5	Arsenic	77.2 mg/kg

Water	Dissolved Nickel	47 µg/l**

3 - 4.5	cPAHs	0.302 mg/kg

0.5 - 1.5	cPAHs	0.298 mg/kg

1 - 2.5	cPAHs	0.230 mg/kg
4.5 - 6	cPAHs	7.242 mg/kg
8.5 - 9	cPAHs	5.959 mg/kg

0.5 - 1.5	cPAHs	0.236 mg/kg
0.5 - 1.5	Lead	297 mg/kg

1 - 2	cPAHs	2.544 mg/kg
1 - 2	Lead	252 mg/kg

HB-B01

HB-TP04

HB-TP05

HB-MW02

HB-TP06

HB-TP07

HB-TP08

HB-MW03

HB-TP09

HB-TP10

MATCHLINE (SEE FIGURE 7A)

SOUTH 12TH STREET VIEW CORRIDOR

SOUTH 13TH STREET VIEW CORRIDOR

FORMER SEA SCOUTS BUILDING

EXISTING BUILDING

PROPOSED CENTRAL WATERFRONT PARK PROPERTY

DOCK STREET / DOCK STREET RIGHT-0F-WAY

FOUND 3" BRASS CAP

S07°24'10"E 760.05'

S 07°24'10" E 690.15'

N 07°24'10" W 390.08'

S07°24'10"E 310.08'

S07°24'10"E 80.00'

N 82°38'17" E 118.00'

N 82°38'17" E 95.00'

WOOD ESPLANADE

WOOD BENCH

WOOD LANDSCAPE EDGING

WOOD DECK

WOOD BLOCK

WOOD STRIP LANDSCAPE EDGING

ECO BLOCKS (TYP)

FLOATING DOCK

COLUMN (TYP)

7' CHAIN LINK FENCE

6' CHAIN LINK FENCE

FENCE/GATE POST (TYP)

1.5' VERTICAL WOOD WALL (TYP)

EVERGREEN TREE (TYP)

LANDSCAPING

ROCKS

DIRT/GRAVEL

GRAVEL

BENCH

VERTICAL CURB

CURB AND GUTTER

ROW

TACOAMW : SCY

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Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- RIGHT OF WAY LINE
- INNER HARBOR LINE
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW)
- MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.
- HB-MW02 — MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)
- HB-TP01 — TEST PIT NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)
- HB-B01 — BORING NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

DEPTH IN FEET / ANALYTE / CONCENTRATION IN mg/kg

0.5 - 2	cPAHs	4.298 mg/kg
3 - 5	cPAHs	1.233 mg/kg
3 - 5	Lead	2,630 mg/kg*
3 - 5	Arsenic	77.2 mg/kg

* INDICATES CONCENTRATION EXCEEDS CONSENT DECREE MAXIMUM SOIL CONCENTRATION

DEPTH IN FEET / ANALYTE / CONCENTRATION IN µg/l

Water	Dissolved Nickel	47 µg/l**

** INDICATES CONCENTRATION EXCEEDS PROTECTION OF MARINE SURFACE WATER - CHRONIC CRITERIA (CHAPTER 173-201A-240 WAC)

CALLOUT BOXES SHOW CHEMICALS OF CONCERN DETECTED AT CONCENTRATIONS GREATER THAN THE CONSENT DECREE CLEANUP LEVELS DURING THE REMEDIAL INVESTIGATION AND ASSOCIATED DEPTH BELOW EXISTING GROUND SURFACE (CITY OF TACOMA, 2002)

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

cPAHs	CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
ULU	UNRESTRICTED LAND USE
MTCA	MODEL TOXICS CONTROL ACT
mg/kg	MILLIGRAMS PER KILOGRAM
µg/l	MICROGRAMS PER LITER

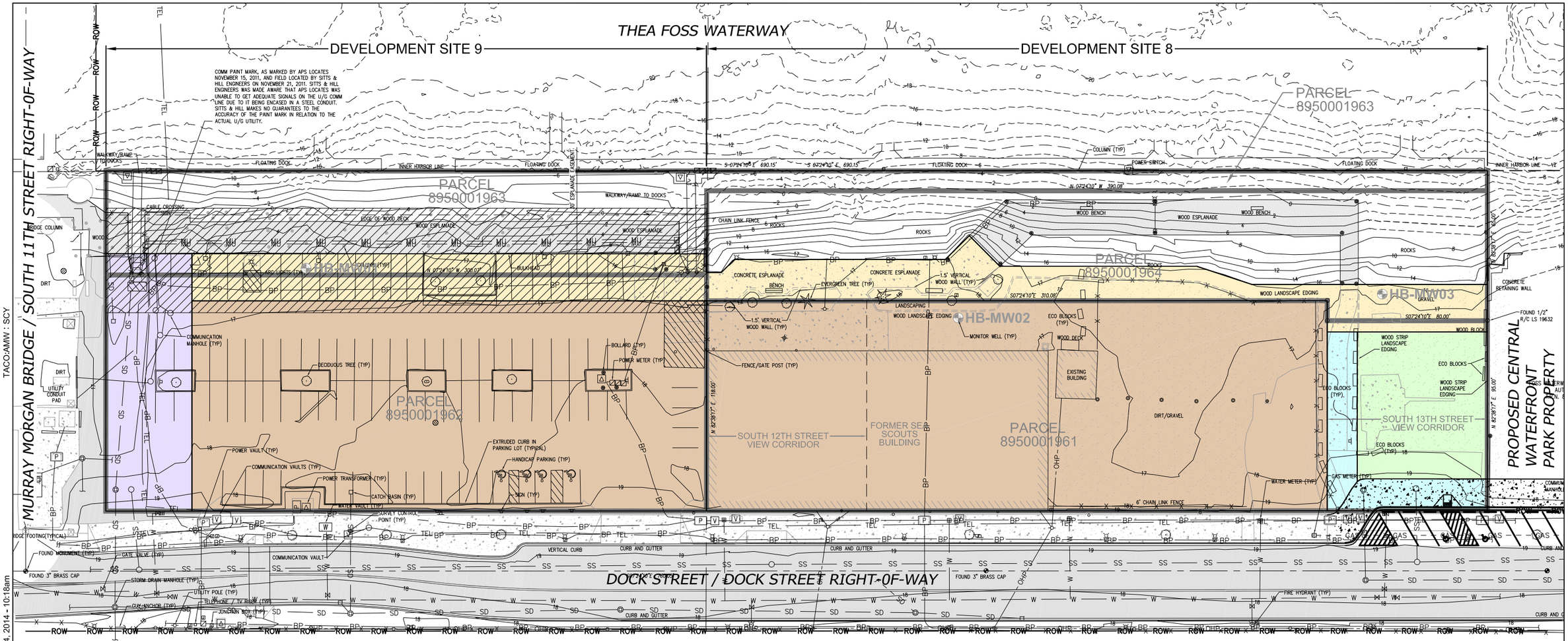
40 0 40
Feet

Summary of Exceedances in Soil and Groundwater - Development Site 8

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 7B



Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- RIGHT OF WAY LINE (ROW — ROW)
- INNER HARBOR LINE
- BURIED STORM DRAIN LINE (SD — SD)
- BURIED SANITARY SEWER LINE (SS — SS)
- BURIED POWER LINE (BP)
- OVERHEAD POWER LINE (– OHP –)
- BURIED WATER LINE (W — W)
- BURIED COMMUNICATION LINE (TEL)
- BURIED GAS LINE (GAS — GAS)
- HB-MW02 — MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

- UNKNOWN UTILITY CONDUIT (MU — MU)
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW) (13)
- MAJOR CONTOUR (MLLW) (10)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

- AREA WITH BUILDING WITH BELOW GRADE STRUCTURE AND RESIDENTIAL USE ON GROUND FLOOR OR AREA WITH BUILDING AT EXISTING SURFACE GRADE AND COMMERCIAL USE ON GROUND FLOOR
- AREA WITH UTILITY / ACCESS CORRIDOR
- ESPLANADE AREA
- PUBLIC PARK / OPEN SPACE / LANDSCAPE AREA
- PUBLIC ACCESS AREA

50 0 50
Feet

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

Conceptual Redevelopment
Site-Specific Cleanup Action Plan

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 8

PROPERTY BOUNDARY

PROPERTY BOUNDARY

PUBLIC / VEHICLE ACCESS

AREA WITH BUILDING AT EXISTING SURFACE GRADE AND COMMERCIAL USE ON GROUND FLOOR

AREA WITH BUILDING WITH BELOW GRADE STRUCTURE AND RESIDENTIAL USE ON GROUND FLOOR

PUBLIC ACCESS / ESPLANADE

PUBLIC PARK / OPEN SPACE / LANDSCAPE AREA

EXISTING GRAVEL / PAVEMENT

PAVEMENT CAP

BUILDING WALL

PAVEMENT CAP (i.e. GROUND FLOOR SLAB)

BUILDING WALL

BUILDING WALL

BUILDING WALL

PAVEMENT CAP

SOIL CAP

EXISTING SOIL / GRAVEL

EXISTING FILL / SOIL

SHORING / BUILDING WALL

PAVEMENT CAP (i.e. GROUND FLOOR SLAB)

EXISTING FILL / SOIL

EXISTING FILL / SOIL

FOUNDATION STRUCTURE

EXISTING UTILITIES

BACKFILL MEETING SITE CLEANUP STANDARDS

NEW UTILITY TRENCH / CORRIDOR

EXISTING FILL / SOIL

BACKFILL MEETING SITE CLEANUP STANDARDS

Legend

- Existing ground surface
- Groundwater surface
- Pavement cap consisting of concrete or asphalt
- Soil cap / backfill consisting of soil meeting site cleanup standards
- Wall comprised of concrete

NOT TO SCALE

Notes:
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Reference: Drawing created from sketch provided by GeoEngineers' personnel.

Conceptual Redevelopment
Site-Specific Cleanup Action Plan Cross Section

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 9

TACOMA : SCY

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Table 1

Soil and Groundwater Cleanup Levels and Soil Contamination Maximums

Site Specific Cleanup Action Plan
Development Sites 8 and 9
Tacoma, Washington

Constituent	Soil Cleanup Level (mg/kg)	Maximum Soil Concentration (mg/kg)	Groundwater Cleanup Level (µg/L)
Total Petroleum Hydrocarbons (TPH) [1]			
Gasoline-Range Petroleum Hydrocarbons (Benzene Present)	**30**	5,000	**800**
Gasoline-Range Petroleum Hydrocarbons (w/out Benzene)	**100**	5,000	**1,000**
Diesel-Range Petroleum Hydrocarbons	**2,000**	5,000	**500**
Oil-Range Petroleum Hydrocarbons	**2,000**	5,000	**500**
Volatile Organic Compounds (VOCs)			
Benzene	34.5	250	71[6]
Toluene	16,000	5,000	200,000[6]
Ethylbenzene	8,000	5,000	29,000[6]
Xylenes	160,000	5,000	**1,600**[7]
Total Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) [2]	0.137	10	0.031
Metals			
Antimony	32	320	4,300[6]
Arsenic	**0.7** (20)[4]	200	0.14[6]
Cadmium	80.0	400	**9.3**[8]
Chromium (VI)[3]	**240**	4,000	50.0[8]
Copper	2,960	29,600	**2.4**[9]
Lead	250[5]	2,500	**8.1**[8]
Mercury	24.0	240	0.025[8]
Nickel	1,600	16,000	**8.2**[8]
Zinc	24,000	240,000	**81.0**[8]
PCBs (Total)	**0.5**	50	0.030[8]

Notes:

Bold - Values have been revised from original Table 4-1 in the Consent Decree to reflect new MTCA Amendments of February 2001.

[1] TPH cleanup criteria are based on MTCA Method A Cleanup Standards.

[2] Total cPAHs calculated using toxicity equivalent methodology presented in Chapter 173-340-708(8) WAC.

[3] The chromium VI cleanup standards are based on an updated oral reference dose of 0.03 mg/kg/day (previous oral RfD was 0.005 mg/kg/day).

[4] The arsenic Method B risk-based cleanup standard is 0.7 mg/kg, while the cleanup level based on Washington State background is 20 mg/kg. The arsenic Method B and C soil cleanup criteria no longer use a GI absorption fraction of 0.4.

[5] Soil cleanup levels for lead are not defined under Method B or C. The Method A cleanup standard is used for the direct contact value.

[6] Cleanup standard based on National Toxics Rule - Ambient Water Quality Criteria (40 CFR 131.36D) for human consumption of aquatic organisms.

[7] The xylenes cleanup standard based on Chapter 173-340-720 WAC Groundwater Method B Non-carcinogen, Standard Formula Value (previous

[8] Cleanup standard based on Chapter 173-201A-240 WAC Marine Water Chronic.

[9] Cleanup standard based on National Toxics Rule - Saltwater Criterion (40 CFR 131.36C) continuous concentration value.

Table 2

Site Specific Applicable or Relevant and Appropriate Requirements (ARARS)

Site Specific Cleanup Action Plan

Development Sites 8 and 9

Tacoma, Washington

Authorizing Statute	Implementing Regulation	Description	Rationale
Potential Chemical-Specific ARARs			
National Toxics Rule; 33 USC 1251	Water Quality Standards; 40 CFR 131.36(b)(1)	Establishes surface water quality standards that protect aquatic life and human health. Washington adopted these standards in Chapter 173-201A WAC.	Potentially applicable to surface water and potentially relevant and appropriate to stormwater runoff, groundwater, and sediment that may impact surface water quality.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Water Quality Standards for Surface Waters; Chapter 173-201A WAC	Establishes narrative and numeric surface water quality standards for waters of the state.	Potentially applicable to surface water and potentially relevant and appropriate to stormwater runoff, groundwater, and sediment that may impact surface water quality.
Clean Water Act; 33 USC 1251-1387	Section 304a of the Clean Water Act; WAC 173-340-730(2)(b)(i)(B)	Establishes surface water quality standards that protect aquatic life and human health. Washington adopted these standards in Chapter 173-201A WAC.	Potentially applicable to surface water and potentially relevant and appropriate to stormwater runoff, groundwater, and sediment that may impact surface water quality.
Hazardous Waste Management; Chapter 70.105D RCW	Washington Model Toxics Control Act Cleanup Regulation; Chapter 173-340 WAC	Establishes groundwater, surface water, and soil cleanup levels.	Potentially applicable to contaminated soil, groundwater, surface water, and sediment at the Site.
WA Water Pollution Control Act; Chapter 90.48 RCW	Washington Sediment Management Standards; Chapter 173-204 WAC	Establishes sediment cleanup levels.	Potentially applicable to contaminated sediment at the Site.
Potential Location-Specific ARARs			
Shoreline Management Act of 1971; Chapter 90.58 RCW	Shoreline Management Act; Chapters 173-18, 173-22, and 173-27 WAC.	The substantive requirements of this statute and its implementing regulations apply to activities within 200 feet of shorelines in the state.	Proposed remedial actions must be consistent with the approved Washington State coastal zone management program.
Construction Projects in State Waters; Chapter 77.55 RCW	Hydraulic Code Rules; Chapter 220-110 WAC	Apply to work conducted in Puget Sound or within the designated shoreline that changes the natural flow or bed of the water body (and therefore has the potential to affect fish habitat).	May apply to remedial actions that take place on the shoreline.
Endangered Species Act; 16 USC 1531 et seq.	Endangered Species Act; 50 CFR Parts 17, 222, and 402	Act protects fish, wildlife, and plant species whose existence is threatened or endangered.	Applies to cleanup actions that may affect a listed threatened or endangered species or designated critical habitat.
Potential Action-Specific ARARs			
Hazardous Waste Management; Chapter 70.105D RCW	Selection of Cleanup Actions; WAC 173-340-350	Minimum requirements and procedures for conducting remedial investigation and feasibility studies.	Applicable to remedial action selection and implementation.
Hazardous Waste Management; Chapter 70.105D RCW	Institutional Controls; WAC 173-340-440	Institutional control requirements.	Potentially applicable to remedial action selection and implementation.
Hazardous Waste Management; Chapter 70.105D RCW	Compliance Monitoring Requirements; WAC 173-340-410, -720(9), -730(7), -740(7), and -745(8)	Compliance monitoring requirements for soil, groundwater, and surface water.	Potentially applicable to remedial action selection and implementation.

Authorizing Statute	Implementing Regulation	Description	Rationale
Potential Action-Specific ARARs			
Ecology Area of Contamination Policy	8/20/1991 Interprogram Policy	Allows movement/placement of excavated contaminated material within the regulated site without triggering dangerous waste designation.	Could be applicable for containment remedial alternatives.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Ecology Construction Stormwater General Permit	Requires obtaining a NPDES permit, development of Stormwater Pollution Prevention Plan (SWPPP) and implementation of a sediment erosion and pollution prevention controls.	Applies to construction activities that disturb one or more acres.
Water Well Construction; Chapter 18.104 RCW	Minimum Standards for Construction and Maintenance of Wells; Chapter 173-160 WAC	Applies to the construction and maintenance of monitoring wells	Potentially applicable to wells constructed for groundwater withdrawal and monitoring and decommissioning of existing or future wells.
Resource Conservation and Recovery Act (RCRA): 40 CFR 761	RCRA Subtitle C 40 CFR Parts 260-299	Establishes a "cradle-to-grave" system for governing hazardous waste from the point of generation to disposal.	Potentially applicable to fill and soil excavated as part of remedial actions.
Hazardous Waste Management; Chapter 70.105 RCW	Dangerous Waste Regulations; Chapter 173-303 WAC	Applies if dangerous wastes are generated during remedial program	These regulations must be fully complied with for any off site disposal of waste determined to be dangerous waste. This would only apply to upland remedial options as dredged sediment is exempt from waste classification.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	NPDES Permit Program; Chapter 173-220 WAC	Applicable to the discharge of pollutants and other wastes and materials to the surface waters of the state	NPDES may be required for discharges related to ongoing remedial actions or discharge of stormwater/drainage.
State Environmental Policy Act (SEPA); Chapter 43.21C.110 RCW	SEPA Rules; Chapter 197-11 WAC	Applies if future construction/remedial action occurs at the site	Applies if future construction/ remedial action occurs at the site.
Solid Waste Management; Chapter 43.21A RCW	Minimum Functional Standards for Solid Waste Handling WAC 173-304	Establishes minimum functional standards for the handling of solid waste.	Applies if non-dangerous wastes are generated during remedial action
Transportation of Hazardous Material; 49 USC 5101-5127	Hazardous Materials Regulations; 49 CFR Parts 171 through 180	Regulations that govern the transportation of hazardous materials.	Applies to any hazardous materials transported off-site as part of remediation.
Hazardous Waste-Land Disposal Restrictions; USEPA	40 CFR 268/22 CCR 66268	Establishes land disposal restrictions and treatment standards for hazardous wastes applicable to generators.	Any hazardous wastes generated as a result of on-site activities or by treatment systems must meet land disposal restriction requirements.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Federal Water Pollution Control Act Certification; Chapter 173-225 WAC	Applies to activities that may result in a discharge into navigable waters.	Applies to remedial actions that may result in a discharge into navigable waters (i.e., dredging). \\
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Mixing Zones; WAC 173-201A-400	Applies to the allowable size and location of a mixing zone.	Potentially applicable to remedial alternatives that would require substantive compliance with NPDES permit requirements.

Authorizing Statute	Implementing Regulation	Description	Rationale
Potential Action-Specific ARARs			
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Short Term Modifications (to State Water Quality Criteria); Chapter 173-201A-410	Criteria may be modified for a specific water body on a short-term basis when necessary to accommodate essential activities, respond to emergencies, or to otherwise protect the public interest, even though such activities may result in a temporary reduction.	Potentially applicable to remedial alternatives involving excavation/dredging of sediment.
USACE permit	Section 404 Permit Program	Applies to dredging or filling in the waters of the U.S.	A permit will be required to perform dredging of sediment and/or placing fill associated with sediment capping or backfilling of dredged areas.
Archeological and Historic Preservation	Federal Archeological and Historical Preservation Act; 16 USCA 496a-1	The Archeological and Historical Preservation Act (16 USCA 496a-1) would be applicable in areas or potential cultural resources if any subject materials are discovered during site excavation and dredging activities.	Potentially applicable for remedial alternatives that include excavation and dredging activities.
Washington State Clean Air Act; Chapter 70.94 RCW	General Requirements for Air Pollution Sources; Chapter 173-400 WAC. Controls for New Sources of Toxic Air Pollutants; Chapter 173-460 WAC	Establishes technically feasible and reasonably attainable standards and rules generally applicable to the control and/or prevention of the emission of air contaminants.	May apply to remedial alternatives that produce emissions to air.
Occupational Safety and Health Act; Public Law 91-596	Hazardous Waste Operations and Emergency Response; 29 CFR Subpart 1910.120	Provides Federal standards to assure safe working conditions.	Potentially applicable for redevelopment and remedial construction activities in contaminated areas.
Washington Industrial Safety and Health Act; Chapter 49.17 RCW	Safety Standards for Construction Work; Chapter 296-155 WAC. Hazardous Waste Operations; Chapter 296-843 WAC	Provides Washington State standards to assure safe working conditions.	Potentially applicable for redevelopment and remedial construction activities.

Table 3

Remedial Action Cost Estimate[1]

Site Specific Cleanup Action Plan
Development Sites 8 and 9
Tacoma, Washington

Item No.	Description	Quantity	Unit	Unit Price	Amount	Notes and Assumptions
REMEDIAL ACTION CONSTRUCTION						
Mobilization, Construction Facilities and Site Controls						
1	Mobilization/Demobilization	1	LS	$88,000.00	$88,000	For Contractor mobilization to and demobilization from Site to perform remedial construction activities. Assumes that remedial action construction activities will be performed as one event. Assumed to be 5 percent of total construction cost.
2	Temporary Facilities and Site Controls	1	LS	$25,000.00	$25,000	Assumed cost for facilities and site controls to include a construction trailer, security fencing, portable toilets, power supply and water supply.
3	TESC-Silt Fencing, Wattles and Sand Bags	930	LF	$10.00	$9,300	Assumed cost to establish and maintain TESC BMPs during remedial construction activities. Assumes TESC controls will be established along the northern, eastern and southern perimeters of the upland portion of the Site which is approximately 825 linear feet. Includes procurement of materials, installation and maintenance of TESC BMPs.
4	TESC-Stabilized Construction Entrances	2	LS	$4,000.00	$8,000	Assumed cost to establish and maintain stabilized construction entrance TESC BMPs including quarry spall entrance/exit and wheel wash facilities at two locations. Includes procurement of materials, installation and maintenance of TESC BMPs.
5	TESC-Soil Stockpile Management	1	LS	$25,000.00	$25,000	Assumed cost to establish and maintain TESC BMPs related to stockpiling of contaminated soil including creating a stockpile area or areas, lining stockpiles area(s) with visqueen and covering stockpiles with visqueen. Includes procurement of materials, installation and maintenance of TESC BMPs.
6	Stormwater Collection, Management and Disposal	1	LS	$50,000.00	$50,000	Assumed cost to collect, manage, and dispose of stormwater runoff that enters the Site during remedial action construction activities. Assumed to include equipment and materials and installation, operation and maintenance of system necessary to collect, transfer, store, provide minimal on-site treatment (i.e., sand filtration) and to transfer or transport the stormwater runoff off-site for disposal.
7	Clearing and Grubbing	1	LS	$10,000.00	$10,000	Assumed cost to remove and recycle and/or dispose of existing trees and vegetation at the Site. Assumed to include transportation and recycling and/or disposal fee.
8	Temporary Traffic Controls	1	LS	$10,000.00	$10,000	Assumed cost to facilitate traffic flow on and off the Site during remedial action construction activities. Includes planning and implementation of traffic control revisions during construction.
	Subtotal				**$225,300**	
Demolition						
9	Building Abatement	1	LS	$54,810.00	$54,800	Estimated cost for performing abatement of regulated building materials including asbestos, lead based paint and fluorescent light fixtures on/in existing buildings. See report presenting regulated building materials survey results provided in Appendix E of SCAP.
10	Building Dismantling/Demolition and Recycling/Disposal	1	LS	$15,000.00	$15,000	Assumed cost for dismantling/demolition of existing, approximately 13,600 square foot and 480 square foot buildings and transport and recycling/disposal of building materials.
11	Asphalt Demolition	4,425	SY	$4.00	$17,700	Assumed cost for demolition of visible asphalt surfacing at the Site.
12	Asphalt Recycling/Disposal	665	TON	$15.00	$10,000	Assumed cost for transport and off-site recycling/disposal of demolished asphalt. Asphalt assumed to be 3 inches thick. Assumed 1.8 tons/cubic yard conversion factor for asphalt volume to weight.
13	Concrete Demolition	380	CY	$25.00	$9,500	Assumed cost for demolition of visible concrete structures and surfacing including visible building footings, pads, slabs, walkways, curbs and wheel stops. Assumes variable thicknesses of concrete structures.
14	Concrete Recycling/Disposal	760	TON	$22.00	$16,700	Assumed cost for transport and off-site recycling/disposal of demolished concrete. Concrete assumed to have variable thicknesses. Assumed 2.0 tons/cubic yard conversion factor for concrete volume to weight.
15	Utilities Decommissioning/Demolition	1	LS	$10,000.00	$10,000	Assumed cost for decommissioning, demolition and disposal of utilities in remedial action areas. Assumed to include removing utilities within remedial action excavations and plugging the ends of stormwater and sewer pipes that are trunkaded at the limits of the excavations and disposal of utilities that are removed.
	Subtotal				**$133,700**	
Remedial Excavation for Building Construction with Residential Use on Ground Level and Below-Grade Stucture [2]						
16	Remedial Excavation and Stockpiling of Fill/Soil[3]	9,000	CY	$11.00	$99,000	Assumed cost for excavation of 32,330 square foot area to depth of groundwater. Groundwater assumed to be at an average depth of 7.5 feet. Assumes rehandling of a portion of the excavated material for stockpiling prior to off-site treatment, disposal and/or for reuse on site.
17	Transport and Disposal of Fill/Soil Designated Hazardous/Dangerous Waste	1,700	TON	$235.00	$399,500	Assumed cost for transportation and disposal of fill/soil that designates as Hazardous/Dangerous Waste. Assumes 10 percent of excavated fill/soil designates as Hazardous/Dangerous Waste requiring disposal at Subtitle C landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
18	Transport, Treatment and Disposal of Fill/Soil	1,700	TON	$50.00	$85,000	Assumed cost for transportation, treatment and disposal of fill/soil. Assumes 10 percent of excavated fill/soil will be treated via incineration and disposed of at an appropriate off-site facility. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
19	Reuse of Soil On Site	1,700	TON	$0.00	$0	Assumes 10 percent of excavated soil will be reused on site for soil capping and backfill because the soil meets the site-specific cleanup standards. No cost is assumed to be associated with this item. Cost for excavation and temporary stockpiling is included in remedial excavation unit cost. Assumed cost for placement and compaction is identified in separate tasks.
20	Transport and Disposal of Fill/Soil as Solid Waste	12,200	TON	$35.00	$427,000	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes 70 percent of excavated fill/soil disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
21	Placement of Reusable Soil as Backfill	1,280	TON	$4.00	$5,120	Assumed cost for reuse on site of soil that meets the site-specific cleanup standards. Assumed cost for placement and compaction of soil as backfill around building below grade structure/foundation from the groundwater surface to Site surface.
	Subtotal				**$1,015,620**	

Item No.	Description	Quantity	Unit	Unit Price	Amount	Notes and Assumptions
Remedial Excavation for Building Construction At-Grade with Commercial Use on Ground Floor [2]						
22	Remedial Excavation and Stockpiling of Fill/Soil[3]	2,000	CY	$11.00	$22,000	Assumed cost for excavation of 26,820 square foot area to depth of 2 feet below ground surface to allow for installation of foundation structures, structural backfill and slab on grade for above-ground building. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
23	Transport and Disposal of Fill/Soil Designated Hazardous/Dangerous Waste	380	TON	$235.00	$89,300	Assumed cost for transportation and disposal of fill/soil that designates as Hazardous/Dangerous Waste. Assumes 10 percent of excavated fill/soil designates as Hazardous/Dangerous Waste requiring disposal at Subtitle C landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
24	Transport and Disposal of Fill/Soil as Solid Waste	3,400	TON	$35.00	$119,000	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes 90 percent of excavated fill/soil disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
25	Temporary Utilities Rerouting	1	LS	$25,000.00	$25,000	Assumed cost for temporary rerouting of utilities (ex., electric, water) during construction to maintain utilities for marina operation.
	Subtotal				**$255,300**	
Remedial Actions for Public Park/Open Space Area						
26	Remedial Excavation and Stockpiling of Fill/Soil to Support Capping	520	CY	$11.00	$5,700	Assumed cost for excavation of fill/soil to average depth of 2 feet in open space/park area to allow placement of 3-foot-thick soil cap that transitions from new to existing surface elevations. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
27	Transport and Disposal of Fill/Soil as Solid Waste	1,000	TON	$35.00	$35,000	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes all excavated fill/soil from park area/open space disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
28	Procure and Install Geotextile Layer	530	SY	$5.50	$2,900	Assumed cost for geotextile fabric layer installed to provide visual indication of limit of soil cap.
29	Install 3-Foot-Thick Soil Cap - Imported Material	420	TON	$14.00	$5,900	Assumed cost for procurement of imported cap material and placement of 1/2 of soil needed to install 3-foot-thick soil cap over park area/open space. Assumes 1/2 of cap material is imported to the Site for the cap.
30	Install 3-Foot-Thick Soil Cap - Reuse of Site Soil	420	TON	$4.00	$1,700	Assumed cost for placement and compaction of 1/2 of soil needed to install 3-foot-thick soil cap. Assumes 1/2 of soil used for soil cap is Site soil with contaminant concentrations less than site-specific cleanup standards excavated from area where building is to be constructed with residential use on ground floor and with below grade structure. Cost assumes handling and placement of reused Site soil.
31	Install Concrete Cap	260	SY	$32.00	$8,300	Assumed cost for installation of concrete sidewalk as cap in southwest portion of Site between Dock Street and the esplanade on Development Site 8 and adjacent to Dock Street as part of parking revisions. Unit cost assumes 4-inch-thick concrete for sidewalk.
	Subtotal				**$49,500**	
Remedial Actions for Utility Corridor Area						
32	Remedial Excavation and Stockpiling of Fill/Soil to Support Capping	140	CY	$11.00	$1,500	Assumed cost for excavation of fill/soil to average depth of 1 foot in utility corridor area to allow placement of concrete cap that transitions from new to existing surface elevations. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
33	Remedial Excavation and Stockpiling of Fill/Soil for New Utility Trench	350	CY	$11.00	$3,900	Assumed cost for excavation of fill/soil to install a new utility trench in the utility corridor area. Assumed dimensions of the utility trench are 12 feet wide by 6 feet deep from the Dock Street right-of-way to the esplanade area. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
34	Transport and Disposal of Fill/Soil Designated Hazardous/Dangerous Waste	90	TON	$235.00	$21,200	Assumed cost for transportation and disposal of fill/soil that designates as Hazardous/Dangerous Waste. Assumes 10 percent of excavated fill/soil designates as Hazardous/Dangerous Waste requiring disposal at Subtitle C landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
35	Transport and Disposal of Fill/Soil as Solid Waste	850	TON	$35.00	$29,800	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes 90 percent of excavated fill/soil disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
36	Procure and Install Geotextile Layer in New Utility Trench	170	SY	$5.50	$900	Assumed cost for geotextile fabric layer installed to provide visual indication of limit of clean backfill within new utility trench.
37	Procure and Place Backfill Material for New Utility Trench	550	TON	$14.00	$7,700	Assumed cost for procurement, placement and compaction of clean backfill material for the new utility trench.
38	Procure and Place Backfill Material for Concrete Cap	230	TON	$14.00	$3,200	Assumed cost for backfill needed to change existing grade an average of 1 foot within utility corridor area to match grades resulting from new building and esplanade construction. Cost assumes procurement of backfill material, placement and compaction.
39	Install Concrete Cap	600	SY	$32.00	$19,200	Assumed cost for installation of concrete pavement as cap in northern portion of Site adjacent to 11th Street right-of-way. Cost assumes 4-inch-thick concrete for cap area.
40	Manhole/Catch Basin Modifications	7	EA	$1,000.00	$7,000	Includes modification of manholes/catch basins to match grade that is changed by placement of concrete pavement cap. Assumes 7 manholes/catch basins are modified. Assumes that existing underground utilities will not be modified for the purposes of installing concrete pavement cap.
	Subtotal				**$94,400**	
Remedial Actions for Esplanade Area [4]						
41	Install Concrete Cap at Site 8	1,060	SY	$32.00	$33,900	Assumed cost for installation of concrete pavement sidewalk as cap on eastern portion of Site adjacent to Thea Foss Waterway. Assumes concrete pavement cap placed at elevations at or above top of shoreline slope/bank. Unit cost assumes 4-inch-thick concrete for sidewalk.
	Subtotal				**$33,900**	

Item No.	Description	Quantity	Unit	Unit Price	Amount	Notes and Assumptions
Site Restoration and Survey						
42	Site Restoration	1	LS	$20,000.00	$20,000	Assumed cost for seeding open space/park area, restoration of sidewalks in Dock Street right-of-way and other restoration associated with or repairs resulting from remedial construction activities.
43	Post-Construction (As-Built) Survey	1	LS	$15,000.00	$15,000	Assumed cost for preparation of as-built survey to document remedial actions and post-construction Site conditions.
	Subtotal				**$35,000**	
Contractor Overhead and Taxes						
44	Contractor Overhead	10%	%		$184,300	Assumed to be 10 percent of total remedial action construction costs.
45	Sales Tax	8%	%		$166,200	Assumed to be 8 percent of total remedial action construction costs including contractor overhead.
REMEDIAL ACTION CONSTRUCTION SUBTOTAL					**$2,193,000**	
46	Construction Management and Monitoring	10%	%		$219,300	Assumed cost for construction management tasks as well as monitoring and documentation of field activities and compliance with environmental requirements including sampling and analysis for compliance monitoring and waste characterization, remedial action construction reporting and agency coordination and communication. Assumed to be 10 percent of total construction cost.
REMEDIAL ACTION CONSTRUCTION TOTAL					**$2,412,000**	
47	Contingency	15%	%		$361,800	Assumed contingency cost to account for additional construction management and monitoring requirements and/or currently unidentified Site conditions during construction. Examples of currently unidentified Site conditions during construction include identification, demolition, removal and recycling/disposal of additional below ground structure(s), unforeseen environmental conditions or contamination [i.e., underground storage tank(s), additional fill/soil designated at Hazardous Waste, etc.], or other identified changes in Site conditions during construction.
CONSTRUCTION TOTAL WITH CONTINGENCY					**$2,774,000**	
Indirect Construction Costs						
48	Pre-Remedial Design Investigation	1	LS	$100,000.00	$100,000	Assumed cost for performing additional investigation of Development Sites 8 and 9 to support the actual remedial design to characterize fill/soil for disposal and reuse, confirm extent of contamination above cleanup standards and to identify depth to groundwater across Site.
49	Engineering Design and Agency Authorizations	1	LS	$250,000.00	$250,000	Assumed cost for preparing Engineering Design Report (EDR), construction plans and specifications, contractor solicitation bid package, Compliance Monitoring Plan, submittals for agency authorizations and approvals and coordination and communication with regulatory agencies.
50	Existing Tenant Parking Relocation	1	LS	$10,000.00	$10,000	Assumed cost associated with relocation of existing parking for marina tenants.
	Subtotal				**$360,000**	
TOTAL PROJECT COST					**$3,134,000**	

General Assumptions:

[1] Based on conceptual redevelopment plan described in the Site-specific Cleanup Action Plan (SCAP) and presented in Figures 8 and 9 of the SCAP. The actual cleanup action costs will be based on actual redevelopment and remedial actions performed at the Site by a future developer of the Site.

[2] Remedial action costs presented do not include construction of new building structures, foundations, or slabs that would provide a cap for fill/soil with contaminant concentrations greater than the site-specific cleanup standards beneath the building

[3] Excavation shoring not included in remedial costs. Assumed to be included as part of building construction costs.

[4] Remedial action costs presented do not include construction of new esplanade.

BMPs Best Management Practices

TESC Temporary Erosion and Sediment Controls

APPENDIX A
Area-Wide Consent Decrees and Thea Foss Redevelopment Cleanup Action Plan

Tacoma Redevelopment
FS 1263

IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON
FOR PIERCE COUNTY

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY,

Plaintiff,

v.

CITY OF TACOMA and METROPOLITAN PARK DISTRICT OF TACOMA,

Defendant(s).

No. 94-2-10917-6

CONSENT DECREE

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I. INTRODUCTION

A. This Consent Decree (Decree) is made and entered into by and between the Washington State Department of Ecology (Ecology), the City of Tacoma (City), and the Metropolitan Park District of Tacoma (Park District). Successors in Interest and Assigns may become parties to this Decree as provided herein in Section XIX.

B. In entering into this Consent Decree (Decree), the mutual objective of the Washington State Department of Ecology (Ecology), and the City of Tacoma and the Metropolitan Park District (Defendant(s)) is to provide for remedial action at facilities adjacent to the Thea Foss Waterway in the City of Tacoma, Washington, where there have been releases or threatened releases of hazardous substances causing contamination of soils. This Decree establishes potential remedial actions for a number of properties, described in Section II. Some of the properties potentially subject to this Decree are currently known to be contaminated and some are not. Some are currently owned by the City and the Park District and some are not. Those properties potentially subject to this Decree that are not reported as or determined by Ecology to be cleanup sites, and those properties that are not eventually purchased by the City or the Park District will not be cleaned up under this Decree.

C. Ecology, the City of Tacoma, and the Metropolitan Park District are entering into this Consent Decree in order to achieve substantial public benefits. The City recently acquired

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approximately 27 acres along the Thea Foss Waterway, which is part of the Commencement Bay Nearshore/Tideflats Superfund Site. The City acquired the property in order to spur cleanup of the City's waterfront and redevelopment of abandoned industrial and commercial land. The City's efforts have included the Park District who has taken title to some of the recently acquired property so that public access, parks and open spaces will be included in the ultimate redevelopment.

D. The remedial action(s) under this Decree recognize land use planning and the ultimate reuse of contaminated property. This Decree will promote expedient, efficient remedial actions. This Decree will facilitate quicker remedial action than would occur without the Decree. This Decree allows Ecology to enforce permanent and effective controls to ensure that cleanups are protective of human health and the environment. Furthermore, this Decree will promote the fulfillment of Ecology's source control obligations set forth in the 1994 Cooperative Agreement between the U.S. Environmental Protection Agency (EPA) and Ecology.

E. This Decree requires the Defendant(s) to undertake the following remedial action(s), which are more specifically described in Sections IX and X of this Decree:

(1) Conduct remedial investigations of sites;

(2) Prepare site-specific Cleanup Action Plans for soil contamination on sites, to be approved by Ecology. The site-specific Cleanup Action Plans will be

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consistent with the Thea Foss Redevelopment Cleanup Action Plan attached hereto as Exhibit C;

(3) Remediate soil contamination on sites in accordance with the site-specific Cleanup Action Plans;

(4) Provide and maintain institutional controls and compliance monitoring, as required in this Decree.

Ecology has determined that these actions are necessary to protect public health and the environment. This Decree addresses soil contamination only. Sites at which active remediation of groundwater is necessary are not within the scope of this Decree.

F. The Complaint in this action is being filed simultaneously with this Decree. An answer has not been filed, and there has not been a trial on any issue of fact or law in this case. However, the parties wish to resolve the issues raised by Ecology's complaint. In addition, the parties agree that settlement of these matters without litigation is reasonable and in the public interest and that entry of this Decree is the most appropriate means of resolving these matters.

G. In signing this Decree, Defendant(s) agrees to its entry and agrees to be bound by its terms.

H. By entering into this Decree, the parties do not intend to discharge nonsettling parties from any liability they may have with respect to matters alleged in the complaint. The parties retain the right to seek reimbursement, in whole or in

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part, from any liable persons for sums expended under this Decree.

I. This Decree shall not be construed as proof of liability or responsibility for any releases of hazardous substances or cost for remedial action nor an admission of any facts; provided, however, that the Defendant(s) shall not challenge the jurisdiction of Ecology or the findings of fact in this Decree in any proceeding brought by Ecology to enforce this Decree.

J. The Court is fully advised of the reasons for entry of this Decree, and good cause having been shown: IT IS HEREBY ORDERED, ADJUDGED, AND DECREED AS FOLLOWS:

II. POTENTIAL SCOPE OF DECREE; DESCRIPTION OF SITES

A. The property potentially subject to this Decree shall be: (1) property adjacent to the west side of the Thea Foss Waterway in the City of Tacoma, Washington, located between the mean high high water mark on the east and Dock Street on the west, inclusive of the Dock Street Right of Way; and between Parcel 1A on the north and the Harmon Cabinets property on the south; and the City sewage pump station property; and (2) parcels 5 and 8 and the 11th Street Right of Way adjacent to the east side of the Thea Foss Waterway, upland of the mean high high water mark. This geographic boundary is depicted in Exhibit A to this Decree. The legal descriptions of properties within this geographic boundary are in Exhibit B. The properties above-described may extend to the mean low low wa

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mark if EPA concurs. Any remedial action on property between the mean high high water mark and the mean low low water mark shall be interim actions and shall not constitute final cleanup of that property.

B. In this Decree the term "site(s)" or "cleanup site(s)" shall mean any properties, parcels or portions thereof within the geographic boundary described in paragraph A that are currently owned by the City or the Park District or which the City or the Park District acquires during the duration of this Decree, on which Ecology has determined that a release or threatened release of hazardous substances exists. These sites are "facilities" as defined in RCW 70.105D.020(3).

C. The properties which the City owns as of the effective date of this Decree are: Dock Street Right of Way, Municipal Dock, Atlas Foundry, Coast Iron Works, Steam Plant, Johnny's Seafood, 15th Street Right of Way, 18th Street Right of Way, Sewage Pump Station, and 11th Street Right of Way. The properties which the Park District owns as of the effective date of this Decree are: Parcels 1A, 1B, 1C, 1D, 2, 3A, 3B, 3C, 5, and 8; and the Morris Property (hereinafter Parcel 7). The properties within the geographic boundary described in paragraph A but not now owned by either the City or the Park District are: Albers Mill (hereinafter Parcel 9), Investco Property, Trucco Property, Harmon Cabinets, and any State Department of Natural Resources (DNR) property. These properties are generally depicted on Exhibit A. Defendant(s) will provide the legal

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descriptions of these properties to Ecology in the Notice of Intent to Proceed submitted under Section VIII of this Decree.

D. The properties currently owned by the City on which there are known releases of hazardous substances and which are now known to be "sites" under this Decree are Atlas Foundry, Steam Plant, and 18th Street Right of Way. The properties currently owned by the Park District on which there are known releases of hazardous substances and which are now known to be sites are: Parcel 7. These sites are generally depicted in Exhibit A; their legal descriptions are included in Exhibit B. Other properties depicted in Exhibit A will become "sites" under this Decree, when (1) Defendant(s) acquires an ownership interest in the property; and/or (2) Ecology determines the property is a cleanup site pursuant to Section VII of this Decree. Ecology has determined that Parcel 9 and Investco Property contain releases of hazardous substances that require cleanup.

E. The designation of a site by Ecology pursuant to Section VII of the Decree, where appropriate; receipt of a Notice of Intent to Proceed by Ecology under Section VIII of the Decree; and the existence of a binding Prepayment Agreement under Section VIII are conditions precedent to the applicability of the remaining sections of the Consent Decree to any individual site.

F. Each of the provisions of this Decree apply to each site individually.

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G. On property that the City or the Park District does not currently own, if Ecology takes enforcement action at that property prior to the City or Park District's purchase, those sites shall not be subject to this Decree unless agreed to by the parties.

III. JURISDICTION

A. This Court has jurisdiction over the subject matter and over the parties pursuant to Chapter 70.105D RCW, the Model Toxics Control Act (MTCA).

B. Authority is conferred upon the Washington State Attorney General by RCW 70.105D.040(4)(a) to agree to a settlement with any potentially liable person if, after public notice and hearing, Ecology finds the proposed settlement would lead to a more expeditious cleanup of hazardous substances. RCW 70.105D.040(4)(b) requires that such a settlement be entered as a consent decree issued by a court of competent jurisdiction.

C. Ecology has determined, or will determine as set forth in Section VII of this Decree, that releases or threatened releases of hazardous substances have occurred at the sites which are the subject of this Decree. Ecology has further determined, or will determine as set forth in Section VII of this Decree, that the releases are causing contamination of soils, surface water and/or groundwater, and will continue to cause contamination unless the releases are remediated.

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D. The City is a potentially liable person (PLP) for the Atlas Foundry, Steam Plant, and 18th Street Right of Way sites as an owner or operator under RCW 70.105D.040(1)(a).

E. The City is an owner of Dock Street Right of Way, Municipal Dock, Coast Iron Works, Johnny's Seafood, 15th Street Right of Way, Sewage Pump Station, and 11th Street Right of Way, and will be a PLP if Ecology determines that a release or threatened release of hazardous substances has occurred at that property.

F. The Park District is a PLP for Parcel 7 as an owner or operator under RCW 70.105D.040(1)(a).

G. The Park District is an owner or operator of Parcels 1A, 1B, 1C, 1D, 2, 3A, 3B, 3C, 5, and 8, and will be a PLP if Ecology determines that a release or threatened release of hazardous substances has occurred at that property.

H. If the City or the Park District acquires an interest in Trucco Property, Harmon Cabinets, or any DNR property, it would be a PLP as an owner if Ecology determines during the City's or the Park District's ownership that a release or threatened release of hazardous substances has occurred at that property. Ecology has already determined that a release of hazardous substances has occurred at Parcel 9 and Investco Property, and the City or the Park District would be a PLP as an owner if either acquires an interest in those properties.

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I. The City and the Park District have accepted their status as PLPs for the site(s) and by signing this Decree waive their right to notice and comment under RCW 70.105D.020(8).

J. The actions to be taken pursuant to this Decree are necessary to protect public health, welfare, and the environment.

K. Defendant(s) has agreed to undertake the actions specified in this Decree and consents to the entry of this Decree under the MTCA.

IV. PARTIES BOUND

A. This Decree shall apply to and be binding upon the signatories to this Decree. Successors in Interest and Assigns may become parties as provided in Section XIX. The undersigned representative of each party hereby certifies that he or she is fully authorized to enter into this Decree and to execute and legally bind such party to comply with the Decree. Defendant(s) agree to undertake all actions required by the terms and conditions of this Decree and not to contest state jurisdiction regarding this Decree, nor to contest any findings of fact in this Decree. No change in ownership, corporate status, or membership of any governing body shall alter the responsibility of the Defendant(s) under this Decree. Defendant(s) agrees to utilize contractual and regulatory means to insure the implementation and enforceability of this Decree by and against any subsequent owner, operator, lessee or tenant of the site(s). Defendant(s) shall remain liable for all obligations agreed to

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in this Decree in the event of a sale, transfer, or assignment of any ownership interest from Defendant(s) to a third party. Nothing herein shall prevent the City or the Park District from negotiating with purchasers, lessees, or other third parties to contractually allocate remedial action costs and responsibilities, provided that such contractual arrangements are not in breach of this Decree and do not affect the City's or the Park District's liability hereunder.

B. Defendant(s) shall provide a copy of this Decree to all agents, contractors and subcontractors retained to perform work required by this Decree and shall ensure that all work undertaken by such contractors and subcontractors will be in compliance with this Decree.

V. DEFINITIONS

Except for as specified herein, all definitions in Chapters 70.105D RCW and 173-340 WAC apply to the terms in this Decree.

A. Active Remediation of Groundwater: For purposes of this Decree, active remediation of groundwater shall mean all remedial actions related to groundwater except for long term monitoring of groundwater and remediation of contaminated soil that is a source of contamination to the groundwater.

B. Consent Decree or Decree: Refers to this Consent Decree, each of the exhibits to the Decree, and any amendments to the Decree. All exhibits are integral and enforceable parts of this Consent Decree. In the event of any conflict between

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the Consent Decree and any exhibits to the Decree, the Consent Decree shall govern.

C. Days: Refers to calendar days unless otherwise specified.

D. Defendant(s): Refers to the City of Tacoma and the Metropolitan Park District. Successors in Interest and Assigns may become Defendants as provided in Section XIX.

E. Parties: Refers to the Washington State Department of Ecology, the City of Tacoma and the Metropolitan Park District. Successors in Interest and Assigns may become parties as provided in Section XIX.

F. Section: Refers to a portion of this Decree identified by a Roman numeral and including one or more paragraphs.

G. Site(s) or cleanup site(s): Refers to the properties, or any of them, described in Section II.B of this Decree.

H. Successors in Interest and Assigns: Refers to any person who acquires an interest in the sites under this Decree through purchase, lease, transfer, or assignment.

VI. STATEMENT OF FACTS

Ecology makes the following finding of facts without any express or implied admissions by Defendant(s).

A. The City of Tacoma and the Metropolitan Park District own various parcels of property adjacent to the Thea Foss Waterway, as described in Section II of this Decree, totaling approximately 27 acres. Many of the parcels were abandoned,

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unused industrial land. Since approximately 1852, these properties have been the site of various industrial activities. Lumber mills, shipyards, asphalt and concrete plants, flour mills, metal plating and foundry facilities, and other industrial based operations have occurred along the waterway.

B. In 1991, the City and the Park District began purchasing some of this property for the purpose of cleanup, redevelopment, and reuse of the City's waterfront for commercial and residential use, including public access, parks and open spaces. The City and the Park District may purchase additional parcels adjacent to the waterway, for the same purpose. These parcels are also described in Section II.

C. The City and others have performed independent environmental investigations of the properties potentially subject to this Decree. These investigations are described more fully in Section 3.1 of the Thea Foss Redevelopment Cleanup Action Plan, attached to this Decree as Exhibit C. Under these investigations, soil and groundwater samples were collected from 15 of the properties potentially subject to this Decree. These investigations have documented the presence of hazardous substances that exceed the MTCA method B soil cleanup standards under WAC 173-340-740, as described in Section 3.0 of the Thea Foss Redevelopment CAP. These hazardous substances are: total petroleum hydrocarbons (TPH); benzene, toluene, ethylbenzene, and xylene (BTEX); polynuclear aromatic hydrocarbons (PAHs);

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antimony; arsenic; cadmium; chromium; copper; lead; mercury; nickel; zinc; and polychlorinated biphenyls (PCBs).

D. In 1993-94, the City prepared an Area-wide Feasibility Study (FS) and Phase I Remedial Investigation. The investigation indicates that the properties potentially subject to this Decree have similar physical characteristics, past and future uses, and similar potential contaminant problems, allowing the development of similar cleanup remedies for all the properties.

VII. DESIGNATION OF CLEANUP SITES

A. On property that is owned by Defendant(s) and within the geographic boundary described in Section II.A but has not yet been determined by Ecology to be a cleanup site under MTCA, if a release of a hazardous substance is discovered at the property, Defendant(s) shall report that release to Ecology in accordance with WAC 173-340-300. Ecology shall determine whether the site requires further action under MTCA. Ecology shall inform Defendant(s) in writing of its decision. Ecology's decision shall not be subject to dispute resolution under Section XVIII.B of this Decree. If Defendant(s) disagrees with Ecology's decision, the site shall not be included within the scope and effect of this Decree. Sites that Ecology determines require no further action are also not within the scope and effect of this Decree. Unless otherwise specified in this Decree, sites that Ecology determines require further action under MTCA shall be subject to this Decree, unless Defendant(s)

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disagrees with Ecology's decision and so informs Ecology in writing.

B. Once Defendant(s) reports a release, Defendant(s) shall not allow any person or entity to perform any remedial actions at the site nor physically disturb the site or otherwise impair or foreclose potential remedial actions until Ecology determines if the site is subject to this Decree or unless Ecology otherwise agrees in writing. Defendant(s) and Ecology anticipate the possible construction of public access facilities on portions of some sites. Construction of such facilities on portions of sites that are not contaminated may proceed prior to or during remediation of sites if Ecology so agrees in writing.

VIII. NOTICE OF INTENT TO PROCEED AND PREPAYMENT OF COSTS

A. On sites that are subsequently determined to be cleanup sites under Section VII of this Decree and on the Atlas Foundry, Steam Plant, 18th Street Right of Way, Parcel 7, Parcel 9, and Investco Property sites, prior to physical disturbance of a site, exclusive of actions necessary to discover the release of a hazardous substance consistent with WAC 173-340-300, and those activities agreed to by Ecology as described in Section VII, the Defendant(s) shall file a written "Notice of Intent to Proceed" with Ecology. The written Notice of Intent to Proceed shall indicate that the Defendant(s) is prepared to perform remedial actions at the site(s) consistent with this Decree. The Notice shall provide a legal description of the site(s); the intended use of the site(s); proof that the Defendant(s) own

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the property that makes up the site(s); and whether the Defendant(s) will be selling, leasing or otherwise transferring any ownership or possessory interest in the site(s) to a third party(ies), and, if so, the identity of the third party(ies).

B. The Notice of Intent to Proceed shall be accompanied by a draft "Prepayment Agreement" pursuant to Ecology's Toxics Cleanup Program's policy POL 500C, as now or hereafter amended. If the City or the Park District wish to include any Successors in Interest or Assigns as parties to the Consent Decree, the City or the Park District shall follow the procedures in Section XIX. The Prepayment Agreement is necessary to provide Ecology staff resources to oversee implementation of the Consent Decree. A Prepayment Agreement may apply to more than one site. Ecology, in its sole discretion, may choose not to enter into a Prepayment Agreement or implement the Consent Decree until sufficient services are needed under the Decree to require at least one half of a full time equivalent position (FTE) or additional services in increments of at least one half of an FTE. Ecology's decision shall not be subject to dispute resolution under Section XVIII.B of this Decree.

C. As an alternative to entering into a Prepayment Agreement on each site, the Defendant(s) and Ecology may, at their option, agree to enter into a Prepayment Agreement that addresses all sites under this Decree, and establishes a prepaid account into which funds may be deposited by Defendant(s) and drawn upon by Ecology to perform Ecology's obligations under

this Decree. Any such Prepayment Agreement must include a provision that the agreement would not become effective, and Ecology would not be required to implement the Consent Decree, until sufficient services are needed under the Decree to require at least one half of an FTE or additional services in increments of at least one half of an FTE.

D. If Ecology chooses to enter into a Prepayment Agreement, Ecology and the Defendant(s) shall negotiate that agreement. If the parties cannot reach agreement on the terms of a Prepayment Agreement, the site or sites intended to be covered by the agreement will not be within the scope of this Consent Decree.

IX. WORK TO BE PERFORMED

A. This Decree contains a program designed to protect public health, welfare and the environment from the known release, or threatened release, of hazardous substances or contaminants at, on, or from the site(s). The work to be performed in this Decree is subject to change by Ecology, as necessary, to incorporate the substantive requirements of state and local laws, as required by Section 14 of ESSB 6339 (1994). See Section XXXI.A.6.

B. No sooner than ninety (90) days nor later than one hundred twenty (120) days after the parties have entered into a site-specific prepayment agreement or, if the parties enter into a prepayment agreement for all sites under this Decree, no sooner than ninety (90) days nor later than one hundred twenty

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(120) days after receipt by Ecology of a Notice to Proceed under Section VIII, unless a shorter time is agreed to by Ecology, the Defendant(s) shall submit to Ecology a site-specific Remedial Investigation (RI) work plan consistent with WAC 173-340-350. The work plan shall include a site-specific Sampling and Analysis Plan (SSAP) consistent with WAC 173-340-350 and WAC 173-340-820, a site-specific Quality Assurance Project Plan, and a site-specific Safety and Health Plan consistent with WAC 173-340-810. The SSAP shall incorporate the elements of the Thea Foss Sampling and Analysis Plan (SAP) and the Thea Foss Quality Assurance Project Plan (QAPP), attached hereto as Exhibits D and E, respectively, and shall be modified, as appropriate, by site-specific characteristics and knowledge. Ecology shall review and comment on, but not approve or disapprove, the Safety and Health Plan. The RI work plan shall include a schedule for conducting all RI tasks and submitting all deliverables. The RI work plan shall be submitted to Ecology for review. Ecology will endeavor to review the RI work plan and submit any comments to Defendant(s) within twenty one (21) days of Ecology's receipt of the work plan. Within twenty one (21) days of receipt of Ecology's comments, Defendant(s) shall submit a revised RI work plan to Ecology that incorporates Ecology's comments.

C. Upon receipt of Ecology's approval of the RI work plan, Defendant(s) shall implement the plan in accordance with the schedule in the approved plan. Within 60 days of completion

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of all work required in the RI work plan, the Defendant(s) sh prepare and submit to Ecology a remedial investigation (RI) report. The report must include the Defendant(s)' analysis of which cleanup action, if any, specified in the Thea Foss Redevelopment Cleanup Action Plan, attached as Exhibit C to this Decree, applies to the site and the rationale for that determination.

D. After receipt of the RI report, Ecology shall determine whether any of the cleanup actions specified in Exhibit C apply to the site and if so, which one. Ecology shall provide Defendant(s) with written notice of its decision. If Ecology determines that none of the cleanup actions in Exhibit C apply to the site, the site shall no longer be included within the scope of this Decree. If Ecology determines that groundwater contamination exists on the site that needs active remediation, the site shall no longer be included within the scope of this Decree. Ecology's decisions under this paragraph shall not be subject to dispute resolution under Section XVIII.B of this Decree. If Defendant(s) does not agree with Ecology's final decision under this paragraph, the site shall no longer be included within the scope of this Decree.

E. If Ecology determines one of the cleanup actions in Exhibit C applies, and Defendant(s) agrees, Defendant(s) shall prepare a draft site-specific cleanup action plan (SCAP) consistent with WAC 173-340-360 and the Thea Foss Redevelopment Cleanup Action Plan attached as Exhibit C. The draft SCAP s 1

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describe and justify the specific cleanup action proposed for the site, including the specific technologies proposed to be used. The justification for the proposed cleanup action shall be in accordance with WAC 173-340-360. The draft SCAP shall include a schedule for submission of remedial design documents and a compliance monitoring plan. Defendant(s) shall submit the draft SCAP to Ecology for approval within sixty (60) days of receipt of Ecology's written notice of decision regarding the appropriate cleanup action for the site. Ecology shall prepare a final draft SCAP, and may modify the draft SCAP as necessary.

F. Ecology shall provide public notice and a 30-day comment period for the RI report and the final draft SCAP in accordance with WAC 173-340-600. The public shall be invited to comment upon all information and decisions for which Ecology did not previously provide an opportunity for public comment. If significant public comment is received on these issues, Ecology shall prepare a responsiveness summary responding to the comments. Ecology shall then issue a final SCAP. Ecology may modify the final draft SCAP based on public comment. If, based on public comment, Ecology determines that none of the cleanup actions in the Thea Foss Redevelopment Cleanup Action Plan apply to the site, the site shall no longer be included within the scope of this Decree.

G. The final SCAP shall be included as an amendment to the Decree, pursuant to the procedures in Section XIX.

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H. The final SCAP shall be implemented by Defendant(s) In accordance with the approved time schedule in the SCAP, Defendant(s) shall submit to Ecology for review a draft engineering design report, construction plans and specifications, and an operation and maintenance plan (collectively referred to as remedial design documents) consistent with WAC 173-340-400(4), and a draft compliance monitoring plan consistent with WAC 173-340-410. The remedial design documents and the compliance monitoring plan may be submitted separately or combined in one document. The remedial design documents shall include a schedule for implementing the final SCAP. Ecology will endeavor to review and comment on the draft remedial design documents and compliance monitoring plan within thirty (30) days. Within thirty (30) days of receipt of Ecology's comments, Defendant(s) shall submit to Ecology final remedial design documents and a final compliance monitoring plan that incorporate Ecology's comments on the draft documents. Upon receipt of Ecology's approval of the remedial design documents and the monitoring plan, Defendant(s) shall implement the approved remedial action in accordance with the terms and schedule contained in those documents. Defendant(s) shall submit construction documentation to Ecology in accordance with the approved remedial design documents.

I. Defendant(s) agrees not to perform any remedial actions outside the scope of this Decree unless the signatories agree to amend the scope of work to cover those actions. Al

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work conducted under this Decree shall be done in accordance with chapter 173-340 WAC unless otherwise provided herein.

X. INSTITUTIONAL CONTROLS

A. For any site(s) on which (1) the cleanup action results in residual concentrations of hazardous substances on site which exceed method A or method B cleanup levels established under the MTCA regulations; (2) conditional points of compliance have been established; or (3) Ecology determines institutional controls are required, Defendant(s) shall implement all institutional controls required by Ecology. At the time Ecology prepares a final draft SCAP for a site, if Ecology and the Attorney General determine institutional controls are necessary at the site, they shall propose a restrictive covenant that includes the necessary institutional controls. Ecology shall ensure that the appropriate cities or counties are notified and provided an opportunity to comment on the proposed restrictive covenant, as required by ESSB 6123 (1994). Ecology, the Attorney General, and the Defendant landowner of the site shall use good faith efforts to reach agreement on the terms of the restrictive covenant. Negotiations on the restrictive covenant shall not exceed thirty (30) days, unless agreed to by the negotiating parties. If these parties cannot reach agreement on the restrictive covenant within the allotted time period, Ecology and the Attorney General shall decide the terms of the restrictive covenant, and such decision shall not be subject to dispute resolution under this Decree. If Defendant landowner

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does not agree with the restrictive covenant, the site(s) sh no longer be included within the scope of this Decree.

B. On any site for which a restrictive covenant has been established under paragraph A of this section, within thirty (30) days of the issuance of the final SCAP the Defendant landowner of that site shall record with the Office of the Pierce County Auditor the established restrictive covenant, and provide Ecology and the Attorney General with written confirmation of such recording.

C. The City will use available filing and calendaring mechanisms to ensure that parcels subject to this Decree are flagged or otherwise noted with use restrictions through the City's permit system.

XI. DESIGNATED PROJECT COORDINATORS

A. The project coordinator for Plaintiff Ecology is:

Marv Coleman
Department of Ecology
Southwest Regional Office
St. Martin's College Campus
P.O. Box 47775
Olympia, WA 98504-7775

B. For each site, the Defendant(s) shall include the name and address of the project coordinator in the Notice of Intent to Proceed filed with Ecology pursuant to Section VIII of this Decree.

C. Each project coordinator shall be responsible for overseeing the implementation of this Decree. The Ecology project coordinator will be Ecology's designated representative at the site. To the maximum extent possible, communications

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between Ecology and the Defendant(s) and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Decree, shall be directed through the project coordinators. The project coordinators may designate, in writing, working level staff contacts for all or portions of the implementation of the remedial work required by this Decree. The project coordinators may agree to minor modifications to the work to be performed without formal amendments to this Decree.

D. Any party may change its respective project coordinator. Written notification shall be given to the other parties at least ten (10) calendar days prior to the change.

XII. PERFORMANCE

All work performed pursuant to this Decree shall be under the direction and supervision, as necessary, of a professional engineer or hydrogeologist, or equivalent, with experience and expertise in hazardous waste site investigation and cleanup. Any construction work must be under the supervision of a professional engineer. Defendant(s) shall notify Ecology in writing as to the identity of such engineer(s) or hydrogeologist(s), or others and of any contractors and subcontractors to be used in carrying out the terms of this Decree, in advance of their involvement at the site.

XIII. ACCESS

Ecology or any Ecology authorized representatives shall have the authority to enter and freely move about all property

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at the site at all reasonable times for the purposes of, inter alia: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Decree; reviewing Defendant(s)'s progress in carrying out the terms of this Decree; conducting such tests or collecting such samples as Ecology may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Decree; and verifying the data submitted to Ecology by the Defendant(s). Upon request, Ecology shall split any samples taken during an inspection unless the Defendant(s) fails to make available a representative for the purpose of splitting samples. All parties with access to the site pursuant to this paragraph shall comply with approved safety and health plans.

XIV. SAMPLING, DATA REPORTING, AND AVAILABILITY

A. With respect to the implementation of this Decree, Defendant(s) shall make the results of all sampling, laboratory reports, and/or test results generated by it, or on its behalf available to Ecology and shall submit these results in accordance with Section XV of this Decree.

B. If requested by Ecology, Defendant(s) shall allow split or duplicate samples to be taken by Ecology and/or its authorized representatives of any samples collected by Defendant(s) pursuant to the implementation of this Decree. Defendant(s) shall notify Ecology five (5) working days in advance of any sample collection or work activity at the site. Ecology shall, upon request, allow split or duplicate sampl to

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be taken by Defendant(s) or its authorized representatives of any samples collected by Ecology pursuant to the implementation of this Decree provided it does not interfere with the Department's sampling. Without limitation on Ecology's rights under Section XIII, Ecology shall endeavor to notify Defendant(s) prior to any sample collection activity.

XV. PROGRESS REPORTS

A. Defendant(s) shall submit to Ecology written progress reports which describe the actions taken during the previous reporting period to implement the requirements of this Decree. There shall be quarterly reporting periods when the Defendant(s) is actively sampling or remediating any site or sites pursuant to this Decree. Otherwise there shall be annual progress reports. The progress reports shall include the following:

(1) A list of activities on each site that have taken place during the reporting period;

(2) Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;

(3) Description of all deviations from any approved schedules for implementing work under the Decree during the current reporting period and any planned deviations in the upcoming reporting period;

(4) For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule;

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(5) All raw data (including laboratory analysis) received by the Defendant(s) during the past reporting period and an identification of the source of the sample; and

(6) A list of deliverables for the upcoming reporting period if different from the schedule.

B. All progress reports shall be submitted by the tenth day of the month in which they are due after the effective date of this Decree. Unless otherwise specified, progress reports and any other documents submitted pursuant to this Decree shall be sent by certified mail, return receipt requested, to Ecology's project coordinator.

XVI. RETENTION OF RECORDS

Defendant(s) shall preserve, during the pendency of this Decree and for ten (10) years from the date this Decree is no longer in effect as provided in Section XXIX, all records, reports, documents, and underlying data in its possession relevant to the implementation of this Decree and shall insert in contracts with project contractors and subcontractors a similar record retention requirement. Upon request of Ecology, Defendant(s) shall make all non-archived records available to Ecology and allow access for review. All archived records shall be made available to Ecology within a reasonable period of time.

XVII. TRANSFER OF INTEREST IN PROPERTY

A. No voluntary or involuntary conveyance or relinquishment of title, easement, leasehold, or other interest in any site(s) or portion of any site(s) shall be consummate

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without provision for continued operation and maintenance of any containment system, treatment system, and monitoring system installed or implemented pursuant to this Decree.

B. Prior to transfer of any legal or equitable interest in all or any portion of the sites(s), and during the effective period of this Decree, Defendant(s) shall serve a copy of this Decree upon any prospective purchaser, lessee, transferee, assignee, or other successor in interest of the site(s); and, at least thirty (30) days prior to any transfer, Defendant(s) shall notify Ecology of said contemplated transfer.

C. Transfer of any ownership interest in any site(s) or any portion of any site(s) shall not alter or negate the City's and the Park District's obligations under this Decree. Nothing herein shall prevent the City or the Park District from negotiating with purchasers, lessees, or other third parties to allocate remedial action costs and responsibilities, provided that such contractual arrangements are not in breach of this Decree and do not effect the City's or the Park District's liability hereunder.

XVIII. RESOLUTION OF DISPUTES

A. Unless otherwise specified in this Decree, in the event a dispute arises as to an approval, disapproval, proposed modification or other decision or action by Ecology's project coordinator, the parties shall utilize the dispute resolution procedure set forth below.

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(1) Upon receipt of the Ecology project coordinator's decision, the Defendant(s) has fourteen (14) days within which to notify Ecology's project coordinator of its objection to the decision.

(2) The parties' project coordinators shall then confer in an effort to resolve the dispute. If the project coordinators cannot resolve the dispute within fourteen (14) days, Ecology's project coordinator shall issue a written decision.

(3) Defendant(s) may then request Ecology management review of the decision. This request shall be submitted in writing to the Toxics Cleanup Program Manager within seven (7) days of receipt of Ecology's project coordinator's decision.

(4) Ecology's Toxics Cleanup Program Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute within thirty (30) days of the Defendant(s)'s request for review. The Program Manager's decision shall be Ecology's final decision on the disputed matter.

B. Unless otherwise specified in this Decree, if Ecology's final written decision is unacceptable to Defendant(s), Defendant(s) has the right to submit the dispute to the Court for resolution. The parties agree that one judge should retain jurisdiction over this case and shall, as necessary, resolve any dispute arising under this Decree. In the event Defendant(s) presents an issue to the Court for review, the Court shall review the action or decision of Ecology

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on the basis of whether such action or decision was arbitrary and capricious and render a decision based on such standard of review.

C. The parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used. Where either party utilizes the dispute resolution process in bad faith or for purposes of delay, the other party may seek sanctions.

D. Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Decree, unless Ecology agrees in writing to a schedule extension or the Court so orders.

XIX. AMENDMENT OF CONSENT DECREE; ADDING NEW PARTIES TO DECREE

A. This Decree may only be amended by a written stipulation among the signatories to this Decree that is entered by the Court or by order of the Court. Such amendment shall become effective upon entry by the Court. Agreement to amend shall not be unreasonably withheld by any signatory to the Decree.

B. With respect to amendments of the Decree for the purpose of including SCAPs, after Ecology issues a final SCAP for a site, with the concurrence of the Attorney General, the signatories shall sign a copy of Exhibit F, an "Amendment to Consent Decree to Include Site-Specific Cleanup Action Plan", and it shall be submitted for entry with the Court.

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C. If the City or the Park District wish to amend the Consent Decree to make their Successors in Interest and Assigns parties to the Decree, the City or the Park District and their Successors in Interest and Assigns shall use the following procedure. The City or the Park District shall require the proposed Successors in Interest and Assigns to sign a copy of Exhibit G, an "Agreement of Successors in Interest and Assigns", thereby consenting to be bound by the terms and conditions of this Decree. This signed agreement shall be sent to Ecology at the same time as the Notice of Intent to Proceed under Section VIII of this Decree. If Ecology and the Attorney General consent to the proposed amendment, the Amendment shall be submitted for entry with the Court.

D. For all amendments not covered by paragraphs B and C of this section, Defendant(s) shall submit any request for an amendment to Ecology and the Attorney General for approval. Ecology shall indicate its approval or disapproval in a timely manner after the request for amendment is received. If the amendment to the Decree is substantial, Ecology will provide public notice and opportunity for comment. Reasons for the disapproval shall be stated in writing. If Ecology or the Attorney General does not agree to any proposed amendment, the disagreement may be addressed through the dispute resolution procedures described in Section XVIII of this Decree.

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XX. EXTENSION OF SCHEDULE

A. An extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least 30 days prior to expiration of the deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify the reason(s) the extension is needed.

An extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. A requested extension shall not be effective until approved by Ecology or the Court. Ecology shall act upon any written request for extension in a timely fashion. It shall not be necessary to formally amend this Decree pursuant to Section XIX when a schedule extension is granted.

B. The burden shall be on the Defendant(s) to demonstrate to the satisfaction of Ecology that the request for such extension has been submitted in a timely fashion and that good cause exists for granting the extension. Good cause includes, but is not limited to, the following.

(1) Circumstances beyond the reasonable control and despite the due diligence of Defendant(s) including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by Defendant(s); or

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(2) Acts of God, including fire, flood, blizzard, extre temperatures, storm, or other unavoidable casualty; or

(3) Endangerment as described in Section XXI.

However, neither increased costs of performance of the terms of the Decree nor changed economic circumstances shall be considered circumstances beyond the reasonable control of Defendant(s).

C. Ecology may extend the schedule for a period not to exceed ninety (90) days, except where an extension is needed as a result of:

(1) Delays in the issuance of a necessary permit which was applied for in a timely manner; or

(2) Other circumstances deemed exceptional or extraordinary by Ecology; or

(3) Endangerment as described in Section XXI.

Ecology shall give Defendant(s) written notification in a timely fashion of any extensions granted pursuant to this Decree.

XXI. ENDANGERMENT

A. In the event Ecology determines that activities implementing or in noncompliance with this Decree, or any other circumstances or activities, are creating or have the potential to create a danger to the health or welfare of the people on the site or in the surrounding area or to the environment, Ecology may order Defendant(s) to stop further implementation of this Decree for such period of time as needed to abate the danger r

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may petition the Court for an order as appropriate. During any stoppage of work under this section, the obligations of Defendant(s) with respect to the work under this Decree which is ordered to be stopped shall be suspended and the time periods for performance of that work, as well as the time period for any other work dependent upon the work which is stopped, shall be extended, pursuant to Section XX of this Decree, for such period of time as Ecology determines is reasonable under the circumstances.

B. In the event Defendant(s) determines that activities undertaken in furtherance of this Decree or any other circumstances or activities are creating an endangerment to the people on the site or in the surrounding area or to the environment, Defendant(s) may stop implementation of this Decree for such period of time necessary for Ecology to evaluate the situation and determine whether Defendant(s) should proceed with implementation of the Decree or whether the work stoppage should be continued until the danger is abated. Defendant(s) shall notify Ecology's project coordinator as soon as possible, but no later than twenty-four (24) hours after such stoppage of work, and thereafter provide Ecology with documentation of the basis for the work stoppage. If Ecology disagrees with the Defendant(s)'s determination, it may order Defendant(s) to resume implementation of this Decree. If Ecology concurs with the work stoppage, the Defendant(s)'s obligations shall be suspended and the time period for performance of that work, as

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well as the time period for any other work dependent upon the work which was stopped, shall be extended, pursuant to Section XX of this Decree, for such period of time as Ecology determines is reasonable under the circumstances. Any disagreements pursuant to the clause shall be resolved through the dispute resolution procedures in Section XVIII.

XXII. OTHER ACTIONS

A. Ecology reserves its rights to institute remedial action(s) at the site and subsequently pursue cost recovery, and Ecology reserves its rights to issue orders and/or penalties or take any other enforcement action pursuant to available statutory authority under the following circumstances:

(1) Where Defendant(s) fails, after notice, to comply with any requirement of this Decree;

(2) In the event or upon the discovery of a release or threatened release not addressed by this Decree;

(3) Upon Ecology's determination that action beyond the terms of this Decree is necessary to abate an emergency situation which threatens public health or welfare or the environment; or

(4) Upon the occurrence or discovery of a situation beyond the scope of this Decree as to which Ecology would be empowered to perform any remedial action or to issue an order and/or penalty, or to take any other enforcement action. This Decree is limited in scope to the site(s) described in Section II and to those types and maximum concentrations of hazardous

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substances that are on site at the time this Decree is entered, and are described in Section 3.2 of the Thea Foss Redevelopment Cleanup Action Plan, attached as Exhibit C.

B. Ecology reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances from the site(s).

C. Ecology reserves the right to take any enforcement action whatsoever, including a cost recovery action, against potentially liable persons not party to this Decree.

D. Ecology reserves the right to remove all or a portion of a site from this Decree and take separate enforcement actions against Defendants at that site if Ecology determines it is necessary to do so to meet Ecology's source control obligations under the 1994 Cooperative Agreement between Ecology and EPA.

XXIII. INDEMNIFICATION

Defendant(s) agrees to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action for death or injuries to persons or for loss or damage to property arising from or on account of acts or omissions of Defendant(s), its officers, employees, agents, or contractors in entering into and implementing this Decree. However, the Defendant(s) shall not indemnify the State of Washington nor save nor hold its employees and agents harmless from any claims or causes of action arising out of the negligent acts or omissions of the

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State of Washington, or the employees or agents of the state, in implementing the activities pursuant to this Decree.

XXIV. COMPLIANCE WITH APPLICABLE LAWS

All actions carried out by Defendant(s) pursuant to this Decree shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits.

XXV. REMEDIAL AND INVESTIGATIVE COSTS

The Defendant(s) agrees to pay costs incurred by Ecology pursuant to this Decree. The costs required to be paid under this Decree shall include work performed by Ecology or its contractors for, or on, the site(s) under ch. 70.105D RCW both prior to and subsequent to the issuance of this Decree, for investigations, remedial actions, and Decree preparation, negotiations, oversight and administration. Ecology costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). The Defendant(s) agrees to pay the required amount within ninety (90) days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A general statement of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Failure to pay Ecology's costs within ninety (90) days of receipt of the itemized statement will result in interest charges.

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Ecology entered into an agreement with the City of Tacoma, dated June 14, 1993 to receive prepayment of remedial action costs associated with sites under this Decree. Ecology and the City may enter into additional prepayment agreements for sites under the Decree, pursuant to Section VIII. If the City pays remedial action costs pursuant to a prepayment agreement with Ecology for a site under this Decree, it shall not be required to pay those costs again under this Consent Decree. The City is not released from liability for payment of remedial action costs to Ecology should the City of Tacoma fail to comply with the conditions of such a prepayment agreement, or should prepayment agreement be found to be invalid for any reason.

XXVI. IMPLEMENTATION OF REMEDIAL ACTION

If Ecology determines that Defendant(s) has failed without good cause to implement the remedial action(s) called for by this Decree, Ecology may, after notice to Defendant(s), perform any or all portions of the remedial action(s) that remain incomplete. If Ecology performs all or portions of the remedial action(s) because of the Defendant(s)'s failure to comply with its obligations under this Decree, Defendant(s) shall reimburse Ecology for the costs of doing such work in accordance with Section XXV, provided that Defendant(s) is not obligated under this section to reimburse Ecology for costs incurred for work inconsistent with or beyond the scope of this Decree.

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XXVII. FIVE YEAR REVIEW

As remedial action, including ground water monitoring, continues at the site, the parties agree to review the progress of remedial action at the site, and to review the data accumulated as a result of site monitoring as often as is necessary and appropriate under the circumstances. At least every five years the parties shall meet to discuss the status of the site and the need, if any, of further remedial action at the site. Ecology reserves the right to require further remedial action at the site under appropriate circumstances. This provision shall remain in effect for the duration of the Decree.

XXVIII. PUBLIC PARTICIPATION

Ecology shall maintain the responsibility for public participation at the site(s). However, Defendant(s) shall cooperate with Ecology and, if agreed to by Ecology, shall:

A. Prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans and the completion of engineering design. Ecology will finalize (including editing if necessary) and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings;

B. Notify Ecology's project coordinator prior to the preparation of all press releases and fact sheets, and before major meetings with the interested public and local governments. Likewise, Ecology shall notify Defendant(s) prior to the

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issuance of all press releases and fact sheets, and before major meetings with the interested public and local governments;

C. Participate in public presentations on the progress of the remedial action at the site. Participation may be through attendance at public meetings to assist in answering questions, or as a presenter;

D. In cooperation with Ecology, arrange and/or continue information repositories to be located at the Tacoma Public Library, Main Branch, and Ecology's Southwest Regional Office. At a minimum, copies of all public notices, fact sheets, and press releases; all quality assured ground water, surface water, soil sediment, and air monitoring data; remedial actions plans, supplemental remedial planning documents, and all other similar documents relating to performance of the remedial action required by this Decree shall be promptly placed in these repositories.

XXIX. DURATION OF DECREE

A. This Decree shall remain in effect and the remedial program described in the Decree shall be maintained and continued for a site until the Defendant(s) has received written notification from Ecology that the requirements of this Decree have been satisfactorily completed as to that site.

B. This Decree shall apply to any property within the geographic boundary described in Section II.A for which Ecology has received a Notice of Intent to Proceed under Section VIII within five (5) years of the effective date of this Decree.

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C. After five years from the effective date of this Decree:

(1) Ecology and the Attorney General at their convenience may terminate this Decree as to any site(s) not within the scope of paragraph B of this section at any time prior to or within twenty-one (21) days of receipt of a Notice of Intent to Proceed under Section VIII of this Decree, by providing sixty (60) days written notice of termination to Defendant(s).

(2) Defendant(s) at its convenience may terminate this Decree as to any site(s) not within the scope of paragraph B of this section at any time prior to receipt by Ecology of a Notice of Intent to Proceed, by providing sixty (60) days written notice to Ecology and the Attorney General.

XXX. CLAIMS AGAINST THE STATE

Defendant(s) hereby agrees that it will not seek to recover any costs accrued in implementing the remedial action required by this Decree from the State of Washington Department of Ecology; and further, that the Defendant(s) will make no claim against the state Toxics Control Account for any costs incurred in implementing this Decree. Except as provided above, however, Defendant(s) expressly reserves its right to seek to recover any costs incurred in implementing this Decree from any other potentially liable person under state or federal law.

XXXI. COVENANT NOT TO SUE: REOPENER

In consideration of Defendant(s)'s compliance with provisions of this Decree, Ecology covenants not to institut-

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further legal or administrative actions against Defendant(s) regarding matters within the scope of this Decree. This covenant is limited in its application to the site(s) described in Section II of this Decree and to the types and maximum concentrations of hazardous substances that are on site at the time this Decree is entered, and are described in Section 3.2 of the Thea Foss Redevelopment Cleanup Action Plan, attached as Exhibit C. This covenant is not applicable to any other area, substances, or concentrations of substances. This covenant is contingent upon Defendant(s)'s compliance with all terms and conditions of this Decree. This covenant does not affect Ecology's right to seek recovery for natural resource damages.

A. Reopeners: Notwithstanding the covenant given above, Ecology reserves the right to institute legal or administrative actions against Defendant(s) seeking to require them to perform additional response actions at a site under this Decree, and to pursue appropriate cost recovery in accordance with provisions set out in RCW 70.105D.050, under the following circumstances:

(1) If Defendants fail to meet the requirements of this Decree, including, but not limited to, failure of the remedial action to meet the cleanup standards identified in the Thea Foss Redevelopment Cleanup Action Plan (Exhibit C) and the SCAP for that site;

(2) Upon Ecology's determination that action beyond the terms of this Decree is necessary to abate an imminent and

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substantial endangerment to public health or welfare or the environment;

(3) In the event new information becomes available regarding factors previously unknown to Ecology, including the nature or quantity of hazardous substances at the Site, and Ecology determines, in light of this information, that further remedial action is necessary at the Site to protect human health or the environment, and Defendants, after notice, fail to take the necessary action within a reasonable time;

(4) In the event the assumptions upon which the cleanup remedies agreed to in the Thea Foss Redevelopment Cleanup Action Plan and the SCAP for the site were based do not prove to be true or accurate;

(5) In the event the remedial action conducted at the Site fails to meet the requirements set forth in the Thea Foss Redevelopment Cleanup Action Plan and the SCAP for the site; and

(6) In the event more stringent or different cleanup standards or other regulatory requirements regarding remedial action under MTCA are adopted by the Washington State Legislature or by Ecology.

Further, if factors or conditions at the site, previously unknown to Ecology, are discovered after entry of this Decree, and these unknown factors or conditions indicate that the remedial action is not protective of the public health, or welfare, or the environment, or present a previously unknown threat to human health or the environment, Ecology also reserves

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the right to request the court to amend this covenant not to sue as required by RCW 70.105D.040(4)(c).

B. Applicability: The Covenant Not to Sue set forth above shall no applicability whatsoever to:

1. Criminal liability;

2. Liability for damages to natural resources;

3. Any Ecology action against potentially liable parties not a party to this Decree;

4. Groundwater contamination that may exist at any of the property within the geographic boundary described in Section II.A that requires active remediation;

5. Property within the geographic boundary described in Section II.A that is not determined by Ecology to be a cleanup site under Section VII or to property on which Defendant(s) otherwise does not fully implement all remedial actions under this Decree, including a SCAP;

6. Any portion of a site(s) between the mean high high water mark and the mean low low water mark.

XXXII. EFFECTIVE DATE

This Decree is effective upon the date it is entered by the Court.

XXXIII. PUBLIC NOTICE AND WITHDRAWAL OF CONSENT

This Decree has been the subject of public notice and comment under RCW 70.105D.040(4)(a). As a result of this process, Ecology has found that this Decree will lead to a more expeditious cleanup of hazardous substances at the site.

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If the Court withholds or withdraws its consent to this Decree, it shall be null and void at the option of any party and the accompanying Complaint shall be dismissed without costs and without prejudice. In such an event, no party shall be bound by the requirements of this Decree.

DEPARTMENT OF ECOLOGY

By: _____ 10/3/94
CAROL KRAEGE Date
Acting Program Manager
Toxics Cleanup Program

ATTORNEY GENERAL

By: _____
KATHRYN L. GERLA Date
WSBA #17498 9/30/94
Assistant Attorney General

CITY OF TACOMA

By: _____
Name: _____ Date
Title: _____

_____
Name: _____ Date
Attorney for City of Tacoma

METROPOLITAN PARK DISTRICT

By: _____
Name: Neil A. Olsthun Date
Title: Executive Director

DAVIES PEARSON, P.C.

_____
Name: Mark R. Roberts 9/29/94 Date
Attorney for Metropolitan Park District

DATED this 17 day of OCTOBER, 1994.

_____
JUDGE/COMMISSIONER
Pierce County Superior Court

T5/tac/tacomaf.csd

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enforcing or terminating the terms of this Consent Decree, and of adjudicating disputes between the parties under this Consent Decree.

ENTERED this _____day of _____, 1991.

_____
UNITED STATES DISTRICT JUDGE

The parties whose signatures appear below hereby consent to the terms of this Consent Decree. The consent of the United States is subject to the public notice and comment requirements of 28 C.F.R. § 50.7 and 42 U.S.C. § 9622. The consent of the State of Washington is subject to the public notice and hearing requirements of Section 4(4) of the Model Toxics Control Act and is expressly conditioned upon the entry of findings by the Department of Ecology required therein.

U.S. Department of Justice
10th St. & Pennsylvania Ave., N.W.
Washington, D.C. 20530
(202) 514-1200

CITY CLERK CONTRACT/AGREEMENT NO.

FOR THE CITY OF TACOMA, WASHINGTON

By: _____ Dated: 3/20/91
Ray E. Corpuz, Jr.
City Manager

By: _____ Dated: 3/20/91
for FRED A THOMPSON
Director of Public Works

By: _____ 3/21/91 Dated: 3/21/91
Peter Lutzropp
Director of Finance

Attest: _____ Dated: 3-20-91
Genelle Birk
City Clerk

Approved as to form:

By: _____ Dated: 3/20/91
City Attorney

U.S. Department of Justice
10th St. & Pennsylvania Ave., N.W.
Washington, D.C. 20530
(202) 514-1200

FOR THE UNITED STATES OF AMERICA

By: _____ Dated: 3/22/91

GEORGE W. VAN CLEVE
Acting Assistant Attorney
General
Land and Natural Resources
Division
U.S. Department of Justice
Washington, D.C. 20530

By: _____ Dated: 3/22/91

STEVEN NOVICK
Attorney
Land and Natural Resources
Division
U.S. Department of Justice
Washington, D.C. 20536

MIKE McKAY
UNITED STATES ATTORNEY
3600 Seafirst Fifth Avenue Plaza
800 Fifth Avenue
Seattle, Washington 98104

By: _____ Dated: March 20, 1991

DANA A. RASMUSSEN
Regional Administrator
United States Environmental Protection Agency
Region 10
Seattle, Washington 98101

By: _____ Dated: March 20, 1991

ANDREW J. BOYD
Assistant Regional Counsel
United States Environmental Protection Agency
Region 10
Seattle, Washington 98101

U.S. Department of Justice
10th St. & Pennsylvania Ave., N.W.
Washington, D.C. 20530
(202) 514-1200

FOR THE STATE OF WASHINGTON

By: Carol L. Fleskes Dated: 3/30/91

CAROL L. FLESKES
Hazardous Waste Investigations
and Cleanup Program Manager
Department of Ecology
Olympia, Washington 98504

By: _____ Dated: 3/30/91

JEFFREY S. MYERS
Assistant Attorney General
State of Washington
Olympia, Washington 98504

U.S. Department of Justice
10th St. & Pennsylvania Ave., N.W.
Washington, D.C. 20530
(202) 514-1200

STATE OF WASHINGTON
PIERCE COUNTY SUPERIOR COURT

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY, Plaintiff, v. CITY OF TACOMA and FOSS WATERWAY DEVELOPMENT AUTHORITY, Defendants.	NO. 94-2-10917-6 CONSENT DECREE – FIRST COMPREHENSIVE AMENDMENT

1. INTRODUCTION

A. This is the First Comprehensive Amendment to this Consent Decree (Decree). The Decree was originally entered in Pierce County Superior Court on October 17, 1994 as Consent Decree No. 94-2-10917-6. The Decree was originally signed by the Department of Ecology (Ecology), the City of Tacoma (City), and the Metropolitan Park District. The Decree has been amended a number of times since 1994 to add parties to it, including an amendment to add the Foss Waterway Development Authority (FWDA) as a party after the Park District conveyed to the FWDA the properties it owned that are subject to this Decree. Other than these amendments to add parties, there have not previously been any amendments to the provisions of the Decree. This comprehensive amendment makes significant changes to the provisions of the original Decree in order to update it and implement a more efficient process for developing and remediating the properties covered by it.

B. This First Comprehensive Amendment to the Decree is made and entered into by and between the Washington State Department of Ecology (Ecology), the City of Tacoma (City), and the Foss Waterway Development Authority (FWDA). Successor Owners or Operators may become Parties to this Decree as provided in Section 17. Parties to this Decree other than Ecology and the Attorney General are referred to in this Decree in the collective as "Defendants."

C. In entering into this Decree, the Parties' mutual objective is to provide for remedial action at facilities adjacent to the Thea Foss Waterway in the City of Tacoma, Washington, where there have been releases or threatened releases of hazardous substances causing contamination of soils.

D. This Decree establishes procedures designed to achieve substantial public benefits. The City and FWDA, with assistance from the Metropolitan Park District, acquired properties along the west side of the Thea Foss Waterway, which is part of the Commencement

Bay Nearshore/Tideflats (CB/NT) Superfund Site, to spur cleanup of the City's waterfront and redevelopment of abandoned industrial and commercial land. This Decree is intended to support cleanup and redevelopment of these properties, consistent with the Thea Foss Area-Wide Consent Decree Cleanup Action Plan, under which the ultimate redevelopment includes public access, parks and open spaces.

E. Remedial actions under this Decree recognize land use planning and the ultimate reuse of contaminated property. This Decree promotes expedient, efficient remedial actions, which can occur more quickly than without the Decree. This Decree allows Ecology to enforce permanent and effective controls to ensure that cleanups are protective of human health and the environment. Furthermore, this Decree promotes the fulfillment of Ecology's source control obligations set forth in the 1994 Cooperative Agreement between the U.S. Environmental Protection Agency (EPA) and Ecology.

F. This Decree requires the Defendants to undertake the following remedial action for the site or sites they own, which are more specifically described in Sections 7 and 8 of this Decree:

(1) Conduct remedial investigations of sites;

(2) Prepare site-specific Cleanup Action Plans for soil contamination on sites, to be approved by Ecology. The site-specific Cleanup Action Plans will be consistent with the Thea Foss Redevelopment Cleanup Action Plan (Exhibit C);

(3) Remediate soil contamination on sites in accordance with the site-specific Cleanup Action Plans;

(4) Provide and maintain institutional controls and compliance monitoring, as required in this Decree.

Ecology has determined that these actions are necessary to protect public health and the environment. This Decree addresses soil contamination only. Sites at which active remediation of groundwater is necessary are not within the scope of this Decree.

G. The Complaint in this action was filed simultaneously with this Decree in 1994. An answer was not filed, and there has not been a trial on any issue of fact or law in this case. However, the Parties wish to resolve the issues raised by Ecology's complaint. In addition, the Parties agree that settlement of these matters without litigation is reasonable and in the public interest and that entry of this Decree is the most appropriate means of resolving these matters.

H. In becoming a party to this Decree, each Defendant agrees to its entry and agrees to be bound by its terms.

I. By entering into this Decree, the Parties do not intend to discharge nonsettling parties from any liability they may have with respect to matters alleged in the complaint. The Parties retain the right to seek reimbursement, in whole or in part, from any liable persons for sums expended under this Decree.

J. This Decree shall not be construed as proof of liability or responsibility for any releases of hazardous substances or cost for remedial action nor an admission of any facts; provided, however, that no Defendant may challenge the jurisdiction of Ecology or the findings of fact in this Decree in any proceeding brought by Ecology to enforce this Decree.

K. The Court fully advised of the reasons for entry of this Decree, and good cause having been shown:

IT IS HEREBY ORDERED, ADJUDGED, AND DECREED AS FOLLOWS:

2. SCOPE OF DECREE

A. The property subject to this Decree is property adjacent to the west side of the Thea Foss Waterway in the City of Tacoma, Washington, located between the mean high water mark, the geographic boundary of which is depicted in Amended Exhibit A to this Decree,

which replaces Exhibit A of the original Decree. The legal descriptions of properties within this geographic boundary are in Amended Exhibit B. These properties may extend to the mean low water mark if EPA concurs. Such concurrence shall occur on a parcel-by-parcel basis considering, where appropriate, clean up actions taken under the CB/NT Superfund remedy.

B. In this Decree the terms "site" or "cleanup site" mean, in the singular or plural, any properties, parcels or portions thereof within the geographic boundary described in paragraph A that are currently owned by a Defendant or which a Defendant acquires during the duration of this Decree. These sites are "facilities" as defined in RCW 70.105D.020(3).

C. Each of the provisions of this Decree apply to each site individually.

3. JURISDICTION

A. This Court has jurisdiction over the subject matter and over the Parties pursuant to Chapter 70.105D RCW, the Model Toxics Control Act (MTCA).

B. Authority is conferred upon the Washington State Attorney General by RCW 70.105D.040(4) (a) to agree to a settlement with any potentially liable person if, after public notice and hearing, Ecology finds the proposed settlement would lead to a more expeditious cleanup of hazardous substances. RCW 70.105D.040(4)(b) requires that such a settlement be entered as a consent decree issued by a court of competent jurisdiction.

C. Ecology has determined that releases or threatened releases of hazardous substances have occurred at the sites which are the subject of this Decree. Ecology has further determined that the releases are causing contamination of soils, surface water and/or groundwater, and will continue to cause contamination unless the releases are remediated.

D. Each Defendant is a PLP for each property for which it is an owner or operator under RCW 70.105D.040(I)(a) if Ecology has determined that a release or threatened release of hazardous substances has occurred at that property.

E. Each Defendant accepts their status as a PLP for the sites they own. By signing this Decree Defendants waive their right to notice and comment under RCW 70.105D.020(8). However, if additional contamination is discovered after a Defendant signs this Decree, the Defendant retains the right to assert any applicable defenses to liability for the newly-discovered contamination. Furthermore, with regard to claims for contribution against any Defendant for matters addressed in this Decree, Ecology agrees that Defendants are entitled to protection from contribution actions or claims as is provided by MTCA, RCW 70.105D.040, or as otherwise provided by law.

F. The actions to be taken pursuant to this Decree are necessary to protect public health, welfare, and the environment.

G. Each Defendant agrees to undertake the actions specified in this Decree as they apply to the site or sites owned by each Defendant and consents to the entry of this Decree under the MTCA.

4. PARTIES BOUND

A. This Decree applies to and is binding upon the signatories to this Decree. Successor Owners or Operators may become Parties as provided in Section 17. The undersigned representative of each Party hereby certifies that he or she is fully authorized to enter into this Decree and to execute and legally bind such Party to comply with the Decree. Defendant agrees to undertake all actions required by the terms and conditions of this Decree and not to contest state jurisdiction regarding this Decree, nor to contest any findings of fact in this Decree. No change in ownership, corporate status, or membership of any governing body shall alter the responsibility of a Defendant under this Decree. Each Defendant agrees to utilize contractual and regulatory means to insure the implementation and enforceability of this Decree by and against any subsequent, owner, operator, lessee or tenant of a site. Each Defendant remains liable for all obligations agreed to in this Decree in the event of a sale,

transfer, or assignment of any ownership interest from the Defendant to a third party. Nothing in this Decree prevents the City or the FWDA from negotiating with purchasers, lessees, or other third parties to contractually allocate remedial action costs and responsibilities, provided that such contractual arrangements are not in breach of this Decree and do not affect the City's or FWDA's liability under it.

B. Each Defendant shall provide a copy of this Decree to all agents, contractors and subcontractors retained to perform work required by this Decree and shall ensure that all work undertaken by such contractors and subcontractors will be in compliance with this Decree.

5. DEFINITIONS

Unless otherwise specified, all definitions in Chapters 70.15D RCW and 173-340 WAC apply to the terms in this Decree.

A. Active Remediation of Groundwater: For purposes of this Decree, active remediation of groundwater means all remedial actions related to groundwater except for long term monitoring of groundwater and remediation of contaminated soil that is a source of contamination to the groundwater.

B. Consent Decree or Decree: Refers to this Consent Decree, each of the exhibits to the Decree, and any amendments to the Decree. All exhibits are integral and enforceable parts of this Consent Decree. In the event of any conflict between the Consent Decree and any exhibits to the Decree, the Consent Decree shall govern.

C. Days: Refers to calendar days unless otherwise specified.

D. Defendant: Refers to the signatories to this Decree other than the Department of Ecology and Attorney General.

E. Party: Refers to any signatory to this Decree. Successor Owners or Operators of property covered by this Decree may become Parties (and Defendants) as provided in Section 17.

F. Section: Refers to a portion of this Decree identified by a number and including one or more paragraphs.

G. Site or Cleanup Site: Refers to the properties covered by this Decree, as described in Section 2.A of this Decree.

H. Successor Owner or Operator: Refers to any person who acquires an interest in a Site, whether through purchase, lease, transfer, or assignment.

6. STATEMENT OF FACTS

Ecology makes the following finding of facts without any express or implied admissions by Defendants.

A. This Decree covers various parcels described in Amended Exhibit A. Many of the parcels were abandoned, unused industrial land. Since approximately 1852, these properties have been the site of various industrial activities. Lumber mills, shipyards, asphalt and concrete plants, flour mills, metal plating and foundry facilities, and other industrial based operations have occurred along the waterway.

B. In 1991, the City and the Park District began purchasing some of this property for the purpose of cleanup, redevelopment, and reuse of the City's waterfront for commercial and residential use, including public access, parks and open spaces. In 2000, the Park District transferred its interest in parcels covered under this Decree to the FWDA, which, in turn, intends to transfer its interest in these parcels to developers in accordance with the current Operating Agreement between the City and FWDA. The City or the FWDA may purchase additional parcels adjacent to the waterway, for the same purpose. The Parties agree that if such purchase occurs, they will amend the Decree to include those parcels.

C. The City and others have performed independent environmental investigations of the properties subject to this Decree. Under these investigations, soil and groundwater samples were collected, documenting the presence of hazardous substances that exceed the MTCA method B soil cleanup standards under WAC 173-340-740. These hazardous substances are: total petroleum hydrocarbons (TPH); benzene, toluene, ethylbenzene, and xylene (BTEX); polynuclear aromatic hydrocarbons (PAHs); antimony; arsenic; cadmium; chromium; copper; lead; mercury; nickel; zinc; and polychlorinated biphenyls (PCBs).

D. In 1993-94, the City prepared an Area-wide Feasibility Study (FS) and Phase I Remedial Investigation. The investigation indicates, and subsequent site-specific remedial investigations confirm, that the properties subject to this Decree have similar physical characteristics, past and future uses, and similar potential contaminant problems, allowing the development of similar cleanup remedies for all the properties.

7. WORK TO BE PERFORMED

A. This Decree contains a program designed to protect public health, welfare and the environment from the known release, or threatened release, of hazardous substances or contaminants at, on, or from the sites. The work to be performed in this Decree is subject to change by Ecology, as necessary, to incorporate the substantive requirements of state and local laws, as required by RCW 90.105D.090.

B. On sites that are subsequently determined to be cleanup sites, exclusive of actions necessary to discover the release of a hazardous substance consistent with WAC 173-340-300, the Defendant shall file a written "Notice of Intent to Proceed" with Ecology. The written Notice of Intent to Proceed shall indicate that the Defendant is prepared to perform remedial actions at the site consistent with this Decree. The Notice shall provide a legal description of the site; the intended use of the site; proof that the Defendant owns the property that makes up the site; and whether the Defendant will be selling, leasing or otherwise

transferring any ownership or possessory interest in the site to a third party, and, if so, the identity of the third party.

C. No sooner than 90 days nor later than 120 days after receipt by Ecology of a Notice to Proceed under paragraph 7.B, unless a shorter time is agreed to by Ecology, Defendant shall submit to Ecology a site-specific Remedial Investigation (RI) work plan consistent with WAC 173-340-350. The work plan shall include a site-specific Sampling and Analysis Plan (SSAP) consistent with WAC 173-340-350 and WAC 173-340-820, a site-specific Quality Assurance Project Plan, a site-specific Safety and Health Plan consistent with WAC 173-340-810. The SSAP shall incorporate the elements of the Thea Foss Sampling and Analysis Plan (SAP) and the Thea Foss Quality Assurance Project Plan (QAPP) (Exhibits D and E to this Decree), and shall be modified, as appropriate, by site-specific characteristics and knowledge. Ecology shall review and comment on, but not approve or disapprove, the Safety and Health Plan. The RI work plan shall include a schedule for conducting all RI tasks and submitting all deliverables. The RI work plan shall be submitted to Ecology for review. Ecology will endeavor to review the RI plan and submit any comments to Defendant within 21 days of Ecology's receipt of the work plan. Within 21 days of receipt of Ecology's comments, Defendant shall submit a revised RI work plan to Ecology that incorporate Ecology's comments.

D. Upon receipt of Ecology's approval of the RI work plan, Defendant shall implement the plan in accordance with the schedule in the approved plan. Within 60 days of completing all work required in the RI work plan, the Defendant shall prepare and submit to Ecology a remedial investigation (RI) report. The report must include the Defendant's analysis of which cleanup action specified in the Thea Foss Redevelopment Cleanup Action Plan, attached as Exhibit C to this Decree, applies to the site and the rationale for that determination.

E. After Ecology determines which cleanup action in Exhibit C applies, Defendant shall prepare a draft site-specific cleanup action plan (SCAP) consistent with WAC 173-340-360 and the Thea Foss Redevelopment Cleanup Action Plan attached as Exhibit C. The draft SCAP shall describe and justify the specific cleanup action proposed for the site, including the specific technologies proposed to be used. The justification for the proposed cleanup action shall be in accordance with WAC 173-340-360. The draft SCAP shall include a schedule for submission of remedial design documents and a compliance monitoring plan. If the selected cleanup action includes institutional controls, the SCAP shall address financial assurances pursuant to WAC 173-340-440(11). Defendant shall submit the draft SCAP to Ecology for approval within 60 days of receipt of Ecology's written notice of decision regarding the appropriate cleanup action for the site. Ecology shall prepare a final draft SCAP, and may modify the draft SCAP as necessary.

F. Ecology shall provide public notice and a 30-day comment period for the RI report and the final draft SCAP in accordance with WAC 173-340-600. The public shall be invited to comment upon all information and decisions for which Ecology did not previously provide an opportunity for public comment. If significant public comment is received on these issues, Ecology shall prepare a responsiveness summary responding to the comments and issue it in a timely manner. Ecology shall then issue a final SCAP. Ecology may modify the final draft SCAP based on public comment.

G. The final SCAP shall be included as an amendment to the Decree, pursuant to the procedures in Section 17.

H. The final SCAP shall be implemented by Defendant. In accordance with the approved time schedule in the SCAP, Defendant shall submit to Ecology for review a draft engineering design report, construction plans and specifications, and an operation and maintenance plan (collectively referred to as remedial design documents) consistent with WAC

173-340-400(4), and a draft compliance monitoring plan consistent with WAC 173-340-410. The remedial design documents and the compliance monitoring plan may be submitted separately or combined in one document. The remedial design documents shall include a schedule for implementing the final SCAP. Ecology will endeavor to review and comment on the draft remedial design documents and compliance monitoring plan within 30 days. Within 30 days of receipt of Ecology's comments, Defendant shall submit to Ecology final remedial design documents and a final compliance monitoring plan that incorporate Ecology's comments on the draft documents.

Upon receipt of Ecology's approval of the remedial design documents and the monitoring plan, Defendant shall implement the approved remedial action in accordance with the terms and schedule contained in those documents. Defendant shall submit construction documentation to Ecology in accordance with the approved remedial design documents.

I. Defendant agrees not to perform any remedial actions outside the scope of this Decree unless the signatories agree to amend the scope of work to cover those actions. All work conducted under this Decree shall be done in accordance with chapter 173-340 WAC unless otherwise provided in this Decree.

8. INSTITUTIONAL CONTROLS

A. For any site on which (1) the cleanup action results in residual concentrations of hazardous substances on site which exceed method A or method B cleanup levels established under the MTCA regulations; (2) conditional points of compliance have been established; or (3) Ecology determines institutional controls are required, Defendant shall implement all institutional controls required by Ecology. At the time Ecology prepares a final draft SCAP for a site, if Ecology and the Attorney General determine institutional controls are necessary at the site, they shall propose a restrictive covenant that includes the necessary institutional controls. Ecology shall ensure that the appropriate cities or counties are notified and provided an

opportunity to comment on the proposed restrictive covenant, as required by WAC 173-340-440(6). Ecology, the Attorney General, and the Defendant landowner of the site shall use good faith efforts to reach agreement on the terms of the restrictive covenant. Negotiations on the restrictive covenant shall not exceed 30 days, unless agreed to by the negotiating parties. If these parties cannot reach agreement on the restrictive covenant within the allotted time period, Ecology and the Attorney General shall decide the terms of the restrictive covenant, and such decision shall not be Subject to dispute resolution under this Decree.

B. On any site for which a restrictive covenant has been established under paragraph A of this section, within 90 days of the issuance of the final SCAP the Defendant landowner of that site shall record with the Office of the Pierce County Auditor the established restrictive covenant, and provide Ecology and the Attorney General with written confirmation of such recording.

C. The City will use available filing and calendaring mechanisms to ensure that parcels subject to this Decree are flagged or otherwise noted with use restrictions through the City's permit system.

9. DESIGNATED PROJECT COORDINATORS

A. The project coordinator for Plaintiff Ecology is:

Marv Coleman
Department of Ecology
Southwest Regional Office
300 Desmond Drive
P.O. Box 47775
Olympia, WA 98504-7775

B. For each site, the Defendant shall include the name and address of the project coordinator in the Notice of Intent to Proceed filed with Ecology pursuant to Section 7.B of this Decree.

C. Each project coordinator shall be responsible for overseeing the implementation of this Decree. The Ecology project coordinator will be Ecology's designated representative at the site. To the maximum extent possible, communications between Ecology and the Defendant and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Decree, shall be directed through the project coordinators. The project coordinators may designate, in writing, working level staff contacts for all or portions of the implementation of the remedial work required by this Decree. The project coordinators may agree to minor modifications to the work to be performed without formal amendments to this Decree.

D. Any Party may change its respective project coordinator. Written notification shall be given to the other parties at least 10 calendar days prior to the change.

10. PERFORMANCE

All work performed pursuant to this Decree shall be under the direction and supervision, as necessary, of a professional engineer or hydrogeologist, or equivalent, with experience and expertise in hazardous waste site investigation and cleanup. Any construction work must be under the supervision of a professional engineer. Defendant shall notify Ecology in writing as to the identity of such engineer or hydrogeologist, or others and of any contractors and subcontractors to be used in carrying out the terms of this Decree, in advance of their involvement at the site.

11. ACCESS

Ecology or any Ecology authorized representatives shall have the authority to enter and freely move about all property at the site at all reasonable times for the purposes of, *inter alia*: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Decree; reviewing Defendant's progress in carrying out the terms of this Decree; conducting such tests or collecting such samples as Ecology may deem necessary; using a

camera, sound recording, or other documentary type equipment to record work done pursuant to this Decree; and verifying the data submitted to Ecology by the Defendant. Upon request, Ecology shall split any samples taken during an inspection unless the Defendant fails to make available a representative for the purpose of splitting samples. All parties with access to the site pursuant to this paragraph shall comply with approved safety and health plans.

12. SAMPLING, DATA REPORTING, AND AVAILABILITY

A. With respect to the implementation of this Decree, Defendant shall make the results of all sampling, laboratory reports, and/or test results generated by it, or on its behalf available to Ecology and shall submit these results in accordance with Section 13 of this Decree.

B. If requested by Ecology, Defendant shall allow split or duplicate samples to be taken by Ecology and/or its authorized representatives of any samples collected by Defendant pursuant to the implementation of this Decree. Defendant shall notify Ecology five working days in advance of any sample collection or work activity at the site. Ecology shall, upon request, allow split or duplicate samples to be taken by Defendant or its authorized representatives of any samples collected by Ecology pursuant to the implementation of this Decree provided it does not interfere with the Department's sampling. Without limitation on Ecology's rights under Section 11, Ecology shall endeavor to notify Defendant prior to any sample collection activity.

13. PROGRESS REPORTS

A. Defendant shall submit to Ecology written progress reports which describe the actions taken during the previous reporting period to implement the requirements of this Decree. These reports must be submitted quarterly when the Defendant is actively sampling or remediating any site under this Decree. At other times before the remediation process is complete, these progress reports must be submitted annually. After Defendant has received

written notification from Ecology that the requirements of the Decree have been satisfactorily completed under Section 27, Defendant is no longer required to submit progress reports, except that ongoing monitoring reports are required for properties with one or more ground water wells. Nothing in this section affects any obligation by Defendants under this Decree to notify or consult with Ecology. The progress reports shall include the following:

(1) A list of activities on each site that have taken place during the reporting period;

(2) Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;

(3) Description of all deviations from any approved schedules for implementing work under the Decree during the current reporting period and any planned deviations in the upcoming reporting period;

(4) For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule;

(5) All raw data (including laboratory analysis) received by the Defendant during the past reporting period and an identification of the source of the sample; and

(6) A list of deliverables for the upcoming reporting period if different from the schedule.

B. All progress reports shall be submitted by the tenth day of the month in which they are due after the effective date of this Decree. Unless otherwise specified, progress reports and any other documents submitted pursuant to this Decree shall be sent by certified mail, return receipt requested, to Ecology's project coordinator.

14. RETENTION OF RECORDS

Defendant shall preserve, during the pendency of this Decree and for 10 years from the date this Decree is no longer in effect as provided in Section 27, all records, reports, documents, and underlying data in its possession relevant to the implementation of this Decree and shall insert in contracts with project contractors and subcontractors a similar record retention requirement. Upon request of Ecology, Defendant shall make all non-archived records available to Ecology and allow access for review. All archived records shall be made available to Ecology within a reasonable period of time.

15. TRANSFER OF INTEREST IN PROPERTY

A. No voluntary or involuntary conveyance or relinquishment of title, easement, leasehold, or other interest in any site or portion of any site shall be consummated without provision for continued operation and maintenance of any containment system, treatment system, and monitoring system installed or implemented pursuant to this Decree.

B. Before transferring any legal or equitable interest in all or any portion of a site during the effective period of this Decree, Defendant shall serve a copy of this Decree upon any prospective purchaser, lessee, transferee, assignee, or other successor in interest of the site; and, at least 30 days before any transfer, Defendant shall notify Ecology of the contemplated transfer.

C. Nothing in this Decree prevents the City or the FWDA from negotiating with purchasers, lessees, or other third parties to allocate remedial action costs and responsibilities, provided that such contractual arrangements are not in breach of this Decree and do not affect the City's or the FWDA's liability under this Decree.

16. RESOLUTION OF DISPUTES

A. Unless otherwise specified in this Decree, in the event a dispute arises as to an approval, disapproval, proposed modification or other decision or action by Ecology's project coordinator, the parties shall utilize the dispute resolution procedure set forth below.

(1) Upon receipt of the Ecology project coordinator's decision, the Defendant has 14 days within which to notify Ecology's project coordinator of its objection to the decision.

(2) The parties' project coordinators shall then confer in an effort to resolve the dispute. If the project coordinators cannot resolve the dispute within 14 days, Ecology's project coordinator shall issue a written decision.

(3) Defendant may then request Ecology management review of the decision. This request shall be submitted in writing to the Toxics Cleanup Program Manager within 7 days of receipt of Ecology's project coordinator's decision.

(4) Ecology's Toxics Cleanup Program Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute within 30 days of the Defendant's request for review. The Program Manager's decision shall be Ecology's final decision on the disputed matter.

B. Unless otherwise specified in this Decree, if Ecology's final written decision is unacceptable to Defendant, Defendant has the right to submit the dispute to the Court for resolution. The Parties agree that one judge should retain jurisdiction over this case and shall, as necessary, resolve any dispute arising under this Decree. In the event Defendant presents an issue to the Court for review, the Court shall review the action or decision of Ecology on the

basis of whether such action or decision was arbitrary and capricious and render a decision based on such standard of review.

C. The Parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used. Where either Party utilizes the dispute resolution process in bad faith or for purposes of delay, the other party may seek sanctions.

D. Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Decree, unless Ecology agrees in writing to a schedule extension or the Court so orders.

17. AMENDMENTS; ADDING NEW PARTIES

A. Amendments of this Decree that will directly affect all parcels covered by it may be processed through a written stipulation among the Decree signatories that is entered by the Court or by order of the Court. Agreement to amend shall not be unreasonably withheld by any signatory to the Decree. Amendments to the Decree that affect only specific parcels require written stipulation by Ecology, the City, the FWDA, and the affected Party. This includes amendments to add a new party and amendments to include a site-specific cleanup action plan (SCAP). All amendments shall become effective upon entry by the Court.

B. With respect to amendments of the Decree for the purpose of including SCAPs, after Ecology issues a final SCAP for a site, with the concurrence of the Attorney General, the signatories shall sign a copy of Exhibit F, an "Amendment to Consent Decree to Include Site Specific Cleanup Action Plan" and it shall be submitted for entry with the Court.

C. Defendants may amend the Consent Decree to make a Successor Owner or Operator a party to the Decree, using the following procedure. Any proposed Successor Owner or Operator that will design or construct a cleanup action must become a party to the Decree by signing a copy of the "Successor Owner or Operator Agreement" in Amended

Exhibit G, thereby consenting to be bound by the terms and conditions of this Decree as it applies to the particular parcel in which they are assuming an interest. This Agreement does not make new Parties jointly and severally liable for Sites for which they are not a Successor Owner or Operator. The signed Successor Owner or Operator Agreement shall be sent to Ecology. If Ecology and the Attorney General consent to the proposed amendment, the Amendment shall be submitted for entry with the Court. This Decree is not a unique circumstances consent decree under RCW 70.105D.040(4)(e)(ii).

D. After this Decree has been amended to include a final SCAP for a particular site, any Successor Owner or Operator of that site who is not a party to this Decree and who meets the criteria in RCW 70.105D.040(4)(e)(i) is not subject to enforcement by the State and is not liable for claims for contribution regarding matters addressed in the settlement.

E. For all amendments not covered by paragraphs B and C of this section, Defendant shall submit any request for an amendment to Ecology and the Attorney General for approval. Ecology shall indicate its approval or disapproval in a timely manner after the request for amendment is received. If the amendment to the Decree is substantial, Ecology will provide public notice and opportunity for comment. Reasons for the disapproval shall be stated in writing. If Ecology or the Attorney General does not agree to any proposed amendment, the disagreement may be addressed through the dispute resolution procedures described in Section 16 of this Decree.

18. EXTENSION OF SCHEDULE

A. An extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least 30 days prior to expiration of the deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify the reason the extension is needed.

An extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. A requested extension shall not be effective until approved by Ecology or the Court. Ecology shall act upon any written request for extension in a timely fashion. It shall not be necessary to formally amend this Decree pursuant to Section 17 when a schedule extension is granted.

B. The burden shall be on the Defendant to demonstrate to the satisfaction of Ecology that the request for such extension has been submitted in a timely fashion and that good cause exists for granting the extension. Good cause includes, but is not limited to, the following.

(1) Circumstances beyond the reasonable control and despite the due diligence of Defendant including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by Defendant; or

(2) Acts of God, including fire, flood, blizzard, extreme temperatures, storm, or other unavoidable casualty; or

(3) Endangerment as described in Section 19.

However, neither increased costs of performance of the terms of the Decree nor changed economic circumstances shall be considered circumstances beyond the reasonable control of Defendant.

C. Ecology may extend the schedule for a period not to exceed 90 days, except where an extension is needed as a result of:

(1) Delays in the issuance of a necessary permit which was applied for in a timely manner; or

(2) Other circumstances deemed exceptional or extraordinary by Ecology; or

(3) Endangerment as described in Section 19.

Ecology shall give Defendant written notification in a timely fashion of any extensions granted pursuant to this Decree.

19. ENDANGERMENT

A. In the event Ecology determines that activities implementing or in noncompliance with this Decree, or any other circumstances or activities, are creating or have the potential to create a danger to the health or welfare of the people on the site or in the surrounding area or to the environment, Ecology may order Defendant to stop further implementation of this Decree for such period of time as needed to abate the danger or may petition the Court for an order as appropriate. During any stoppage of work under this section, the obligations of Defendant with respect to the work under this Decree which is ordered to be stopped shall be suspended and the time periods for performance of that work, as well as the time period for any other work dependent upon the work which is stopped, shall be extended, pursuant to Section 18 of this Decree, for such period of time as Ecology determines is reasonable under the circumstances.

B. In the event Defendant determines that activities undertaken in furtherance of this Decree or any other circumstances or activities are creating an endangerment to the people on the site or in the surrounding area or to the environment, Defendant may stop implementation of this Decree for such period of time necessary for Ecology to evaluate the situation and determine whether Defendant should proceed with implementation of the Decree or whether the work stoppage should be continued until the danger is abated. Defendant shall notify Ecology's project coordinator as soon as possible, but no later than 24 hours after such stoppage of work, and thereafter provide Ecology with documentation of the basis for the work

stoppage. If Ecology disagrees with the Defendant's determination, it may order Defendant to resume implementation of this Decree. If Ecology concurs with the work stoppage, the Defendant's obligations shall be suspended and the time period for performance of that work, as well as the time period for any other work dependent upon the work which was stopped, shall be extended, pursuant to Section 18 of this Decree, for such period of time as Ecology determines is reasonable under the circumstances. Any disagreements pursuant to the clause shall be resolved through the dispute resolution procedures in Section 16.

20. OTHER ACTIONS

A. Ecology reserves its rights to institute remedial action at the site and subsequently pursue cost recovery, and Ecology reserves its rights to issue orders and/or penalties or take any other enforcement action pursuant to available statutory authority under the following circumstances:

(1) Where Defendant fails, after notice, to comply with any requirement of this Decree;

(2) In the event or upon the discovery of a release or threatened release not addressed by this Decree;

(3) Upon Ecology's determination that action beyond the terms of this Decree is necessary to abate an emergency situation which threatens public health or welfare or the environment; or

(4) Upon the occurrence or discovery of a situation beyond the scope of this Decree as to which Ecology would be empowered to perform any remedial action or to issue an order and/or penalty, or to take any other enforcement action. This Decree is limited in scope to each site described in Section 2 and to those types and maximum concentrations of hazardous substances that are on site at the time this Decree is

entered, and are described in Section 3.2 of the Thea Foss Redevelopment Cleanup Action Plan, attached as Exhibit C.

B. Ecology reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances from each site.

C. Ecology reserves the right to take any enforcement action whatsoever, including a cost recovery action, against potentially liable persons not party to this Decree.

D. Ecology reserves the right to remove all or a portion of a site from this Decree and take separate enforcement actions against Defendants at that site if Ecology determines it is necessary to do so to meet Ecology's source control obligations under the 1994 Cooperative Agreement between Ecology and EPA.

21. INDEMNIFICATION

Each Defendant agrees to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action for death or injuries to persons or for loss or damage to property arising from or on account of acts or omissions of Defendant, its officers, employees, agents, or contractors in entering into and implementing this Decree. However, no Defendant is obligated to indemnify the State of Washington, or save or hold its employees and agents harmless, from any claims or causes of action arising out of the negligent acts or omissions of the State of Washington, or the employees or agents of the state, in implementing the activities pursuant to this Decree.

22. COMPLIANCE WITH APPLICABLE LAWS

All actions carried out by a Defendant pursuant to this Decree shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits.

23. REMEDIAL AND INVESTIGATIVE COSTS

Each Defendant agrees to pay costs incurred by Ecology pursuant to this Decree. The costs required to be paid under this Decree shall include work performed by Ecology or its contractors for, or on, each site under ch. 70.105D RCW both prior to and subsequent to the issuance of this Decree, for investigations, remedial actions, and Decree preparation, negotiations, oversight and administration. Ecology costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). Defendant agrees to pay the required amount within 90 days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A general statement of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Failure to pay Ecology's costs within 90 days of receipt of the itemized statement will result in interest charges.

Ecology entered into an agreement with the City of Tacoma, dated June 14, 1993 to receive prepayment of remedial action costs associated with sites under this Decree. Ecology and the City may enter into additional prepayment agreements for sites under the Decree. If the City pays remedial action costs pursuant to a prepayment agreement with Ecology for a site under this Decree, it shall not be required to pay those costs again under this Consent Decree. The City is not released from liability for payment of remedial action costs to Ecology should the City of Tacoma fail to comply with the conditions of such a prepayment agreement, or should prepayment agreement be found to be invalid for any reason.

24. IMPLEMENTATION OF REMEDIAL ACTION

If Ecology determines that a Defendant has failed without good cause to implement the remedial action called for by this Decree, Ecology may, after notice to Defendant, perform any or all portions of the remedial action(s) that remain incomplete. If Ecology performs all or

portions of the remedial action because of the Defendant's failure to comply with its obligations under this Decree, Defendant shall reimburse Ecology for the costs of doing such work in accordance with Section 23, provided that Defendant is not obligated under this section to reimburse Ecology for costs incurred for work inconsistent with or beyond the scope of this Decree.

25. FIVE YEAR REVIEW

As remedial action, including ground water monitoring, continues at the site, the parties agree to review the progress of remedial action at the site, and to review the data accumulated as a result of site monitoring as often as is necessary and appropriate under the circumstances. At least every five years the parties shall meet to discuss the status of the site and the need, if any, of further remedial action at the site. Ecology reserves the right to require further remedial action at the site under appropriate circumstances. This provision shall remain in effect for the duration of the Decree.

26. PUBLIC PARTICIPATION

Ecology shall maintain the responsibility for public participation at each site. However, each Defendant shall cooperate with Ecology and, if agreed to by Ecology, shall:

A. Prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans and the completion of engineering design. Ecology will finalize (including editing if necessary) and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings;

B. Notify Ecology's project coordinator prior to the preparation of all press releases and fact sheets, and before major meetings with the interested public and local governments. Likewise, Ecology shall notify Defendant prior to the issuance of all press releases and fact sheets, and before major meetings with the interested public and local governments;

C. Participate in public presentations on the progress of the remedial action at the site. Participation may be through attendance at public meetings to assist in answering questions, or as a presenter;

D. In cooperation with Ecology, arrange and/or continue information repositories to be located at the Tacoma Public Library, Main Branch, and Ecology's Southwest Regional Office. At a minimum, copies of all public notices, fact sheets, and press releases; all quality assured ground water, surface water, soil sediment, and air monitoring data; remedial actions plans, supplemental remedial planning documents, and all other similar documents relating to performance of the remedial action required by this Decree shall be promptly placed in these repositories.

27. DURATION OF DECREE

A. This Decree shall remain in effect and the remedial program described in the Decree shall be maintained and continued for a Site until the Defendant has received written notification from Ecology that the requirements of this Decree have been satisfactorily completed as to that site. Upon completion of active remedial actions specified under the SCAP, a Defendant may request, and if warranted Ecology will issue, a written confirmation that such active remedial actions have been completed.

B. This Decree shall apply to any property within the geographic boundary described in Amended Exhibit A for which Ecology has received a Notice of Intent to Proceed under Section 7.B within 5 years of the effective date of this Decree, or within 5 years of the effective date of the First Comprehensive Amendment to the Decree.

C. After five years from the effective date of the First Comprehensive Amendment to this Decree:

(1) Ecology and the Attorney General at their convenience may terminate this Decree as to any site not within the scope of paragraph B of this

section at any time prior to or within 21 days of receipt of a Notice of Intent to Proceed under Section 7.B of this Decree, by providing 60 days written notice of termination to Defendant.

(2) Defendant at its convenience may terminate this Decree as to any site not within the scope of paragraph B of this section at any time prior to receipt by Ecology of a Notice of Intent to Proceed, by providing 60 days written notice to Ecology and the Attorney General.

28. CLAIMS AGAINST THE STATE

Each Defendant hereby agrees that it will not seek to recover any costs accrued in implementing the remedial action required by this Decree from the State of Washington Department of Ecology; and further, that the Defendant will make no claim against the state Toxics Control Account for any costs incurred in implementing this Decree. Except as provided above, however, Defendant expressly reserves its right to seek to recover any costs incurred in implementing this Decree from any other potentially liable person under state or federal law.

29. COVENANT NOT TO SUE: REOPENER

In consideration of Defendant's compliance with provisions of this Decree, Ecology covenants not to institute further legal or administrative actions against Defendant regarding matters within the scope of this Decree. This covenant is limited in its application to the sites described in Section 2 of this Decree and to the types and maximum concentrations of hazardous substances that are on site at the time this Decree is entered, and are described in Section 3.2 of the Thea Foss Redevelopment Cleanup Action Plan, attached as Exhibit C. This covenant is not applicable to any other area, substances, or concentrations of substances. This covenant is contingent upon Defendant's compliance with all terms and conditions of this

Decree. This covenant does not affect Ecology's right to seek recovery for natural resource damages.

A. Reopeners: Notwithstanding the covenant given above, Ecology reserves the right to institute legal or administrative actions against a Defendant seeking to require them to perform additional response actions at a site under this Decree, and to pursue appropriate cost recovery in accordance with provisions set out in RCW 70.105D.050, under the following circumstances:

(1) If Defendants fail to meet the requirements of this Decree, including, but not limited to, failure of the remedial action to meet the cleanup standards identified in the Thea Foss Redevelopment Cleanup Action Plan (Exhibit C) and the SCAP for that site;

(2) Upon Ecology's determination that action beyond the terms of this Decree is necessary to abate an imminent and substantial endangerment to public health or welfare or the environment;

(3) In the event new information becomes available regarding factors previously unknown to Ecology, including the nature or quantity of hazardous substances at the Site, and Ecology determines, in light of this information, that further remedial action is necessary at the Site to protect human health or the environment, and Defendants, after notice, fail to take the necessary action within a reasonable time;

(4) In the event the assumptions upon which the cleanup remedies agreed to in the Thea Foss Redevelopment Cleanup Action Plan and the SCAP for the site were based do not prove to be true or accurate;

(5) In the event the remedial action conducted at the Site fails to meet the requirements set forth in the Thea Foss Redevelopment Cleanup Action Plan and the SCAP for the site; and

(6) In the event more stringent or different cleanup standards or other regulatory requirements regarding remedial action Under MTCA are adopted by the Washington State Legislature or by Ecology if it determines that applying the new standards to a particular site is necessary to protect human health or the environment.

Further, if factors or conditions at the site, previously unknown to Ecology, are discovered after entry of this Decree, and these unknown factors or conditions indicate that the remedial action is not protective of the public health, or welfare, or the environment, or present a previously unknown threat to human health or the environment, Ecology also reserves the right to request the court to amend this covenant not to sue as required by RCW 70.105D.040(4)(c).

B. Applicability: The Covenant Not to Sue set forth above shall have no applicability whatsoever to

(1) Criminal liability;

(2) Liability for damages to natural resources;

(3) Any Ecology action against potentially liable parties not party to this Decree;

(4) Groundwater contamination that may exist at any of the property covered under Section 2.A that requires active remediation;

(5) Property covered under Section 2.A on which Defendant does not fully implement all remedial actions under this Decree, including a SCAP;

(6) Any portion of a site between the mean high water mark and the low water mark.

30. EFFECTIVE DATE

This Decree was originally effective on October 17, 1994, the date it was entered by the Court. The "Consent Decree – First Comprehensive Amendment" is effective on the date it is entered by the Court.

31. PUBLIC NOTICE AND WITHDRAWAL OF CONSENT

This Decree has been the subject of public notice and comment under RCW 70.105D.040(4)(a). As a result of this process, Ecology has found that this Decree will lead to a more expeditious cleanup of hazardous substances at the site.

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If the Court withholds or withdraws its consent to this Decree, it shall be null and void at the option of any Party and the accompanying Complaint shall be dismissed without costs and without prejudice. In such an event, no Party shall be bound by the requirements of this Decree.

DATED this _____ day of _____, 2002.

_____
JUDGE/COMMISSIONER
Pierce County Superior Court

DEPARTMENT OF ECOLOGY

_____
JAMES PENDOWSKI
Program Manager
Toxics Cleanup Program
Date: _____

CHRISTINE O. GREGOIRE
Attorney General

_____
STEVEN J. THIELE, WSBA #20275
Assistant Attorney General
Attorneys for Plaintiff
Department of Ecology
Date: _____

CITY OF TACOMA

By: _____
Date: _____
Name: _____
Title: _____

_____
DOUGLAS F. MOSICH, WSBA #18341
Attorney for City of Tacoma
Date: _____

FOSS WATERWAY DEVELOPMENT AUTHORITY

_____
DONALD G. MEYER
Executive Director
Date: _____

PRESTON GATES & ELLIS LLP

_____
KIRK A. LILLEY, WSBA #20369
Attorneys for Foss Waterway Development Authority
Date: _____

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WORKING/REFERENCE COPY

EXHIBIT C

THEA FOSS REDEVELOPMENT CLEANUP ACTION PLAN

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CONTINUED

THEA FOSS AREA WIDE CONSENT DECREE
CLEANUP ACTION PLAN

1.0 INTRODUCTION

This final Cleanup Action Plan (CAP) is provided to describe the proposed remedial actions for certain Thea Foss Area-Wide Redevelopment Properties (hereinafter collectively referred to as "Site"; individual parcels referred to as "site(s)") located along the upland portions of the Thea Foss Waterway in Tacoma, Washington as more fully described in Section 2.1. (Figure 1-1 shows the entire Thea Foss Waterway Area; Figure 1-2 shows the sites subject to this Cleanup Action Plan.) This CAP has been prepared to satisfy the requirements of the Model Toxics Control Act (MTCA). The purposes of this Cleanup Action Plan are to: 1) describe the Site, including a summary of its history and extent of contamination as presented in the Area-Wide Feasibility Study and Phase I Remedial Investigation (Area-Wide Report); 2) identify the site specific cleanup standards; 3) summarize the remedial alternatives presented in the Feasibility Study (FS); and 4) identify and describe the selected alternative for Site remediation.

A major component of the City of Tacoma's Thea Foss Waterway Environmental Master Plan project is to facilitate the cleanup process on the publicly owned upland properties. These cleanups are expected to be conducted under a Consent Decree which would have jurisdiction over the investigation, design and cleanup processes on these public properties and will define potential cleanup action alternatives based on future use and contaminants encountered. In compliance with the Washington State Model Toxics Control Act (MTCA), the Consent Decree is accompanied by this Cleanup Action Plan which defines the Ecology requirements for cleanup actions conducted under the Consent Decree.

This CAP establishes potential remedial actions for a number of properties, described in Section 2.1, below. Some of the properties potentially subject to this CAP are currently known to be contaminated and some are not. Some are currently owned by the City and the Metropolitan Park District of Tacoma and some are not. Those properties potentially subject to this CAP that are not reported as or determined to be cleanup sites, and those properties that are not purchased by the City or the Park District at some time in the future will not be cleaned up under the Decree or this CAP.

Thorough descriptions of the Site and the remedial alternatives set forth are found in the Area-Wide Report (B & V Waste Science and Technology Corp. (BVWST), 1994). The Area-Wide Report was generated as an independant action by the City of Tacoma, with technical assistance by Ecology.

2.0 SITE DESCRIPTION

The Thea Foss Waterway is comprised of approximately three and one-half miles of shoreline adjacent to the City of Tacoma central business district (Figure 1-1). The upland properties on the Thea Foss Waterway have been sites of

industrial activity since 1852. Lumber mills were the original industry until the 1880's when shipping and warehousing began to dominate the waterfront. Since the turn of the century, shipyards, asphalt and concrete plants, flour mills, metal plating and foundry facilities, and other industrial based operations have occurred along the waterway.

Since the late 1970s, the properties adjacent to the waterway have, for the most part, become vacant. In 1991 the City of Tacoma (City) and the Metropolitan Park District of Tacoma (MPD) began acquiring 27 acres of property adjacent to the Waterway with plans for future redevelopment. Some of these properties were known to contain varying amounts of contamination. The City of Tacoma redevelopment plans, which were formalized in the *Thea Foss Waterway Design and Development Plan* (MAKERS 1992), focus on transitioning the area from abandoned industrial land to a thriving commercial, retail, office, and residential setting.

2.1 Applicable Properties

Previous investigations indicate that the properties adjacent to the waterway subject to this CAP are likely to have similar physical characteristics and similar potential contaminant problems. Previous studies also indicate that identified contamination is primarily due to petroleum related spills and discharges, and metals wastes.

The similarities include physical setting, past use, future use, and contamination characteristics. These similarities facilitate the development of a comprehensive environmental cleanup solution for all of the publicly owned properties adjacent to the waterway.

The specific properties to which this CAP potentially applies are: Dock Street Right of Way (ROW), Municipal Dock, Former Atlas Foundry, Coast Iron Works, Former Steam Plant, Johnny's Seafood, parcels 1A, 1B, 1C, 1D, 2, 3A, 3B, 3C, 5, 7, 8, and 9, 15th Street ROW, 18th Street ROW, 11th Street ROW, Sewage Pump Station, Investco property, Trucco property, Harmon Cabinets and any State Department of Natural Resources (DNR) property. Parcels 4A, 4B and the area labeled "Former Coal Gasification Site" are known to be contaminated by a former manufactured coal gasification facility and are sources of contamination to the waterway. The cleanup of the Former Coal Gasification Site is currently being addressed under a separate Agreed Order DE 93TC-S166 (dated October 28, 1993) with Ecology and is not within the scope of this CAP.

This Cleanup Action Plan applies to the above properties located adjacent to the Thea Foss Waterway, shown in Figure 1-2, which meet all the following criteria:

- Are owned now or in the future by the City of Tacoma or the Metropolitan Park District of Tacoma.

- Are located within boundaries defined by Dock Street, inclusive, and the Waterway between parcel 1A and the Harmon Cabinets property, and the sewage pump station on the west side of the Waterway, or are one of the selected parcels on the east side of the Waterway, as shown in Figure 1-2.

- Have contamination of sufficient degree to warrant a cleanup under MTCA (Chapter 70.105D RCW).

- Have only the contaminants listed in Table 3-1 with site-wide concentrations less than or equal to the maximums which are listed in Table 3-1 and detailed in Section 3.2.

- Have soil contamination only. Parcels with ground water contamination which, in Ecology's opinion, requires active remediation (defined in subsection 4.2.1), are not addressed by this Cleanup Action Plan.

2.2 Waterway Area Characteristics

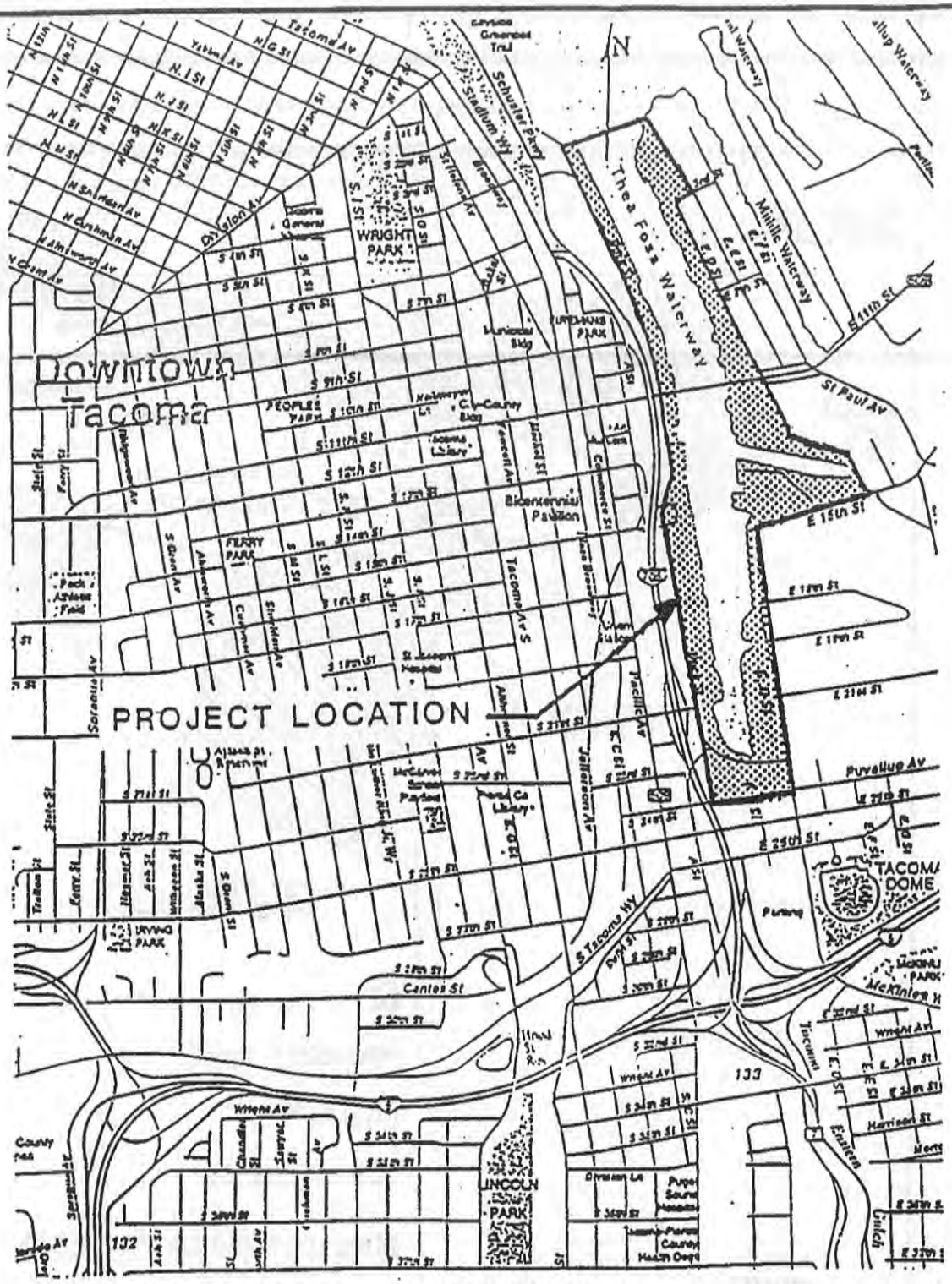
Characteristics of the Site, including area geology, hydrogeology, vegetation, terrestrial wildlife resources, aquatic resources, and environmentally sensitive species and areas are described in detail in Sections 3.0 and 4.0 of the Area-Wide Report.

2.3 Commencement Bay Superfund Site Considerations

In 1983, the Commencement Bay area was identified as a federal Superfund site. Thea Foss Waterway marine sediments were found to be contaminated with metals, polynuclear aromatic hydrocarbons (PAHs), oil and grease (treated herein as TPH), polychlorinated biphenyls (PCBs), and other organic chemicals (Tetra Tech, 1985, 1988). The Record of Decision for the Commencement Bay Nearshore/Tideflats Superfund Site (US EPA, 1989) defines the cleanup plan for the marine environment throughout the superfund site. The overall objective of the plan is to achieve sediment quality in the bay that will support a healthy marine environment and will reduce the risk of eating contaminated seafood from the bay.

The selected remedy calls for: 1) continued public health warnings on seafood consumption, 2) source control, 3) natural recovery of marginally contaminated sediments, 4) active cleanup of significantly contaminated sediments, and 5) long-term monitoring. To implement the cleanup plan, EPA and Ecology entered into an agreement in which Ecology is lead for source control and EPA is the lead for sediment remedial action.

The Source Control Strategy (EPA, May 1992) describes Ecology's source control efforts. The source identification phase is complete in the Thea Foss and Wheeler Osgood Waterways. Ecology is continuing its work on source characterization and source control.



CITY OF TACOMA
THEA FOSS WATERWAY
ENVIRONMENTAL MASTER PLAN

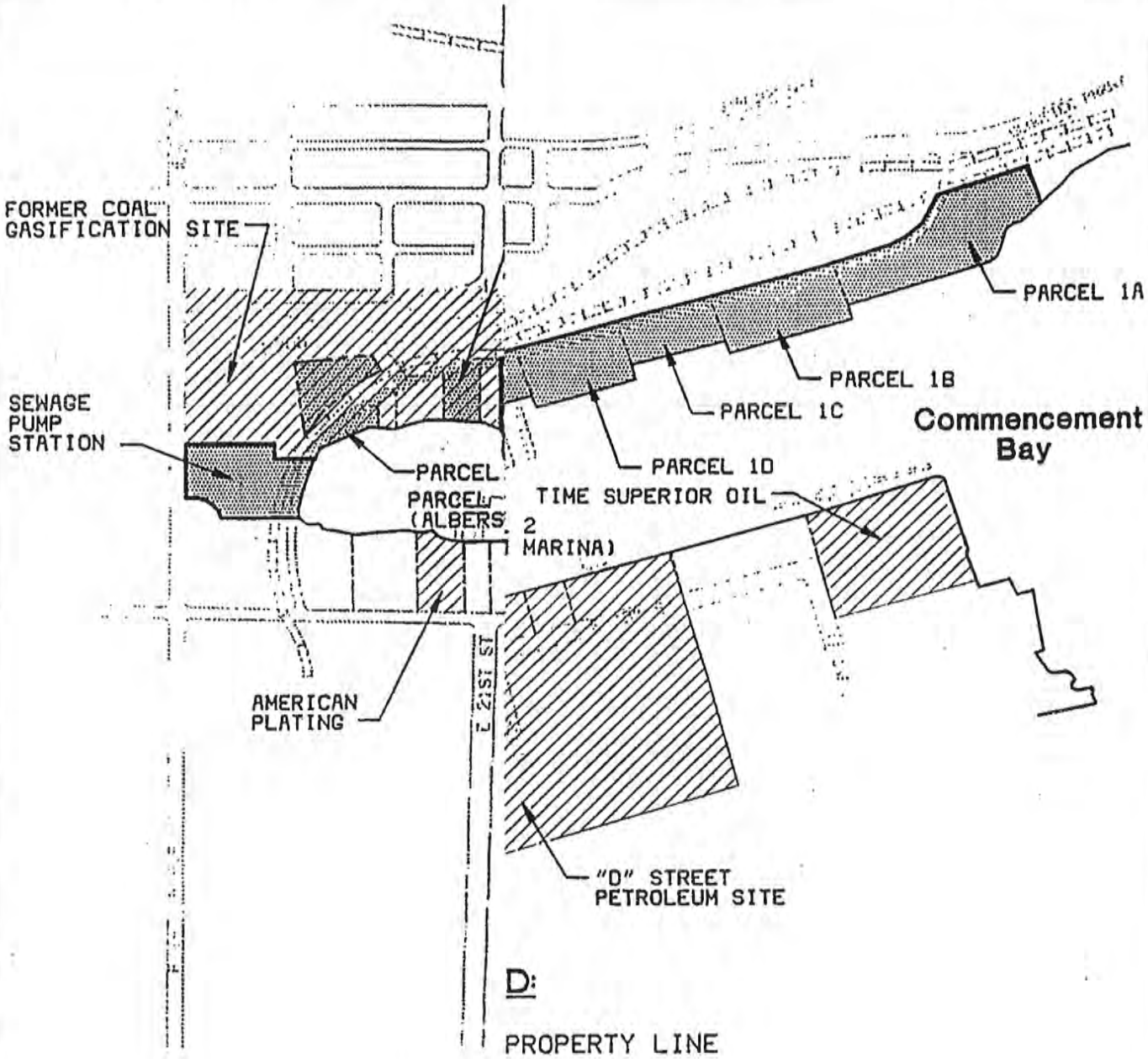
CLEANUP ACTION PLAN

ECOLOGY

BLACK & VEATCH
Waste Science, Inc.
1201 PACIFIC AVE.
SUITE 1100
TACOMA, WA. 98402
(206) 383-1436

LOCATION MAP

FIGURE 1-1



D:

PROPERTY LINE

RAILROAD

BOAT MOORAGE

PUBLICLY OWNED PROPERTY

NOTE:

PROPERTIES UNDER SEPERA ORDERS ARE NOT COVERED CONSENT DECREE.

EXTENT OF DOE CONSENT DECREE JURISDICTION

PROPERTIES WITH OR SOON TO HAVE A SEPARATE ADMINISTRATIVE ORDER IN PLACE (BOUNDARIES ARE APPROXIMATE).

CITY OF TACOMA
THEA FOSS WATERWAY
ENVIRONMENTAL MASTER PLAN

SITE MAP

FIGURE 1-2

ECO-F001

Planning for sediment cleanup has also begun in the Thea Foss and Wheeler Osgood Waterways. EPA and and the City of Tacoma signed an Administrative Order on Consent on March 23, 1994 that calls for sediment remedial design in the Thea Foss and Wheeler Osgood Waterways. Remedial design work will confirm natural recovery estimates, designate areas and volumes of sediment needing cleanup, identify potential disposal sites and cleanup options. During remedial design, EPA will determine whether source control is complete enough to move forward with sediment remedial action. Decisions on these matters will be subject to public comment before a final cleanup decision is made.

3.0 SITE CHARACTERIZATION

3.1 Previous Investigations

During 1993 and early 1994, the City's contractor, BVWST, performed a study and compilation of previous environmental investigations performed on properties along the Thea Foss Waterway. With Ecology technical assistance, the City then generated an Area-Wide Feasibility Study and Phase I Remedial Investigation report (Area-Wide Report), with the objectives of: 1) evaluating alternatives available to provide a permanent site remedy for the waterway area, in accordance with the Model Toxics Control Act, and 2) providing a framework for site specific remedial investigations, to be performed as waterway properties are developed. The Area-Wide Report was submitted to Ecology in March 1994.

3.1.1 Summary of Investigations

Under previous investigations, soil and ground water environmental samples have been collected from 15 of the properties adjacent to the Thea Foss Waterway currently owned by the City or the MPD (hereinafter: "publicly owned"). Properties considered under this Cleanup Action Plan which have notbeen sampled are Parcel 1B, the Municipal Dock, Johnny's Seafood, the 15th Street right-of-way (ROW), the sewage pump station, and the East 11th Street ROW. The environmental samples were collected during environmental assessments and underground storage tank (UST) removals. The combined data from these individual sampling efforts, and from limited additional sampling conducted by the City, provides a basis for the environmental evaluation of the properties in this Cleanup Action Plan and development of the FS Contaminant Scenario presented in Chapter 6.0 of the Area Wide Report (BVWST 1994).

In May 1990, a Phase I Environmental Assessment was conducted on several parcels on the west side of the Thea Foss Waterway (Parametrix, Inc. 1990). The individual assessments were performed by collecting and reviewing historical data, conducting interviews with current and previous employees or owners of the parcels, and visiting the parcels. These assessments were performed at the Municipal Dock Building, the former Atlas Foundry/Coast Iron Works properties, the former Steam Plant property, East 18th Street ROW, Parcel 7, and Parcel 4A. A low to moderate potential for soil and ground

water contamination was indicated for all of these parcels except Parcel 4A which was given moderate to high potential due to proximity to the former coal gasification plant site.

In December 1990, a Phase II Environmental Site Assessment was conducted prior to the City and MPD purchase of several parcels adjacent to the Thea Foss Waterway. Soil samples were collected from Parcels 1A, 1C, 1D, 3A, 3B, 3C, 4A, 5, 7, and 8 (Bison Engineering, Inc. 1990). However, some problems are noted with this report. The detection limits used for arsenic (3.3 ppm), hexachlorobenzene (2.0 ppm) and individual carcinogenic polycyclic aromatic hydrocarbons (PAH) (1.0 ppm) were generally greater than the MTCA Method B cleanup standards of 1.43 ppm, 0.63 ppm, and 0.14 ppm, respectively. Additionally, the documentation of composite samples is not consistent. Additional site characterizations have been conducted on Parcel 3, Parcel 7, Parcel 2, the Atlas Foundry property, the Coast Iron Works property, and the Steam Plant property.

Soil samples were collected from Parcel 3 during two separate UST removals (Tacoma-Pierce County Health Department (TPCHD) UST File 1993) and prior to an interim beautification measure on the property (Spectra Laboratories, Inc. 1993). In addition, ground water samples were collected from Parcel 3 as part of a City Waterway Special Study Report (Ecology and Environment, Inc. 1990). The ground water samples collected as a part of this study were not collected from wells constructed in accordance with Chapter 173-160 WAC. Therefore, these data can only be used to indicate the possible presence of contamination. In addition, some samples did not meet holding time or other QC limits and others had sodium interference which prohibited the results for the total halogenated hydrocarbon analyses from being obtained.

At Parcel 7, additional investigations included a Phase II Environmental Site Assessment (Kennedy/Jenks Consultants 1991), and a Site Characterization and Remedial Alternatives Investigation (BVWST 1993). Multiple soil samples were collected from the Totem Marina property while three USTs were removed and the soil adjacent to the tanks was remediated by aerating stockpiled soils onsite (TPCHD UST File 1993).

One slag sample was collected at the former Atlas Foundry site from a location immediately above the waterline of the Thea Foss Waterway (Coleman 1992). Three soil samples were collected at the former Coast Iron Works site (Tacoma WWTP Laboratory 1990). During a TPCHD environmental assessment of the Steam Plant site, soil, sediment, sludge, brick, and concrete samples were collected and analyzed (TPCHD 1988).

3.1.2 Summary of Environmental Sampling Results

The upland soil organic contamination detected on all of the publicly owned properties along the Waterway can be generalized as weathered petroleum hydrocarbons resulting from past industrial practices. Nine of the thirteen publicly owned sites along the Waterway contained petroleum products or PAH detections greater than MTCA Method B cleanup standards. A majority of this

soil has not been remediated to date. However, there are also several sites where leaking underground storage tanks (LUSTs) have been removed and contaminated soils were remediated to the satisfaction of the TPCHD.

Four of the thirteen sites along the Waterway contained metals concentrations greater than MTCA Method B cleanup standards. One of these sites, the former Atlas Foundry site contains antimony, arsenic, chromium, copper and lead, all detected in a single slag sample from the Waterway bank at concentrations greater than the Method B soil cleanup standards. Much of the slag on the site may be able to be separated from the soil and removed from the site. The potential for metals contamination from leaching of this slag is unknown on this site. The former Steam Plant site contained one sample with mercury concentrations greater than the MTCA B soil cleanup standard. The other two sites (Parcels 3A and 7) each contained lead detected at concentrations greater than the cleanup standards. For Parcel 3A this detection was from a composite sample and for Parcel 7 this detection occurred in the Dock Street ROW, near the railroad ROW.

Ground water analytical data has been established for four publicly owned properties (Parcels 3A, 3B, 3C, and 7) and one privately owned property (Parcel 9) along the Waterway. None of the concentrations of chemicals from the ground water samples collected exceed the marine chronic surface water criteria per Chapter 173-201A WAC. Samples from three of the sites were ground water grab samples. Two of these sites (Parcels 3B and 3C) had concentrations of PAHs which exceed the standard for the protection of human health through the consumption of aquatic organisms per 40 CFR 131 Subpart D. However, these samples also had quality control problems which make the data suspect. If these chemicals are present, then a LUST is a potential source. However, since BTEX and TPH were not analyzed, verification of a LUST as a source is difficult. The two properties to the south (Parcel 7 and Parcel 9), had ground water samples collected from approved wells. PAHs were not detected in any of these wells, however, TPH and benzene were detected at elevated levels in one Parcel 7 well. These compounds are probably related to a LUST, recorded on the site, which was removed in 1989.

3.2 Soil Quality

The previous section discussed the contaminants that are known to be present on properties adjacent to the Waterway based on previous investigations. The major chemicals of concern in soils are TPH, the carcinogenic PAHs, metals, and PCBs. Additionally, the potential exists along the waterway for soil and ground water contamination caused by LUSTs. Because of this potential, BTEX is listed as a contaminant of concern.
For the Area-Wide Report, a "Feasibility Study (FS) Contaminant Scenario" was developed to describe the range of existing contaminants of concern. Based on existing data, future site specific investigations on parcels will likely identify site contamination which will fall within the parameters of this scenario. Site histories, previous land use and environmental investigations conducted to date indicate a low potential for other types of previously unidentified hazardous compounds in concentrations which would pose a threat

to human health and the environment. Further, relatively volatile contaminants are not expected to be present at elevated levels on parcels based primarily on the duration of time since industrial uses have occurred. Table 3-1 specifically identifies the primary chemicals of concern and the maximum concentrations expected. The Cleanup Action Plan is not applicable to any site that contains contaminants other than those listed in Table 3-1 or to any site with site-wide concentrations of any contaminants that exceed the maximum soil concentrations listed in Table 3-1. The maximum anticipated concentrations for TPH and the carcinogenic PAHs presented in Table 3-1 are based on the highest concentrations observed during previous investigations. The maximum concentration for benzene is based on a five percent benzene concentration common in gasoline. The reasonable maximum concentration for benzene was calculated as five percent of the TPH-G maximum of 5,000 mg/kg, or

Table 3-1
CAP Contaminant Scenario
Soil Contamination Maximums
Applicable to the CAP Contamination Scenario

Compound	Maximum Soil Concentration (mg/Kg)	Compound	Maximum Soil Concentration (mg/Kg)
TPH[1]	5,000	Indeno(1,2,3-cd)pyrene	10.0
Benzene	250	Antimony	320
Toluene	5,000	Arsenic	200[2]
Ethylbenzene	5,000	Cadmium	400
Xylenes	5,000	Chromium	4,000
Benzo(a)anthracene	10.0	Copper	29,600
Benzo(a)pyrene	10.0	Lead	2,500[3]
Benzo(b)fluoranthene	10.0	Mercury	240
Benzo(k)fluoranthene	10.0	Nickel	16,000
Chrysene	10.0	Zinc	240,000
Dibenzo(a,h)anthracene	10.0	PCBs (total)	50.0

1 TPH by WTPH 418.1 modified, WTPH-D, or WTPH-G analyses.
2 Based on background concentration.
3 Based on Method A standard.

250 mg/kg. The toluene, ethylbenzene, and xylene maximum soil concentrations were first calculated as ten times the soil standard for ground water protection (WAC 173-340-740(3)(a)(ii)(A)). However, this yielded unacceptably high values with respect to flammability. Therefore, the maximum soil concentrations deemed acceptable for the cleanup scenario for toluene, ethylbenzene, and xylene were set at 5,000 ppm. The ground water standard is based on the protection of surface water as discussed in Chapter 7.0 of the Area-Wide Report. The maximum concentration for xylene is based on the MTCA Method B ground water standard (WAC 173-340-720(3)) because xylene does not have a surface water standard. The maximum concentrations for antimony, cadmium, chromium, copper, mercury, nickel, and zinc are ten times the Method B soil standard. The maximum concentration for arsenic is ten times the background level of 20 ppm (WAC 173-340-740(2), Table 2). The maximum concentration for lead is ten times the Method A soil standard since there is no Method B standard for lead. PCBs have not been analyzed in soils during previous investigations, therefore PCB presence and concentrations are currently unknown. Any PCB contamination is expected to be localized and associated with a spill or catastrophic failure of a transformer. The maximum concentration for PCBs (total) has been set such that soils cleaned up under the CAP Contaminant Scenario would not be regulated by the Toxic Substances Control Act (TSCA) dangerous waste disposal regulations.

All maximum contamination concentrations described above define the upper limit of contamination of low to moderate concern, for which similar remedial technologies are applicable.

There are at least two sites along the Thea Foss Waterway where source materials (i.e. slag or masses of tar-like petroleum hydrocarbons) have been encountered in the soil matrix. The source materials have concentrations of contaminants which are greater than those described by this CAP Contaminant Scenario (Table 3-1). However, these contaminants are likely to be readily identifiable, separable and removable from the soil matrix. Based upon data included in a site-specific RI, Ecology, at its discretion, may determine that the presence of these materials does not exclude a site from applicability under this CAP. Analytical results obtained from these source materials should not be used in site-wide statistical concentration calculations.

Comprehensive subsurface investigations have not been conducted on each site, therefore, volumes of contaminated soils were estimated for use in the Feasibility Study. Both low and high estimates of contaminated volumes were used to define and compare alternatives for remediation. The volume estimates are provided in Table 3-2. These estimates were calculated based on the existing site data (Chapter 5.0 and Appendix A of the Area-Wide Report) and on the following assumptions:

- The low estimate assumes that all parcels north of the 11th Street bridge do not require remediation, and that other parcels individually contain soil contamination requiring remediation ranging from 0 percent (Coast Iron Works, Johnny's Seafood, and 11th St. ROW) to 50 percent (Atlas Foundary) of the parcel area.

- The high estimate assumes that individual parcels contain soil contamination which will require remediation ranging from 0 percent (Johnny's Seafood) to 80 percent (Atlas Foundary, Coast Iron Works, Steam Plant) of the parcel area.

- Contamination on each parcel is assumed to extend vertically to the water table. Static ground water is approximately 8 feet below existing grade.

The sum of the total volume of potentially contaminated soils on publicly owned properties adjacent to the Thea Foss Waterway is estimated between 60,000 cubic yards and 155,000 cubic yards.

3.3 Ground Water Quality

As discussed in Section 7.0 of the Area-Wide Report, shallow ground water at the site is not a current or potential future source of drinking water due to the fact that the near-surface water-bearing zones in the Site are expected to produce relatively poor quality water, based on secondary water quality standards. Because of this, ground water quality will be evaluated with respect to its potential to discharge to the closest surface water body and will therefore be compared with federal and state marine surface water quality standards.

As stated in Section 3.1.2 ground water environmental samples have been collected from only five properties adjacent to the waterway that are not under another administrative order. Data from only two of these properties was properly collected and documented. Only TPH and benzene were detected at elevated levels in only one of the wells. All other ground water samples collected from these properties were free of contaminants at levels that indicate ground water contamination above marine surface water quality standards.

Table 3-2
Estimated Volumes of Soil Requiring Remediation

Property	Total Area (sq ft)	Estimated % Requiring Remediation		Depth of Remediation (ft)	Estimated Area (sq ft) Requiring Remediation		Estimated Volume (cu ft) Requiring Remediation		Estimated Volume (cu yd) Requiring Remediation	
		low	high		low	high	low	high	low	high
Parcel 1A	60,000	0%	0%	8	0	0	0	0	0	0
Parcel 1B	67,500	0%	0%	8	0	0	0	0	0	0
Parcel 1C	57,000	0%	0%	8	0	0	0	0	0	0
Parcel 1D	67,500	0%	5%	8	0	3,375	0	27,000	0	1,000
Totem Marina	200,000	0%	5%	8	0	10,000	0	80,000	0	3,000
Municipal Dock	45,000	0%	0%	8	0	0	0	0	0	0
Atlas Foundry	45,000	50%	80%	8	22,500	36,000	180,000	288,000	6,700	10,700
Coast Iron Works	37,500	0%	80%	8	0	30,000	0	240,000	0	8,900
Steam Plant	22,500	40%	80%	8	9,000	18,000	72,000	144,000	2,700	5,300
Johnny's Seafood	3,750	0%	0%	8	0	0	0	0	0	0
Parcel 3A	169,000	20%	50%	8	33,800	84,500	270,400	676,000	10,000	25,000
Parcel 3B	136,000	20%	50%	8	27,200	68,000	217,600	544,000	8,100	20,100
Parcel 3C	59,400	20%	50%	8	11,880	29,700	95,040	237,600	3,500	8,800
Parcel 7	77,500	43%	60%	8	33,325	46,500	266,600	372,000	9,900	13,800
Parcel 4A	28,500	10%	50%	8	2,850	14,250	22,800	114,000	800	4,200
Sewage Pump Station	113,000	10%	60%	8	11,300	67,800	90,400	542,400	3,300	20,100
Parcel 5	81,000	30%	50%	8	24,300	40,500	194,400	324,000	7,200	12,000
Parcel 8	75,000	30%	75%	8	22,500	56,200	180,000	450,000	6,700	16,700
11th Street ROW	52,000	0%	30%	8	0	15,600	0	124,800	0	4,600
Totals									58,900	154,200

Some contaminants, particularly those typically associated with petroleum products from LUSTs, may be found in the ground water. Ground water contamination for which soil remediation is an appropriate remedial alternative is addressed by this CAP. However, this CAP will not be applicable to sites at which the type and concentrations of contaminants found in ground water are of a nature to warrant active ground water remediation.

3.4 Surface Water Quality:

Surface water resulting from precipitation occurs onsite and primarily runs overland to City of Tacoma storm drains along Dock Street or D Street, depending upon the specific property location. These storm drains eventually discharge to the Thea Foss Waterway. Some precipitation runoff discharges directly to the waterway from near-shore upland and waterway bank areas.

The City of Tacoma's storm drains will be addressed by an NPDES permit and are also included in the Agreed Order on Consent (AOC) for the Thea Foss Waterway under the EPA CBN/T Superfund action.

Sampling of storm runoff over near-shore and bank areas has not been performed. Sampling and analysis to evaluate this transport mechanism and its impact on the marine surface waters and sediments will be a requirement of future site specific remedial investigations on those properties where bank or surface soil contamination has been documented.

4.0 CLEANUP STANDARDS

4.1 Soil Cleanup Standards

Cleanup standards were developed for this Site based on Chapter 173-340 WAC (Table 4-1). Soil cleanup standards are based on the protection of ground water and surface water and on estimates of reasonable maximum exposure expected for the protection of human health. Ecology has determined that exposure under the residential use scenario as defined in MTCA represents the reasonable maximum exposure scenario based on direct contact.

4.1.1 Non-industrial Sites

MTCA states that Method A cleanup levels may be used for routine cleanup actions or when relatively few contaminants are involved. Method B cleanup levels are the standard method for determining cleanup levels. Since comprehensive RIs have not been conducted on the majority of the upland parcels addressed in the Area-Wide Report, the standard method of determining cleanup levels (Method B) shall be used. Lead and TPH, however, are not defined under Method B. The Method A cleanup standard for lead (250 ppm) shall be used.

Current Ecology policy calls for cleanup of TPH soil contamination to a level of 200 ppm. This standard is deliberately conservative and is based on the protection of ground water. Ecology is in the process of evaluating

information for establishing TPH cleanup concentrations that will be based on protection of human health and the environment. Ecology recognizes that higher levels of TPH in a weathered state exist in soils at the sites that may be protective of ground water. However, unless Ecology subsequently approves TPH cleanup levels other than the 200 ppm standard as being protective of human health and the environment, the current standards shall apply.

4.1.2 Industrial/Commercial Sites

Method C cleanup levels are conditional and may be used for industrial/commercial sites if certain criteria are met (WAC 173-340-740(1)(c)).

To qualify the site must:

- Be currently zoned for industrial/commercial use.
- Be currently used for industrial/commercial purposes or have a history of use as industrial/commercial properties.
- Be adjacent to and in the general vicinity of properties which are used for or are designated for industrial/commercial use.
- Be expected to be used for industrial/commercial uses in the foreseeable future due to zoning, comprehensive plans and other relevant factors.
- Properties to be considered for Method C cleanup must also meet the definition of "industrial properties" per RCW 70.105D.020 and Engrossed Substitute Senate Bill 6123, Section 2(13), 1994.

Properties on the east side of the Thea Foss Waterway including Parcel 5, Parcel 8, and the 11th Street ROW (Figure 1-2) are currently potentially subject to these conditions. No other sites currently subject to this CAP are eligible for use of Method C cleanup standards. If remediation is proposed for these parcels in the future, at that time Ecology, at its sole discretion, will evaluate and decide whether Method B or Method C cleanup standards apply.

Concentrations of contaminants will be determined on a site-wide statistical basis as described in Ecology's *Statistical Guidance for Ecology Site Managers* and supplements (Ecology 1992) with adjustment for source material which can easily be separated from the soil matrix (Section 3.2). Cleanup levels may exceed concentrations determined by Method B or C only if background concentrations (WAC 173-340-700(4)(d)) or analytical considerations (WAC 173-340-707) warrant it. Cleanup levels may also exceed Method B concentrations if attainment of those concentrations is not technically possible (WAC 173-340-706(i)(c)). Adjustments to cleanup levels for multiple hazardous substances will be made in accordance with WAC 173-340-708(5) & (6) and WAC 173-340-740(5). Cleanup levels may be adjusted to comply with new requirements in accordance with WAC 173-340-710(5). Data to support the use of any of the above adjustments to the cleanup standards will be documented in

subsequent SCAPs. Cleanup must be permanent to the maximum extent practicable.

4.2 Ground Water Cleanup Standards

In accordance with MTCA (WAC 173-340-720), ground water is considered to be drinking water (potable) unless three criteria are met. These criteria are:

- The aquifer is not a current drinking water source.
- The aquifer is not a future drinking water source.
- That it is unlikely that contaminants will be transported to an area where ground water is a current or potential source of drinking water.

The upland properties in the vicinity of the Thea Foss Waterway currently meet all of the three criteria for determining the shallow aquifer in the area to be non-potable. The aquifer is not presently a drinking water source, nor is it suitable for future use as a drinking water source due to the high potential of saline intrusion during pumping. Current municipal controls implemented through zoning ordinances restrict the placement of drinking water wells in the shallow aquifer, and municipal water is available for all parcels along the Waterway. Municipal wells have been and will continue to be placed in the deeper, semi-confined water bearing units. Contaminated substances will not likely be transported to the lower aquifer due to the upward vertical gradients and effective aquiclude observed regionally and locally.

In the development of cleanup standards for the upland properties in the vicinity of the Thea Foss Waterway, the shallow aquifer is considered non-potable.

4.2.1 Protection of Surface Water

MTCA states that when an aquifer can be considered as non-potable, ground water cleanup standards will be based on the next highest use. In this case, the next highest use is protection of adjacent surface waters (WAC 173-370-720(1)(c)). As such, the appropriate cleanup standards to apply to the ground water at these properties are the marine chronic criteria from the surface water standards (WAC 173-201A), and the federal water quality standards (40 CFR 131) including marine chronic standards and standards for the protection of human health from consumption of aquatic organisms.

Ground water contamination above applicable cleanup standards is not expected on these properties except as related to LUST discharges. For the purposes of this CAP, ground water that exceeds the cleanup standards, background levels, and practical quantitation limits, will be considered to be contaminated. This CAP is not applicable to any site, which in the opinion of Ecology, has ground water contamination at sufficient concentrations to require active ground water remediation. Active ground water remediation is all remedial

actions related to ground water except for remediation of source materials such as contaminated soil or long term monitoring.

Cleanup standards were developed for this Site based on Chapter 173-340 WAC (Table 4-1)*.

Table 4-1

SITE CLEANUP STANDARDS FOR SOIL AND GROUND WATER			
CONTAMINANT	SOIL (mg/kg)[b]		GROUND WATER(ug/1)[b]
	Method B	Method C	
TPH[a]	200	200	1,000
Benzene	34.5	1,380	71.0
Toluene	16,000	64,000	200,000
Ethylbenzene	8,000	32,000	29,000
Xylenes	160,000	640,000	16,000
Carginogenic PAH Compounds	0.137	5.48	0.031
Antimony	32.0	128	4,300
Arsenic	1.43 (20[c])	57.1	0.14
Cadmium	80.0	320	8.0
Chromium (VI)	400	1,600	50.0
Copper	2,960	11,800	2.5
Lead[d]	250	250	5.8
Mercury	24.0	96.0	0.025
Nickel	1,600	6,400	7.9
Zinc	24,000	96,000	76.6
PCBs (total)	0.13	5.19	0.030

Key: (a) The current Ecology TPH cleanup standard of 200 ppm may be adjusted to allow for alternatives in setting the standard based on new risk assessement methods or Ecology standards not yet developed as per Section 4.1.1. Reassessment of the TPH cleanup standard will be considered at the time of site-specific work, to take into account site-specific characteristics and contemporary cleanup policies.

(b) Practical Quantitation Limits (PQL): Ecology recognizes that the PQL may be higher than the cleanup standard for a given parameter. In these cases, the cleanup standard may be considered to be attained if the paramenter is undetected at the PQL, consistent with the latest Ecology Implementation policy, and if the conditions of WAC 173-340-707 are met.

(c) Cleanup level based on background concentration in the state of Washington (WAC 173-340-740). Natural or area background values may be substituted as cleanup objectives if Ecology determines the requirements of WAC 173-340-708(11) are satisfied.

(d) Soils cleanup levels for lead are not defined under Method B or Method C. The Method A cleanup level will be used.

*In accordance with WAC 173-340-708(5) & (6) and WAC 173-340-740(5), the cumulative hazardous index shall not exceed 1 and the cumulative total excess cancer risk shall not exceed 1 X 10^{-5} for contaminants included in Table 4-1.

5.0 SUMMARY OF REMEDIAL ALTERNATIVES

The MTCA requires at a minimum that all cleanup actions protect human health and the environment, comply with cleanup standards, comply with applicable state and federal laws, and provide for compliance monitoring. In addition, all cleanup actions must consider implementation time, cost effectiveness, permanent solutions, and resource recovery technologies to the maximum extent practicable.

A number of potential remediation alternatives were screened in the Feasibility Study process to select the most effective, implementable, and cost effective alternatives for more detailed evaluation. The Feasibility Study developed four remedial alternatives to address potential human health and environmental risks associated with the potential soil contamination at the site. Each alternative is briefly described below.

5.1 Alternative 1: No Action

The no action alternative is carried forward as a baseline alternative for comparison purposes only.

5.2 Alternative 2: Isolation of Contaminants

This remedial alternative includes use of caps such as concrete, asphalt or three foot thick soil covers, to prevent contact with, and ingestion or inhalation of contaminated soils or dusts. Any excavations for foundations or utility trenches would need to be located in uncontaminated soils. No contaminated soils would be disturbed and therefore no treatment of any soil would occur. This alternative would significantly restrict the development

activities possible on these parcels. This alternative would also require institutional controls on all contaminated parcels.

5.3 Alternative 3: Remediation of Soils Based on Future Land Use Development

This remedial alternative does not restrict the type of development possible for the properties. Instead this alternative describes remediation components which are applicable to each of the potential future land use categories.

For public open space parcels, commercial/retail/office use parcels, or for those parcels in which commercial/retail or parking uses are proposed at the ground floor with multifamily residential uses possible on upper floors, this alternative proposes remedial measures which include soil treatment and/or isolation with soil covers/caps. Exposure to contaminated soils would be restricted by a requirement for concrete or asphalt pavement or three foot thick clean soil covers to be placed above all contaminated soil areas. Soil covers would be clean fill or treated soils which meet cleanup standards. Remediation would be required for all contaminated soil removed from all excavations on the site. Treatment of excavated contaminated soils would be required whenever practicable, but actual treatment process options must not be selected before a site specific remedial investigation has been conducted. Areas where repeated excavations are anticipated in the future, such as at utility corridors, would be over-excavated or lined with a geofabric and backfilled to limit future exposure. Soil cleanup standards would meet Method B requirements.

For properties at which residential use is proposed at the ground surface, or where private yards on the ground surface are proposed, this alternative would require that soils be remediated to Method B standards to a depth equal to the mean-high ground water level.

Under this alternative, it is proposed that parcels on the east side of the Waterway be considered for Method C industrial/commercial soil cleanup standards if all of the requirements under WAC 173-340-740(1)(c) can be met for the parcel at the time of remediation.

Under this alternative, all properties on which residual contamination remains following remediation would require institutional controls to control future excavations and land use, provide for long-term maintenance of surface treatments, and potentially provide for routine environmental monitoring.

5.4 Alternative 4: Remediation of All Soils to the Mean-High Ground Water Level

Under this alternative, remediation of all contaminated soil would be required, regardless of future land use development, to a depth equal to the mean-high ground water level. Soil would be remediated to MTCA Method B standards. This alterative does not limit the type of development possible for the properties. Deed restrictions would be required for sites at which residual contamination remains below the mean-high ground water level.

6.0 SELECTED CLEANUP ACTION:

For purposes of this section, remediate(d)(tion) shall mean cleanup of soils to levels presented on Table 4-1. The specific technology to achieve these levels is not stated herein, but will be addressed in site-specific cleanup action plans.

Based on the comparative analysis, it is Ecology's opinion that Alternative 3: Remediation Based on Future Land Use Development would provide the greatest protection of human health and the environment, for the relative costs incurred.

Alternative 3 is a combination of Alternatives 2 and 4, which incorporate isolation measures, soil removal and treatment processes, and institutional controls to meet Remedial Action Objectives (RAOs), based on the type of use expected for each parcel of property within the Site.

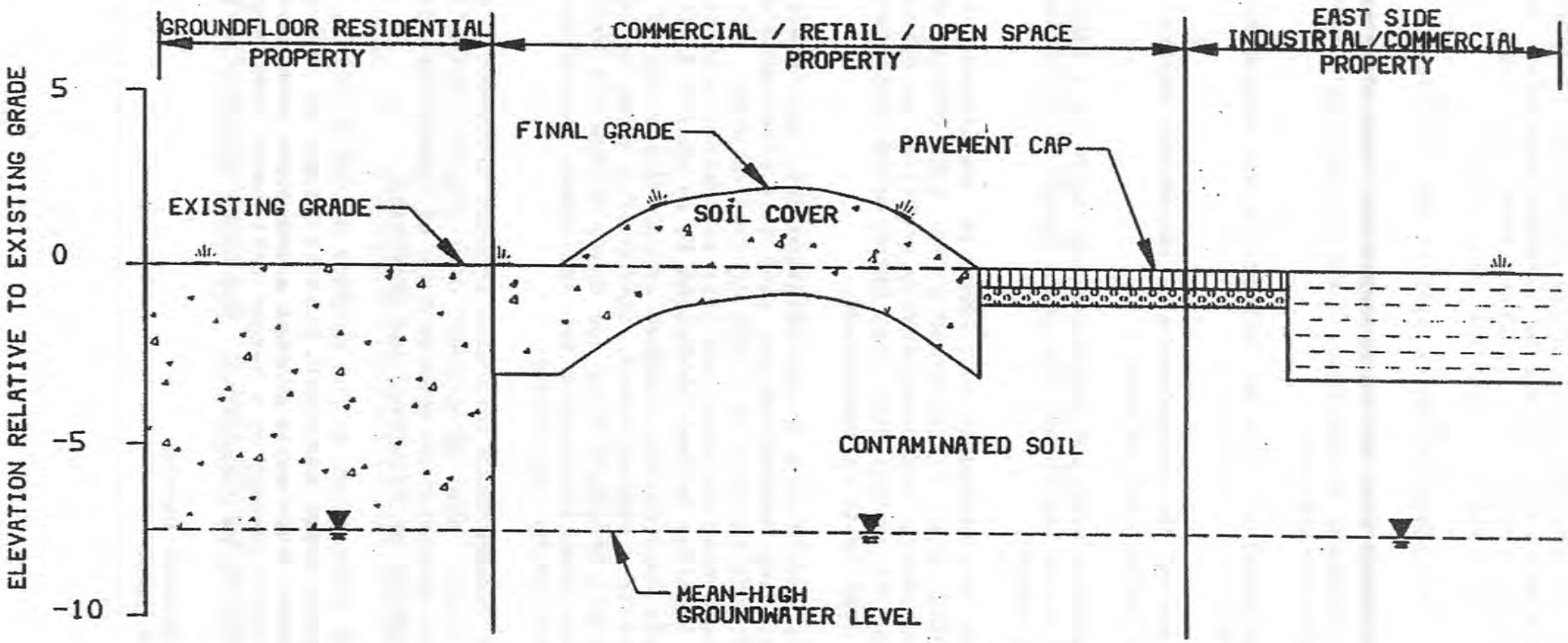
6.1 Detailed Description of the Selected Cleanup Action

This alternative will aid in realizing the land use development potential for the properties. The quantity and depth of soil to be remediated will be based on the following three land use scenarios proposed for each parcel. This alternative includes the use of soil treatment technologies and processes to reduce toxicity, mobility, and volume of the contaminants; soil covers and caps to limit exposure if contaminants are left on-site; deed restrictions to limit exposure to contaminated soil and prohibit use of ground water for domestic uses; and long-term ground water monitoring which could be required for parcels with residual contamination. Figure 6-1 illustrates the conceptual design for the remediation of soils for various land use scenarios for this alternative. The following is a description of the land use scenarios and applicable cleanup remedies subject to this CAP.

(1) For properties proposed for redevelopment with ground floor residential uses, contaminated soil will be remediated to a depth equal to the mean-high ground water level (approximately 8 feet below ground surface) to meet MTCA Method B standards.

(2) For properties proposed for use as commercial/retail, open space, or upper story residential uses, contaminated soil will be isolated below 3 feet of clean soil, a building, or a pavement cap. Remediation measures could include excavating and treating up to 3 feet of soil to MTCA Method B standards followed by backfilling using clean soil covers and/or caps.

(3) For selected properties on the east side, for which industrial or commercial activities are proposed, soil will be remediated to MTCA Method C standards per WAC 173-340-740 if Ecology determines that the property meets all of the requirements for industrial/ commercial cleanup standards under MTCA. Remediation measures would include treating up to three feet of soil or using clean



NOTES:

1. RELATIONSHIP OF FINAL AND EXISTING GRADES WILL VARY.
2. ALL EXCAVATED CONTAMINATED SOIL WILL BE REMEDIATED.

NOT TO SCALE

LEGEND:

- FILL OR TREATED SOIL WILL MEET MTCA METHOD B STANDARDS
- FILL OR TREATED SOIL WILL MEET MTCA METHOD C INDUSTRIAL/COMMERCIAL STANDARDS

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CLEANUP ACTION PLAN

REMEDIATION OF CONTAMINATED SOIL BASED ON FUTURE LAND USE DEVELOPMENT (ALTERNATIVE 3)

FIGURE 6-1

soil covers and caps.

In compliance with WAC 173-340-360(9)(b), small quantities of contaminated soil which would remain below soil covers or pavement caps shall be remediated to meet Table 4-1 cleanup levels. To facilitate these decisions, the following criteria will be used to define the word "small":

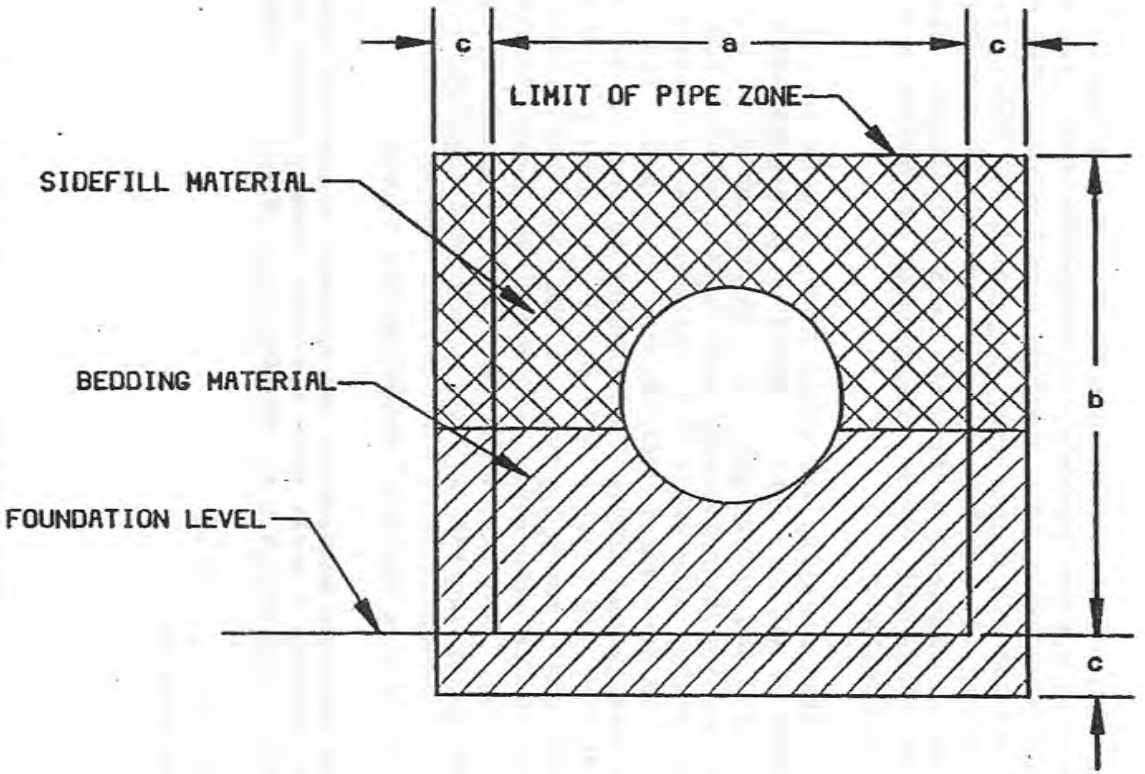
- The extent of contamination is defined and localized.
- The contaminated soil can be accessed and removed or remediated without disturbing foundations, harming the environment, or spreading contamination.
- The contaminated soil can be technically and economically removed or treated.
- The location of the contaminants is accessible during development or source control activities.
- The contaminant type and concentration would be a significant threat to human health and the environment if contamination were to remain onsite.

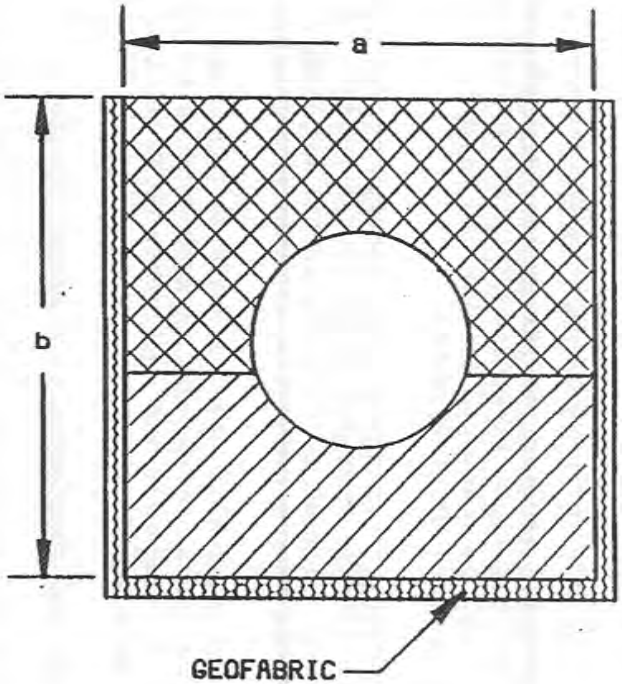
Under this alternative, all excavated soil shall be remediated. Soil treatment for these soils shall be performed rather than offsite disposal in landfills whenever technically and economically practical as determined by Ecology. Small volumes of contaminated soil which would otherwise remain below covers or caps must be fully remediated.

Structural and utility excavations in contaminated soil may be allowed under this alternative. Building foundations may rest on contaminated soil, but backfill around the foundation must be clean or treated soil. Utility trenches would be constructed to state and city standards, with the additional requirement that all trenches be over-excavated to allow for a minimum 1-foot perimeter of clean soil outside the standard trench dimensions or lined with geofabric. Figure 6-2 is a typical cross section of a sewer trench as specified in Washington's Standard Plans for Road, Bridge and Municipal Construction (DOT 1991) that illustrates the additional over-excavation and backfill and geofabric lining requirement.

A large percentage of contaminated soil will require treatment. All soil cannot be capped in place. Site development will require excavation of surface soils on every property for construction of appropriate site grading, drainage, and construction of buildings and utilities.

Assuming contaminated soils exist at the surface of the property, the surface elevation considerations noted above will have to be met as well as any remedial considerations. This would prevent a developer from simply capping the entire property with pavement or a 3-foot soil cover, and require at least some contaminated soils to be remediated. The exact quantity or percentage of





NOT TO SCALE

NOTE:

DIMENSIONS "a" AND "b" SPECIFIED IN THE STATE STANDARD SPECIFICATION FOR PIPE BEDDING FOR SANITARY SEWERS IN TRENCHES ONLY. DIMENSION "c" IS ONE FOOT OVER EXCAVATION ZONE.

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TYPICAL UTILITY CROSS SECTION ILLUSTRATING OVER-EXCAVATION AND GEOFABRIC

FIGURE 6-2

soils that will be remediated is impossible to estimate until a development is proposed and a site specific remedial investigation is conducted on the given site. All excavated soils must be remediated to cleanup standards; contaminated soils may not be relocated on site and capped. Excavated soil to be remediated will be treated if practicable.

In all properties abutting the waterway, construction of the public esplanade shall require that all surface drainage be collected inboard of the esplanade, such that drainage is not allowed to flow beyond the esplanade pavement and into the Waterway.

If any soils cleaned up under this CAP designate as Dangerous Waste under chapter 70.105 RCW, they shall be managed in accordance with all applicable ARARs. Dangerous Waste management and applicable ARARs will be addressed, if and as necessary, in each SCAP.

6.2 Activities Expected for Completion of Cleanup Process

The activities expected for completion of Site remediation are as follows:

1) Provide Ecology with a Notice of Intent to Proceed, regarding parcel or parcels (site(s)) to be remediated.

2) After Ecology approval of a site specific Remedial Investigation work plan, proceed with a State Remedial Investigation (RI), per WAC 173-340-350, to include a site-specific Sampling and Analysis Plan consistent with WAC 173-340-820 and a site-specific Health and Safety Plan consistent with WAC 173-340-810. (Note: Per WAC 173-340-350(7), Ecology will allow information from the Area Wide Report, that has previously been submitted, to be incorporated by reference to avoid unnecessary duplication.)

   All work, including sampling and other field data gathering activities, and any remedial or removal action, shall be performed under an appropriate health and safety plan for the protection of workers and the surrounding community in accordance with OSHA and WISHA requirements. The health and safety plan shall also satisfy the requirements of WAC 173-340-810 and be consistent with Chapter 49.17 RCW. The City shall submit a Site Health and Safety Plan (SHASP) to Ecology for comment prior to commencing any actions on a particular site(s) subject to this CAP. The SHASP shall be appropriate to the field activities and other information to ensure site safety and health requirements for that particular site(s). The City shall be solely responsible for ensuring that the SHASP satisfies all applicable laws and regulations.

3) Provide Ecology with a Remedial Investigation Report.

4) For sites that Ecology determines are subject to cleanup under this CAP, the City will prepare a draft Site Specific Cleanup Action Plan (SCAP) for the site(s), consistent with the findings of the Area-Wide

Feasibility Study and with WAC 173-340-360(10) which will be subject to public comment. Ecology will prepare a final SCAP consistent with WAC 173-340-360(12), and include that document as an amendment to the Consent Decree. The SCAP shall ensure compliance with all ARARs.

5) Proceed with remediation construction. A key component of the cleanup action will be remedial design documents consistent with WAC 173-340-400(4)(a)-(c). These documents, in addition to specifying the design and construction criteria for each site cleanup, will document any contaminants expected to remain on-site above cleanup standards. An Operations and Maintenance Plan will be prepared as part of the remedial design documents which will specify, among other things, inspections and monitoring to be performed as part of any institutional controls that may be placed on the site(s).

6) Institutional controls that may be required as a result of contamination above MTCA Method B cleanup standards left on site(s) include, but are not limited to:

   a. Disruption of soil covers or cap systems is prohibited, without Ecology approval.

   b. Any breach of isolation systems is to be reported to Ecology.

   c. Ground water monitoring will be performed, as appropriate, according to the SCAP and remedial design documents.

   d. Utility corridors and foundations will be constructed according to the Feasibility Study criteria and SCAP.

   e. Prohibiting property uses other than the types of uses upon which the selection of cleanup actions was based.

   f. At least every five years, Ecology and the PLPs shall meet to discuss the status of site(s) and the need, if any, for further remedial actions.

7) Institutional controls (WAC 173-340-440) expected to be required will be enumerated in each SCAP and will be recorded as restrictive covenents on the property. Use of conditional cleanup levels under Method C, for industrial properties, are subject to the provisions noted in subsection 4.1.2, above.

8) With respect to all above activities, Ecology will ensure compliance with the applicable substantive provisions of chapters 70.94, 70.95, 70.105, 75.20, 90.48, and 90.58 RCW, as required by Section 14 of ESSB 6339 (1994) and the substantive provisions of any laws requiring or authorizing local government permits or approvals.

6.3 Points of Compliance/Compliance Monitoring

The selected cleanup alternative includes isolation of hazardous substances on-site; therefore requirements of WAC 173-340-740(6)(d) must be met, including compliance monitoring to ensure the long-term integrity of any isolation systems, and other requirements for isolation technologies in WAC 173-340-360(8).

If the SCAP includes construction of monitoring wells, ground water will be monitored by wells located on the perimeter of the isolation (cap) system, near the Thea Foss Waterway; these wells shall represent the points of compliance for ground water cleanup standards monitoring. All wells will sample the uppermost aquifer system. Specific well placements, designs, and monitoring methodologies will be developed during the remedial design phase.

The vertical point of compliance for soils cleanup will be the Mean High Ground Water Level.

7.0 JUSTIFICATIONS/DETERMINATIONS:

The MTCA requires that any alternative selected for site remediation must, at a minimum, meet four threshold requirements: protect human health and the environment; comply with cleanup standards; comply with applicable state and federal laws; and, provide for compliance monitoring.

7.1 Protection of Human Health and the Environment

The risks identified in the Area Wide Report are: 1) potential human health impacts from ingestion, inhalation, or dermal contact with on-site soils containing elevated levels of organic and/or inorganic contaminants; 2) potential water quality impact in the Thea Foss Waterway attributable to surface water or ground water runoff containing elevated levels of contaminants; 3) potential impacts to marine sediments in Thea Foss Waterway attributable to surface water or ground water runoff containing elevated levels of contaminants on particulates.

The selected cleanup action eliminates the human health risks from ingestion, inhalation, and dermal contact by: 1) removing or treating contaminated soil combined with, 2) use of soil covers, impermeable or semi-permeable caps, and 3) use of deed restrictions regarding future property use and modifications.

The selected cleanup action eliminates potential impacts to surface waters and marine sediments by removing or treating contaminated source materials (soils), requiring surface treatments that eliminate surface runoff to the waterway, and monitoring ground water that migrates from the Site to the waterway. Ground water monitoring that indicates migration of contaminants above cleanup levels to the waterway will be reported to Ecology as a breach of an isolation system (subsection 6.2 above).

As noted in Section 2.3 above, Ecology believes that various locations within the Site are potential sources, along with other sources, of contaminants of concern to the Thea Foss Waterway sediments. Remediation of the Thea Foss Waterway sediments will be addressed in other activities pursuant to the Commencement Bay Nearshore/Tideflats Record of Decision.

7.2 Compliance with Cleanup Standards

The selected alternative is designed to comply with the Remedial Action Objectives listed in Section 5.0 and detailed in Section 6.0 above.

7.3 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

This evaluation criterion is used to determine the degree to which the selected cleanup action complies with federal and state standards and regulations. The following ARARs apply to the site:

STATE LAWS AND REGULATIONS

a. Chapter 70.105D RCW, Model Toxics Control Act
b. Chapter 173-340 WAC, Model Toxics Control Act Cleanup Regulations
c. Chapter 173-303 WAC, Washington Dangerous Waste Regulations
d. Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington
e. Chapter 173-204 WAC, Sediment Management Standards
f. Chapter 173-14 WAC, Shoreline Management Act
g. Chapter 90.48 RCW, Water Pollution Control Act
h. Chapter 70.94 RCW, Washington Clean Air Act
i. Chapter 173-160 WAC, Minimum Standards for Construction and Maintenance of Wells
j. Chapter 197-11 WAC, State Environmental Policy Act Rules
k. Washington Industrial Safety and Health Act (WISHA)

FEDERAL LAWS AND REGULATIONS

l. 33 USC 1251 et. seq. Clean Water Act of 1977
m. 40 CFR 131 Subpart D, Federally Promulgated Water Quality Standards
n. 40 CFR 761 Subpart D, Toxic Substances Control Act (TSCA)
o. Resource Conservation and Recovery Act (RCRA)
p. Commencement Bay Nearshore/Tideflats Record of Decision
q. 29 CFR Subpart 1910.120, Occupational Safety and Health Act

The selected cleanup action achieves all ARARs listed above. Other ARARs such as local air quality regulations will be complied with as an integral part of the remedial design and implementation steps.

7.4 Compliance Monitoring

Compliance monitoring as specified in WAC 173-340-410 will be provided to determine compliance with the cleanup standards listed in Section 4.0 above.

Ground water will be monitored in cases where contaminants are left on-site above MTCA Method B levels to evaluate compliance with ground water cleanup standards. A compliance monitoring plan will be prepared and submitted to Ecology for approval during the remedial design phase.

7.5 Short-Term Effectiveness

Short-term effectiveness considers how each alternative would impact human health and the environment during the implementation (construction) phase and prior to attainment of cleanup standards.

Risks to workers and the community will be minimal during the implementation phase of the selected cleanup action. The primary risks would be associated with construction and treatment process activities. Risks would vary with specific treatment processes selected.

All workers in direct contact with contaminated soils will be expected to comply with OSHA standards; earthwork will be expected to include control measures such as watering to reduce dust generation; onsite drainage and erosion control measures will be required to minimize potential impacts to the Thea Foss Waterway.

7.6 Long-Term Effectiveness

Long-term effectiveness is evaluated in terms of the magnitude of residual risk and the adequacy and reliability of the cleanup action. The magnitude of the residual risk will vary with land use scenario and treatment options selected for the specific site, but on the whole the residual risks will be significantly reduced following application of the selected cleanup action. The residual risks would be essentially eliminated for the ground floor residential scenario and properties that would be remediated to ground water. The residual risks will be higher for other land use scenarios, as contaminated soils will remain below isolation measures.

The needs for long-term management of soil covers, caps, and ground water monitoring of the sites will vary with the degree of remediation performed and land use scenario. Properties in which soil covers and caps are placed over contamination will require long-term management. Areas which are fully remediated will require no long term monitoring. Future construction activities can affect either the soil covers or caps, requiring replacement or reconstruction in those areas. Soil covers and caps requiring replacement or reconstruction will increase the risk of exposure for a short period of time. Deed restrictions will prohibit extraction of ground water for domestic and commercial purposes and restrict excavations. Some level of deed restrictions may be necessary for all properties where contamination remains onsite. All treatment options that can be implemented per Section 6.0, above, will result in the permanent destruction or removal of the contaminants from soil that is remediated.

7.7 Permanent Reduction of Toxicity, Mobility, or Volume

This evaluation criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, and volume of the hazardous substances present.

The toxicity, mobility, and volume of the contaminants of concern will be reduced under the selected cleanup action through use of treatment, removal/disposal, and isolation measures. The degree of reduction will be dependent on the remedial action selected for the specific property. For some properties, the contaminants of concern will be eliminated. Handling of treatment residuals will vary with treatment technologies and processes and will be documented in remedial design plans for each property.

7.8 Implementability/Technical Feasibility

The technologies that can be utilized in the selected alternative have been implemented and used reliably elsewhere to remediate contaminated soil. Special skills and knowledge are required for some remedial measures such as thermal treatment. Health and safety monitoring will be required for some treatment processes. Each of the treatment processes selected are administratively feasible and generally acceptable to Ecology.

7.9 Cost

Table 7-1 (4 pages) details the approximate expected capital costs for parcels remediated under all alternatives, based on assumptions and existing data used in the Feasibility Study. Long-term ground water monitoring and sampling costs are not included. The five major cost areas are site preparation, mobilization, treatment, engineering design, and contingencies.

Site preparation costs include clearing, grubbing, and grading of property required to conduct the remedial action. Site preparation is assumed to cost $2,000 per acre of land requiring remedial action.

Mobilization costs are typically lump sum fees charged by the vendor to transport, set up, and breakdown all equipment necessary for remediation. Mobilization/demobilization costs are estimated at ten percent of the direct capital cost.

Soil treatment costs may vary considerably depending on the treatment technology and processes employed. Treatment costs may range from $60 per cubic yard of soil for removal and disposal of petroleum contaminated soil at a sanitary landfill to $400 per cubic yard for incineration. For the purposes of the Feasibility Study, treatment of petroleum contaminated soil is assumed to cost $123 per cubic yard of contaminated soil. Treatment costs include excavation, soil preparation, treatment, sampling, backfill preparation, and backfilling. The volume of metals and PCB contaminated soil is expected to be small on most sites. Cost to dispose and transport metals and PCB

TABLE 7-1(1)

ASSUMPTIONS:

Assumed Land Use low	Assumed Land Use high	Property	Total Area (sq ft)	Estimated % Requiring Remediation low	Estimated % Requiring Remediation high	Estimated Area (sq ft) Requiring Remediation low	Estimated Area (sq ft) Requiring Remediation high	Estimated % Requiring Metals/PCB Remediation low	Estimated % Requiring Metals/PCB Remediation high
Open Space	Open Space	Parcel 1A	60,000	0%	0%	0	0	0%	0%
Commercial	Commercial	Parcel 1B	67,500	0%	0%	0	0	0%	0%
Commercial	Commercial	Parcel 1C	57,000	0%	0%	0	0	0%	0%
Commercial	Commercial	Parcel 1D	67,500	0%	5%	0	3,375	0%	0%
Commercial	Commercial	Totem Marina	200,000	0%	5%	0	10,000	0%	0%
Commercial	Commercial	Municipal Dock	45,000	0%	0%	0	0	0%	0%
Commercial	Commercial	Atlas Foundry	45,000	50%	80%	22,500	36,000	80%	100%
Commercial	Commercial	Coast Iron Works	37,500	0%	80%	0	30,000	50%	100%
Commercial	Commercial	Steam Plant	22,500	40%	80%	9,000	18,000	5%	20%
Commercial	Commercial	Johnny's Seafood	3,750	0%	0%	0	0	0%	0%
Open Space	Open Space	Parcel 3A	169,000	20%	50%	33,800	84,500	5%	25%
Commercial	Residential	Parcel 3B	136,000	20%	50%	27,200	68,000	0%	10%
Commercial	Commercial	Parcel 3C	59,400	20%	50%	11,880	29,700	0%	10%
Open Space	Commercial	Parcel 7	77,500	43%	60%	33,325	46,500	0%	0%
Commercial	Commercial	Parcel 4A	28,500	10%	50%	2,850	14,250	0%	0%
Industrial	Industrial	Sewage Pump Stat	113,000	10%	60%	11,300	67,800	0%	10%
Industrial	Industrial	Parcel 5	81,000	30%	50%	24,300	40,500	0%	5%
Industrial	Industrial	Parcel 6	75,000	30%	75%	22,500	56,250	0%	5%
Industrial	Industrial	11th Street ROW	52,000	0%	30%	0	15,600	0%	5%

General

Assumptions made for Percentages of Area of Land which is Occupied by Buildings, Pavement, and Vegetation is as follows

Land Use	% Buildings or Utility Corridors	% Paved	% Vegetated
Commercial	30%	40%	30%
Open space	10%	30%	60%
Industrial	50%	30%	20%
Residential	40%	30%	30%

Remediation Costs include excavation, soil preparation (screening etc.), treatment process (thermal, bio, etc.), sampling, preparation of soil for backfill, transport cost for offsite disposal (for metals), disposal costs, load and haul, purchase of clean common earth for backfill, and backfilling.
Cost to Remediate TPH, PAH, and BTEX contaminated soils per cu yd = $122.93
Cost to Remediate Metals contaminated soils per cu yd = $368.65
Mobilization costs are based on 10% of the site preparation, remediation, soil cover, and asphalt cap costs.
Engineering costs, including the cost of obtaining permits, are based on 10% of the site preparation, remediation, soil cover, and asphalt cap costs.
Contingency costs are based on 20% of the site preparation, remediation, soil cover, and asphalt cap costs.

Many of the costs included here would be incurred during development even if the properties were not contaminated (i.e. site preparation, pavement, some soil cover, etc.)

Alternative 2

Foundation excavations and utility corridors will need to be placed in uncontaminated locations.
No contaminated soils will be disturbed or remediated.
Three feet of soil cover will be placed on all vegetated areas where contamination exists.

Alternative 3

Areas under buildings or within utility corridors will be remediated to an average depth of 4 feet.
Areas under pavement will not require remediation.
Soil cover consists of two feet of remediated soils and one foot of clean soil.
Areas to be vegetated will be remediated to an average depth of 2 feet.
Soil cover cost includes delivery, hauling, and compaction of 1 foot of imported soil on the vegetated areas of the portion of the property which requires remediation.
A treatability study will cost an average of $21,000. This cost is shared equally among three properties requiring remediation.
Properties with residential units on the ground floor (Residential) will require remediation of all contaminated soils to mean-high groundwater level (approx 8 feet below current grade).

Alternative 4

All contaminated soils will be remediated to an 8 foot depth.
A treatability study will cost an average of $21,000. This cost is shared equally among three properties requiring remediation.

TABLE 7-1(2)

VOLUME OF SOIL AND COSTS TO REMEDIATE SOIL--ALTERNATIVE 2

LOW ESTIMATE

COSTS ARE BASED ON THE ASSUMPTIONS STATED ON PRECEDING PAGE AND ARE ORDER OF MAGNITUDE ESTIMATES ONLY.

Assumed Land Use low	Property	Estimated Area (sq ft) Requiring Remediation low	% Buildings or Utility Corridors	% Paved	% Vegetated	Volume of Soil Requiring Remediation (cu ft)	Volume of Soil Requiring Remediation (cu yd)	Area to Be Paved (sq yd)	Site Preparation $2000/acre	Cost to Remediate Soils	Soil Cover $18.30/cuyd	Asphalt Cap $13.80/sq yd	Treatability Study	Mobilization, Engineering, Contingency	Total
Open Space	Parcel 1A	0	10%	30%	60%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1B	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1C	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1D	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Totem Marina	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Municipal Dock	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Atlas Foundry	22,500	30%	40%	30%	0	0	1,000	$1,000	$0	$13,700	$13,800	$0	$11,000	$40,000
Commercial	Cast Iron Works	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Steam Plant	9,000	30%	40%	30%	0	0	400	$400	$0	$5,500	$5,500	$0	$5,000	$16,000
Commercial	Johnny's Seafood	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Open Space	Parcel 3A	33,800	10%	30%	60%	0	0	1,127	$1,600	$0	$41,200	$15,500	$0	$23,000	$81,000
Commercial	Parcel 3B	27,200	30%	40%	30%	0	0	1,209	$1,200	$0	$16,600	$16,700	$0	$14,000	$49,000
Commercial	Parcel 3C	11,880	30%	40%	30%	0	0	528	$500	$0	$7,200	$7,300	$0	$6,000	$21,000
Open Space	Parcel 7	33,325	10%	30%	60%	0	0	1,111	$1,500	$0	$40,700	$15,300	$0	$23,000	$81,000
Commercial	Parcel 4A	2,850	30%	40%	30%	0	0	127	$100	$0	$1,700	$1,700	$0	$1,000	$5,000
Industrial	Sewage Pump Stat	11,300	50%	30%	20%	0	0	377	$500	$0	$4,600	$5,200	$0	$4,000	$14,000
Industrial	Parcel 5	24,300	50%	30%	20%	0	0	810	$1,100	$0	$9,900	$11,200	$0	$9,000	$31,000
Industrial	Parcel 6	22,500	50%	30%	20%	0	0	750	$1,000	$0	$9,200	$10,400	$0	$8,000	$29,000
Industrial	11th Street ROW	0	10%	30%	60%	0	0	0	$0	$0	$0	$0	$0	$0	$0
								Totals	$8,900	$0	$150,300	$102,600	$0	$104,000	$370,000

HIGH ESTIMATE

COSTS ARE BASED ON THE ASSUMPTIONS STATED ON PRECEDING PAGE AND ARE ORDER OF MAGNITUDE ESTIMATES ONLY.

Assumed Land Use high	Property	Estimated Area (sq ft) Requiring Remediation high	% Buildings or Utility Corridors	% Paved	% Vegetated	Volume of Soil Requiring Remediation (cu ft)	Volume of Soil Requiring Remediation (cu yd)	Area to Be Paved (sq yd)	Site Preparation $2000/acre	Cost to Remediate Soils	Soil Cover $18.30/cuyd	Asphalt Cap $13.80/sq yd	Treatability Study	Mobilization, Engineering, Contingency	Total
Open Space	Parcel 1A	0	10%	30%	60%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1B	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1C	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1D	3,375	30%	40%	30%	0	0	150	$200	$0	$2,100	$2,100	$0	$2,000	$6,000
Commercial	Totem Marina	10,000	30%	40%	30%	0	0	444	$500	$0	$6,100	$6,100	$0	$5,000	$18,000
Commercial	Municipal Dock	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Atlas Foundry	38,000	30%	40%	30%	0	0	1,600	$1,700	$0	$22,000	$22,100	$0	$18,000	$64,000
Commercial	Cast Iron Works	30,000	30%	40%	30%	0	0	1,333	$1,400	$0	$18,300	$18,400	$0	$15,000	$53,000
Commercial	Steam Plant	18,000	30%	40%	30%	0	0	800	$800	$0	$11,000	$11,000	$0	$9,000	$32,000
Commercial	Johnny's Seafood	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Open Space	Parcel 3A	84,500	10%	30%	60%	0	0	2,817	$3,900	$0	$103,100	$38,900	$0	$58,000	$204,000
Residential	Parcel 3B	68,000	40%	30%	30%	0	0	2,267	$3,100	$0	$41,500	$0	$0	$16,000	$63,000
Commercial	Parcel 3C	29,700	30%	40%	30%	0	0	1,320	$1,400	$0	$18,100	$18,200	$0	$15,000	$53,000
Commercial	Parcel 7	48,500	30%	40%	30%	0	0	2,067	$2,100	$0	$28,400	$28,500	$0	$24,000	$83,000
Commercial	Parcel 4A	14,250	30%	40%	30%	0	0	633	$700	$0	$8,700	$8,700	$0	$7,000	$25,000
Industrial	Sewage Pump Stat	67,600	50%	30%	20%	0	0	2,260	$3,100	$0	$27,600	$31,200	$0	$25,000	$87,000
Industrial	Parcel 5	40,500	50%	30%	20%	0	0	1,350	$1,900	$0	$16,500	$16,600	$0	$15,000	$52,000
Industrial	Parcel 6	56,250	50%	30%	20%	0	0	1,875	$2,600	$0	$22,900	$25,900	$0	$21,000	$72,000
Industrial	11th Street ROW	15,600	50%	30%	20%	0	0	520	$700	$0	$6,300	$7,200	$0	$6,000	$20,000
								Totals	$24,100	$0	$332,600	$238,900	$0	$238,000	$830,000

TABLE 7-1(3)

VOLUME OF SOIL AND COSTS TO REMEDIATE SOIL --ALTERNATIVE3

LOW ESTIMATE
COSTS ARE BASED ON THE ASSUMPTIONS STATED ON PRECEDING PAGE AND ARE ORDER OF MAGNITUDE ESTIMATES ONLY.

Assumed Land Use low	Property	Estimated Area (sq ft) Requiring Remediation low	% Buildings or Utility Corridors	% Paved	% Vegetated	Volume of Soil Requiring Remediation (cu ft)	Volume of Soil Requiring Remediation (cu yd)	Area to Be Paved (sq yd)	Site Preparation $2000/acre	Cost to Remediate Soils	Soil Cover $18.30/cuyd	Asphalt Cap $13.60/sq yd	Treatability Study	Mobilization, Engineering, Contingency	Total
Open Space	Parcel 1A	0	10%	30%	60%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1B	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1C	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1D	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Tolm Marina	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Municipal Dock	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Atlas Foundry	22,500	30%	40%	30%	40,500	1,500	1,000	$1,000	$479,000	$4,600	$13,600	$7,000	$199,000	$704,000
Commercial	Coast Iron Works	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Steam Plant	9,000	30%	40%	30%	16,200	600	400	$400	$81,000	$1,600	$5,500	$7,000	$35,000	$131,000
Commercial	Johnny's Seafood	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Open Space	Parcel 3A	33,800	10%	30%	60%	54,080	2,003	1,127	$1,600	$271,000	$13,700	$15,500	$7,000	$121,000	$430,000
Commercial	Parcel 3B	27,200	30%	40%	30%	48,960	1,813	1,209	$1,200	$223,000	$5,500	$16,700	$7,000	$99,000	$352,000
Commercial	Parcel 3C	11,880	30%	40%	30%	21,384	792	528	$500	$97,000	$2,400	$7,300	$7,000	$43,000	$157,000
Open Space	Parcel 7	33,325	10%	30%	60%	53,320	1,975	1,111	$1,500	$243,000	$13,600	$15,300	$7,000	$109,000	$389,000
Commercial	Parcel 4A	2,850	30%	40%	30%	5,130	190	127	$100	$23,000	$600	$1,700	$7,000	$10,000	$42,000
Industrial	Sewage Pump Stati	11,300	50%	30%	20%	27,120	1,004	377	$500	$123,000	$1,500	$5,200	$7,000	$52,000	$189,000
Industrial	Parcel 5	24,300	50%	30%	20%	58,320	2,160	810	$1,100	$265,000	$3,300	$11,200	$7,000	$113,000	$402,000
Industrial	Parcel 8	22,500	50%	30%	20%	54,000	2,000	750	$1,000	$246,000	$3,100	$10,400	$7,000	$104,000	$372,000
Industrial	11th Street ROW	0	10%	30%	60%	0	0	0	$0	$0	$0	$0	$0	$0	$0
								Totals	$8,900	$2,052,000	$50,100	$102,600	$70,000	$885,000	$3,170,000

HIGH ESTIMATE
COSTS ARE BASED ON THE ASSUMPTIONS STATED ON PRECEDING PAGE AND ARE ORDER OF MAGNITUDE ESTIMATES ONLY.

Assumed Land Use high	Property	Estimated Area (sq ft) Requiring Remediation high	% Buildings or Utility Corridors	% Paved	% Vegetated	Volume of Soil Requiring Remediation (cu ft)	Volume of Soil Requiring Remediation (cu yd)	Area to Be Paved (sq yd)	Site Preparation $2000/acre	Cost to Remediate Soils	Soil Cover $18.30/cuyd	Asphalt Cap $13.60/sq yd	Treatability Study	Mobilization, Engineering, Contingency	Total
Open Space	Parcel 1A	0	10%	30%	60%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1B	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1C	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1D	3,375	30%	40%	30%	6,075	225	150	$200	$26,000	$700	$2,100	$7,000	$12,000	$50,000
Commercial	Tolm Marina	10,000	30%	40%	30%	18,000	667	444	$500	$82,000	$2,000	$6,100	$7,000	$36,000	$134,000
Commercial	Municipal Dock	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Atlas Foundry	36,000	30%	40%	30%	64,800	2,400	1,600	$1,700	$885,000	$7,300	$22,100	$7,000	$368,000	$1,289,000
Commercial	Coast Iron Works	30,000	30%	40%	30%	54,000	2,000	1,333	$1,400	$737,000	$6,100	$18,400	$7,000	$305,000	$1,075,000
Commercial	Steam Plant	18,000	30%	40%	30%	32,400	1,200	800	$800	$206,000	$3,700	$11,000	$7,000	$89,000	$318,000
Commercial	Johnny's Seafood	0	30%	40%	30%	0	0	0	$0	$0	$0	$0	$0	$0	$0
Open Space	Parcel 3A	84,500	10%	30%	60%	135,200	5,007	2,817	$3,900	$923,000	$34,400	$38,900	$7,000	$400,000	$1,407,000
Residential	Parcel 3B	68,000	40%	30%	30%	544,000	20,148	2,267	$3,100	$2,972,000	$0	$0	$7,000	$1,190,000	$4,172,000
Commercial	Parcel 3C	29,700	30%	40%	30%	53,460	1,980	1,320	$1,400	$292,000	$8,000	$18,200	$7,000	$127,000	$452,000
Commercial	Parcel 7	46,500	30%	40%	30%	83,700	3,100	2,067	$2,100	$381,000	$9,500	$28,500	$7,000	$168,000	$598,000
Commercial	Parcel 4A	14,250	30%	40%	30%	25,650	950	633	$700	$117,000	$2,900	$8,700	$7,000	$52,000	$186,000
Industrial	Sewage Pump Stati	87,800	50%	30%	20%	162,720	6,027	2,260	$3,100	$889,000	$9,200	$31,200	$7,000	$373,000	$1,313,000
Industrial	Parcel 5	40,500	50%	30%	20%	97,200	3,600	1,350	$1,900	$467,000	$5,500	$16,600	$7,000	$205,000	$725,000
Industrial	Parcel 8	56,250	50%	30%	20%	135,000	5,000	1,875	$2,600	$676,000	$7,600	$25,900	$7,000	$285,000	$1,004,000
Industrial	11th Street ROW	15,600	50%	30%	20%	37,440	1,387	520	$700	$187,000	$2,100	$7,200	$7,000	$79,000	$283,000
								Totals	$24,100	$8,862,000	$97,000	$236,900	$98,000	$3,887,000	$13,010,000

TABLE 7-1(4)

VOLUME OF SOIL AND COSTS TO REMEDIATE SOIL -- ALTERNATIVE 4

LOW ESTIMATE

COSTS ARE BASED ON THE ASSUMPTIONS STATED ON PRECEDING PAGE AND ARE ORDER OF MAGNITUDE ESTIMATES ONLY.

Assumed Land Use low	Property	Volume of Soil Requiring Remediation (cu ft)	Volume of Soil Requiring Remediation (cu yd)	Area to Be Paved (sq yd)	Site Preparation $2000/Acre	Cost to Remediate Soils	Soil Cover $16.30/cuyd	Asphalt Cap $13.60/sq yd	Treatability Study	Mobilization, Engineering, Contingency	Total
Open Space	Parcel 1A	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1B	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1C	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1D	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Totem Marina	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Municipal Dock	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Atlas Foundry	180,000	6,667	1,000	$1,000	$2,130,000	$0	$0	$7,000	$852,000	$2,990,000
Commercial	Coast Iron Works	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Steam Plant	72,000	2,667	400	$400	$381,000	$0	$0	$7,000	$145,000	$513,000
Commercial	Johnny's Seafood	0	0	0	$0	$0	$0	$0	$0	$0	$0
Open Space	Parcel 3A	270,400	10,015	1,127	$1,600	$1,354,000	$0	$0	$7,000	$342,000	$1,905,000
Commercial	Parcel 3B	217,600	8,059	1,209	$1,200	$991,000	$0	$0	$7,000	$397,000	$1,396,000
Commercial	Parcel 3C	95,040	3,520	528	$500	$433,000	$0	$0	$7,000	$173,000	$614,000
Open Space	Parcel 7	266,600	9,874	1,111	$1,500	$1,214,000	$0	$0	$7,000	$486,000	$1,709,000
Commercial	Parcel 4A	22,800	844	127	$100	$104,000	$0	$0	$7,000	$42,000	$153,000
Industrial	Sewage Pump Stat	90,400	3,348	377	$500	$412,000	$0	$0	$7,000	$165,000	$585,000
Industrial	Parcel 5	194,400	7,200	810	$1,100	$885,000	$0	$0	$7,000	$354,000	$1,247,000
Industrial	Parcel 8	180,000	6,667	750	$1,000	$820,000	$0	$0	$7,000	$328,000	$1,156,000
Industrial	11th Street ROW	0	0	0	$0	$0	$0	$0	$0	$0	$0
				Totals	$8,900	$8,704,000	$0	$0	$70,000	$3,484,000	$12,270,000

HIGH ESTIMATE

COSTS ARE BASED ON THE ASSUMPTIONS STATED ON PRECEDING PAGE AND ARE ORDER OF MAGNITUDE ESTIMATES ONLY.

Assumed Land Use high	Property	Volume of Soil Requiring Remediation (cu ft)	Volume of Soil Requiring Remediation (cu yd)	Area to Be Paved (sq yd)	Site Preparation $2000/Acre	Cost to Remediate Soils	Soil Cover $16.30/cuyd	Asphalt Cap $13.60/sq yd	Treatability Study	Mobilization, Engineering, Contingency	Total
Open Space	Parcel 1A	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1B	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1C	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Parcel 1D	27,000	1,000	150	$200	$123,000	$0	$0	$7,000	$49,000	$179,000
Commercial	Totem Marina	80,000	2,963	444	$500	$364,000	$0	$0	$7,000	$148,000	$518,000
Commercial	Municipal Dock	0	0	0	$0	$0	$0	$0	$0	$0	$0
Commercial	Atlas Foundry	288,000	10,667	1,600	$1,700	$3,932,000	$0	$0	$7,000	$1,573,000	$5,514,000
Commercial	Coast Iron Works	240,000	8,889	1,333	$1,400	$3,277,000	$0	$0	$7,000	$1,311,000	$4,596,000
Commercial	Steam Plant	144,000	5,333	800	$800	$918,000	$0	$0	$7,000	$366,000	$1,294,000
Commercial	Johnny's Seafood	0	0	0	$0	$0	$0	$0	$0	$0	$0
Open Space	Parcel 3A	676,000	25,037	2,817	$3,900	$4,616,000	$0	$0	$7,000	$1,848,000	$6,475,000
Residential	Parcel 3B	544,000	20,148	2,267	$3,100	$2,972,000	$0	$0	$7,000	$1,190,000	$4,172,000
Commercial	Parcel 3C	237,600	8,800	1,320	$1,400	$1,298,000	$0	$0	$7,000	$520,000	$1,826,000
Commercial	Parcel 7	372,000	13,778	2,067	$2,100	$1,694,000	$0	$0	$7,000	$678,000	$2,381,000
Commercial	Parcel 4A	114,000	4,222	633	$700	$519,000	$0	$0	$7,000	$208,000	$735,000
Industrial	Sewage Pump Stat	542,400	20,089	2,260	$3,100	$2,963,000	$0	$0	$7,000	$1,186,000	$4,159,000
Industrial	Parcel 5	324,000	12,000	1,350	$1,900	$1,623,000	$0	$0	$7,000	$650,000	$2,282,000
Industrial	Parcel 8	450,000	16,667	1,875	$2,500	$2,254,000	$0	$0	$7,000	$903,000	$3,167,000
Industrial	11th Street ROW	124,800	4,622	520	$700	$625,000	$0	$0	$7,000	$250,000	$883,000
				Totals	$24,100	$27,178,000	$0	$0	$98,000	$10,880,000	$38,180,000

contaminated soil is estimated to be $369 per cubic yard. A treatability study is often required prior to implementation of a remedial technology to insure the treatment process will meet objectives. For the purposes of the costs estimate, it was assumed that a $21,000 treatability study would be conducted for every 3 parcels requiring remediation. Therefore, a lump sum cost of $7,000 has been added to the cost estimate to perform a treatability study.

Engineering design fees for the detailed design of the treatment system are estimated at 10 percent of the direct capital cost. A contingency of 20 percent is added to the direct capital cost to account for the uncertainties associated with this alternative. Assumptions used to develop the cost scenarios are detailed in Chapter 10.0 of the Area Wide Report.

7.10 Elimination of Other Alternatives

Alternative 1 was not selected because it would not adequately protect human health and the environment. Alternative 2 was not selected because it would not, by itself, adequately protect human health and the environment on some properties within the Site. Alternative 4 could meet the requirements for protectiveness by eliminating all soils that contain contaminants above the cleanup standards, on all properties within the Site. However, the additional cost for excavation and remediation of all soils in the Site is excessive, considering the minimal degree of additional protection it would achieve over the recommended alternative: Low=$370,000 versus high=$38,180,000.

Alternative 3, which includes elements of alternatives 2 and 4, provides adequate protection by requiring the use of remediation technologies that are appropriate to the types, volumes, and concentrations of contaminants found and on the future use of each property within the Site. The particular design for each property cleanup will be determined by performing Site Specific Remedial Investigations and developing Site Specific Cleanup Action Plans prior to further improvements being made on the properties.

8.0 STATE ENVIRONMENTAL POLICY ACT (SEPA)

Due to the phased approach of this Cleanup Action Plan (an initial Area-Wide CAP, followed by Site-Specific CAPs), along with new legislation regarding the integration of SEPA & MTCA, the following protocol will be observed with respect to SEPA compliance.

Per WAC 173-11-060(5), a phased review approach will be utilized to comply with SEPA. An initial threshold determination for the general actions addressed by the area-wide feasibility study and CAP has been issued. A Determination of Nonsignificance has been issued. At the completion of each site-specific remedial investigation, the responsible official of the lead agency will make a determination as to the scope and level of detail of environmental review, if necessary, that is appropriate for that stage of work. Subsequent action will be based on the requirements of SEPA, including

sections 197-11-340, 197-11-350, 197-11-360, and Part Six of Chapter 197-11 WAC.

9.0 STATE AND COMMUNITY ACCEPTANCE

Community acceptance will be evaluated based on the comments received during the public comment period. Based on the information gathered from the public, Ecology will modify the draft Cleanup Action Plan to arrive at a final Cleanup Action Plan. The draft SCAPs and final SCAPs will be subject to public comment (final SCAPs entered as amendments to the Decree).

10.0 CLEANUP ACTION REQUIREMENTS

The cleanup action as selected is designed to accomplish the following requirements:

1) Protect human health and the environment.

2) Comply with cleanup standards per WAC 173-340-700 through 760.

3) Comply with applicable state and federal laws per WAC 173-340-710.

4) Provide compliance monitoring per WAC 173-340-410.

5) Use permanent solutions to the maximum extent practicable per WAC 173-340-360(4).

6) Provide a reasonable restoration time frame per WAC 173-340-360(6).

7) Consider public concerns, if any, raised during public comment on the draft Cleanup Action Plan per WAC 173-340-360(10) through (13).

11.0 SCHEDULE FOR IMPLEMENTATION/UPCOMING ACTIVITIES

Ecology has begun negotiations on a Consent Decree per MTCA with the City of Tacoma to cover all phases of the work to be performed. The time line for implementation of all general project phases will be defined in the Consent Decree. (A general, area wide Quality Assurance Project Plan (QAPP), Sampling and Analysis Plan (SAP), and Public Participation Plan (PPP) accompany the Consent Decree to provide general guidance for activities associated with the area-wide effort. Specific SAPs and schedules will be developed for each site specific RI to provide protocols appropriate to the characteristics of each site.)

Schedules for the implementation of remedial actions for specific parcels will be detailed in Site Specific Cleanup Action Plans. Full public participation, including a 30 day public comment period and public meeting, will accompany the MTCA Consent Decree. Full public participation, including 30 day comment periods, will accompany subsequent SCAPs, as these will be entered as amendments to the Consent Decree.

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Chapter 173-340 WAC, Model Toxics Control Act Regulations
Chapter 173-303 WAC, Washington Dangerous Waste Regulations
Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington
Chapter 173-204 WAC, Sediment Management Standards
Chapter 173-14 WAC, Shoreline Management Act Permit Regulations
Chapter 173-160 WAC, Minimum Standards for Construction and Maintenance of Wells

Federal Laws and Regulations

33 USC 1251 et. seq. Clean Water Act of 1977
40 CFR 131 Subpart D, Federally Promulgated Water Quality Standards
Resource Conservation and Recovery Act (RCRA)
40 CFR 761 Subpart D, Toxic Substances Control Act (TSCA)

APPENDIX B
Draft Site-Specific Remedial Investigation Report

Draft
Site-Specific Remedial Investigation
Thea Foss Upland Properties
Hicks-Bull, Coast Iron Works, and
Steam Plan Properties
Tacoma, Washington

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Tacoma

Prepared for
City of Tacoma
Public Works Department

February 26, 2002
4676-72

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Chemical Data Quality Review

DRAFT
SITE-SPECIFIC REMEDIAL INVESTIGATION
THEA FOSS UPLAND PROPERTIES
HICKS-BULL, COAST IRON WORKS, AND STEAM PLANT PROPERTIES
TACOMA, WASHINGTON

INTRODUCTION

This report addresses the site-specific remedial investigation conducted for the Hicks-Bull, Coast Iron Works, and Steam Plant properties (Figure 1). The remedial investigation and any subsequent cleanup activities are being conducted under Consent Decree 94-10917 6 between the Washington State Department of Ecology (Ecology) and the City of Tacoma and Metropolitan Parks District of Tacoma.

The Hicks-Bull, Coast Iron Works, and Steam Plant properties are located between the South 11th Street ROW and the approximate area of the South 13th Street ROW extension (Figure 1). Currently, the only building on the properties is the Sea Scouts building, which is located in the former Coast Iron Works building. The remaining area of these parcels is not currently developed and is used for parking, with paved and unpaved areas. The site is one of four waterfront properties north of South 15th Street between Dock Street and the Thea Foss Waterway currently being investigated for the purpose of developing a cleanup action plan under the Consent Decree.

Under the process outlined in the Consent Decree, if a contaminant release has occurred, a site-specific remedial investigation (RI) is performed. The purpose of the site-specific RI is to identify contaminant release(s) on the property that require cleanup and to propose cleanup actions consistent with the Cleanup Action Plan (CAP) defined in the Consent Decree. Site-specific cleanup actions plans (SCAPs) are then developed that are consistent with long-term plans for use of the site.

For the purposes of redevelopment, the site has been divided into Development Site 8 and Development Site 9, as shown on Figure 1 and subsequent figures. Future development of these sites is currently envisioned as mixed-use commercial/residential. Land use plans include esplanade and public access areas. Structures built within the parcels could include multi-story buildings with commercial development on the ground floor. Excavations for pile caps, footings, subsurface parking structures, and/or future sites for utilities are the most likely future subsurface disturbance.

Scope of Work

The scope of work completed to prepare this report was detailed in the Thea Foss Uplands Site-Specific Remedial Investigation Work Plan for properties north of South 15th Street (Hart Crowser 2000). The scope included:

- Excavating ten test pits and drilling six hollow-stem auger soil borings to obtain data regarding subsurface physical conditions and soil quality;
- Completing three of the soil borings as groundwater monitoring wells;
- Collecting and analyzing two rounds of groundwater quality samples from the three new and one existing monitoring wells, and collecting one bank seep water quality sample at low tide. An additional round of water quality sampling and analysis was performed to assess the effects of salinity on the results of metals analyses;
- Comparing the environmental data to Cleanup Levels and Soil Contamination Maximums established in the Consent Decree;
- Evaluating the available data from the investigations to determine if sources of any detected contamination can be identified; and
- Identifying a cleanup action that is consistent with the Consent Decree Cleanup Action Plan and anticipated future land use of the properties.

HISTORICAL LAND USE

Figure 2 presents significant historical features on the subject properties. The properties originally were open tidelands fronting a steep bluff to the west. Initially, railroad lines were developed along the base of the bluff. By 1893, the parcels south of 11th Street were filled with sediments dredged from the Thea Foss Waterway between 1890 and 1905, but remained relatively undeveloped. By 1896, a railroad spur extended from beneath the 11th Street Bridge onto the developed parcels. In 1910, Northern Pacific Railway transferred the properties to the City of Tacoma, who began leasing the lots to various industries, primarily machine and metal working shops. Since the railroad spur divided the western (Dock Street) and eastern (waterway) portions of the lots, these lots were often leased to separate operations.

Hicks Bull Machine Shop/Dravis Engineering and Machine Works (Lots 1 through 3)

The first operation indicated on these parcels was the Hicks Bull Machine Shop. They operated in two buildings on Lot 2 from the 1910s through the 1930s. A building had previously been located on Lot 1 in the early 1900s and may also have been part of their operation. In the 1910s, the machine shop was in the western building. By the 1920s, the machine shop was moved to the eastern building and operations had expanded to include two additional sheds.

Dravis Engineering and Machine Works, who bought out the Hicks-Bull operation, occupied the site from 1937 until 1960. They had one expansive building rather than the four former Hicks Bull buildings, a small oil house, and a small coal house. Their operations included machining and blacksmithing. In 1963, Dravis transferred the buildings and improvements on Lots 1 and 2 and the north 25 feet of Lot 3 to Atlas Foundry. Atlas used the building for storage and manufacture of wood forms used in their casting facility in the Nalley Valley area. In 1978, the City leased Lots 1 through 5 to Moorage Associates (Totem Boat Haven). None of the historical structures remain and these lots are currently paved parking.

Tacoma Welding/Coast Iron and Machine Works/Fish Packing (Lots 3 through 5)

The Tacoma Welding Company, founded circa 1914, operated in a building on Lot 4 along Dock Street until the mid-1930s. They were replaced by an auto repair shop, that was located there for approximately 10 years. According to title records, the auto repair business was sold in 1946, including one 280-gallon gasoline underground storage tank (UST). The location of this UST is not known. Later uses of this building (1950s) were by the Marush Fish and Oyster Company retail store and by Johnny's Seafood from 1960 through 1975.

The Coast Iron and Machine Works, also founded circa 1914, initially operated in a building on Lot 5 along Dock Street until they moved further south to Lots 7 and 8. The building eventually was removed and the empty lot used for parking.

The southern portion of Lot 3 and the eastern portions of Lots 4 and 5 were occupied primarily by fish and seafood packers. These included the Tacoma Fish and Packing Company (near the waterway in the 1930s), the Marush Fish and Oyster Company (primarily on Lot 3), and Johnny's Seafood. For a brief period, the U.S. Coast Guard had an address along the waterway. Lots 3, 4, and 5 are currently paved parking leased to Moorage Associates.

Tacoma Steam Boiler Works (Lot 6)

The Tacoma Steam Boiler Works operated in a building that encompassed the western portion of Lot 6 and a northwestern portion of Lot 7 circa 1920. They were one of the oldest boiler, tank, stack, and ship repair plants in the Pacific Northwest and were in business through 1955. Due to ownership changes, their name changed to the Tacoma Steam Boiler and Welder Works in the 1930s, before becoming the Tacoma Boiler Works in 1943. The building walls were eventually removed, and the concrete floor used for parking.

Coast Iron and Machine Works (Lots 7 and 8)

Although Coast Iron and Machine Works were not the original occupants of these lots, they built a large machine shop along Dock Street for their operations of at least 50 years. Coast Iron and Machine Works was a general industrial shop that also built custom machinery. They moved to this location in the early 1930s (they were previously on Lot 5), replacing a small office building on Lot 7 that housed the Shaffer Brokerage Company and a larger building on Lot 8 for Sunset Products. Another building had previously been on Lot 7 in 1912 at the location of the brokerage office; its use is not known.

After Coast Iron and Machine Works ceased to occupy the building, it was vacant until the Boy Scouts began using the building in the early 1990s for their Sea Scout program.

The Pacific Machine Shop (Lot 9)

The first identified occupant of Lot 9 was the Case-Shaffer Furnace Company, which was listed at the 1133 Dock Street in 1913. The Pacific Machine Shop, founded circa 1918, developed their plant along Dock Street on Lot 9. They specialized in acetylene and gas welding and manufacture of valves, pumps, and other equipment for the chemical industry. Their original building was replaced at least once in the 68 years that they operated on this parcel. By 1969, their machine shop was set back from Dock Street, closer to the waterway. In 1990, the City of Tacoma demolished the Pacific Machine Shop building. This lot is currently unpaved parking.

Food Warehouses/Auto Repair (Lots 10 and 11)

The first operation indicated on these lots and the southern portion of Lot 9 was the Ryan Fruit Company warehouse in the 1920s (potentially earlier). They were succeeded by William Brothers, who initially operated a warehouse, but then

begin operating a maintenance garage in the late 1940s for approximately 15 years.

By 1966, the Western Fish and Oyster Company operated a retail fish store built primarily on Lot 10 (and the southern portion of Lot 9). Lot 11 was used for parking. In 1990, the City of Tacoma demolished the Western Fish & Oyster Company building and removed a 6,000-gallon UST southeast of the former building. According to Tacoma-Pierce County Health Department (TPCHD) files, the UST formerly contained fuel oil, and was emptied and filled with sand and gravel in 1970.

The City Steam-Electricity Plant (Lots 11 and 12)

The southern half of Lot 11 and the northern half of Lot 12 of Block 62 were transferred with Lots 1 through 10 by Northern Pacific Railway to the City of Tacoma in 1910. The City established Tacoma Steam Plant No. 1 in 1922, which occupied these lots. The City steam plant was built as a backup electrical plant and was reportedly rarely operated. The City demolished the plant in 1988.

ENVIRONMENTAL INVESTIGATIONS

Summary of Previous Investigations

Several previous investigations have been completed within the area of these properties. The investigations primarily included slag sampling along the bank of the waterway and verification samples collected after soil excavation. A summary of these investigations is presented below. Figure 3 shows the previous sampling locations. A summary of the results of soil and groundwater sampling from previous investigations is presented in the following section.

City of Tacoma (1980s) Boardwalk Construction

The City of Tacoma constructed a boardwalk adjacent to the former Coast Iron Works in the 1980s. Materials including massive slag, friable slag, metal turnings, and miscellaneous debris were identified during construction. Three soil samples were reportedly collected for the boardwalk construction project in December 1989 (Ecology 1993 and Black & Veatch 1994); however, documentation of sampling locations and analytical data were not available for this report. According to Black and Veatch, samples were collected at the bank, about 3 or 4 feet below a "slag-like" layer and analyzed for total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), and halogenated

hydrocarbons. Leachability of metals, pesticides, and herbicides was evaluated by extraction procedure toxicity (EP Tox). The slag and metallic waste materials were apparently overlain with fabric and covered with stone riprap when the boardwalk was built. Two samples were noted to have TPH concentrations (4,418 and 1,739 mg/kg) greater than the cleanup goal of 200 mg/kg. The samples results for PAHs were reported as greater than the cleanup goal.

TPCHD (1988) Preliminary Environmental Assessment

TPCHD conducted an environmental assessment of the former Steam Plant (TPCHD 1988) to evaluate health and environmental risk associated with past site use. Twenty samples were collected for chemical analysis and two powder samples were submitted for fish bioassay (for waste designation purposes). Thirteen samples were concrete, brick, ash, and wood shaving; and four were sludge samples. Samples were submitted for analyses of polychlorinated biphenyls (PCBs), priority pollutant metals, halogenated hydrocarbons/PAH, and oil and grease. The location of these samples could not be duplicated since they were located within building structures that have since been demolished. The remaining three were soil or sediment samples (TCL-1, TCL-2, and TCL-3) collected from locations as presented on Figure 3. Samples were submitted for analyses of priority pollutant metals, halogenated hydrocarbons/PAHs, and oil and grease. The halogenated hydrocarbon/PAH test indicated chlorinated halogens were not present in the samples.

City of Tacoma Phase I Environmental Site Assessment (1990)

Parametrix conducted a Phase I Site Assessment on several parcels along the Thea Foss Waterway, including Coast Irons Works, Pacific Machine Shop, the Western Fish and Oyster Company, and the Steam-Electricity Plant (Parametrix 1990).

As cited in this report, the City of Tacoma noted several USTs were closed and filled in the 1970s in the Coast Iron Works area. However, documentation for only one UST removal was found, as discussed below (TPCHD 1990). During the site reconnaissance conducted by Parametrix, several empty 5-gallon paint containers were noted. Large quantities of metals shavings were noted at depths of up to 6 feet along the east side of the Sea Scouts Building. Additional soil and groundwater characterization was recommended for TPH and metals.

No evidence of USTs was encountered on the former Steam-Electricity Plant property in the historical and agency review conducted in this report. It was noted that the building structures were likely supported by driven timber piles.

TPCHD (1990) Tank Removal

A tank was identified on 1137 Dock Street (near former Western Fish and Oyster Company-Lot 10). In the 1970s, the tank was emptied and filled with sand. According to the TPCHD file (TPCHD 1990), the tank was removed on May 17, 1990. After the tank was removed, contaminated soil was excavated from around the tank area. Verification samples were collected to confirm removal of soil. Two samples on the south and west side of the excavation were noted to contain TPH at concentrations of 406 and 788 mg/kg, respectively.

City of Tacoma Contaminated Soil Removal (1991)

The City of Tacoma removed approximately 30 cubic yards of TPH-contaminated soils from the former Steam-Electricity Plant site (Figure 2). Approximately 16 verification soil samples were collected and submitted for TPH analysis. Excavation was continued until samples contained less than 200 mg/kg TPH. The excavated soil was stockpiled to the north of the Public Walkway (on Lot 9) for bioremediation.

UBAT (1992) Bank Slag Sampling

Ecology's Urban Bay Action Team (UBAT) collected samples of slag waste materials along the bank of the waterway on December 2, 1992, to determine whether metals of concern to the waterway exceeded sediment quality objectives (SQOs). Sampling activities were documented in an Ecology memorandum (Ecology 1993). A surface grab sample, ATL-BANK1 (labeled as UBAT92-1 on Figure 3), was collected from the bank below the 11th Street Bridge. The bank sample was analyzed for total metals.

Ecology Sampling (1994)

During a site visit on April 28, 1994, a seep was observed flowing from the bank of the former Steam Plant. Although no pipe was observed, flow at this location was approximately 5 gpm. A seep sample (SPW) was collected and submitted for analysis of total metals. A sediment sample (SP3) was also collected near the seep location and submitted for analysis of total metals.

Thea Foss Waterway Round 1 Sampling (1994)

Hart Crowser completed Round 1 waterway sediment and bank sampling of the Thea Foss Waterway in 1994 (City of Tacoma 1995). A composite bank sediment sample, RD-B32, was collected below the slag and metal turnings pile under the 11th Street Bridge. Analyses included total metals, semivolatile

organic compounds (SVOCs), PAHs, benzene, toluene, ethylbenzene, and xylenes (BTEX), and PCBs/pesticides. In addition, one composite sediment sample (RD-S21) and one sediment sample (RD-S24) were collected from nearshore areas. The sampling locations are shown on Figure 2. Analyses for these samples included total metals, SVOCs, PAHs, and PCBs/pesticides.

UBAT (1995) Bank Slag Sampling

Ecology's UBAT sampled the bank slag area between June 7, 1994, and March 1995. Samples were analyzed for total metals (similar to the 1992 UBAT investigation). One surface sample (UBAT95-1) was collected from a different area of the slag pile in the South 11th Street ROW as shown on Figure 3. In addition, seven samples (UBAT-94-1, UBAT-95-2 through UBAT-95-7) were collected along the bank and submitted for total metals analysis. One seep sample (UBAT-94-Seep) was also collected for analysis of total metals.

Ecology (1995) Bank Slag Resampling and Leachability Analysis

Ecology resampled the slag originally sampled in the UBAT (1992) investigation in June 1995. In addition to total metals analyses, the slag was subjected to leaching tests using the toxicity characteristic leaching procedure (TCLP) (digestion with dilute acetic acid) and ASTM method (digestion with deionized water) to determine whether the slag could be considered an ongoing source to the waterway. The locations of these bank samples, 11ROW-L1 and CIW-L1, are shown on Figure 3.

Thea Foss Waterway Round 3 Sampling (1997)

Hart Crowser completed the Round 3 waterway sediment and groundwater sampling of the Thea Foss Waterway in 1997 (City of Tacoma 1999). As part of this work, an upland shallow and deep well cluster was installed at location RD3-UMW2 A/B and a tidal monitoring study was performed. No soil or groundwater samples were collected for chemical analysis from this location.

Hart Crowser (1998) 11th Street ROW Remedial Investigation

Hart Crowser completed soil and groundwater sampling as part of the RI for the 11th Street Right of Way (ROW) in 1998 (Hart Crowser 1998). Three borings (R11-B01 through R11-B03) were drilled to depths of 20 feet below ground surface. Two test pits (R11-TP01 and R11-TP02) were also excavated to depths of 5 to 6.5 feet. In addition, one monitoring well (R11-MW01) was installed, screened at a depth of 5 to 15 feet. Soil samples were submitted for analysis of total metals, TCLP metals, SVOCs, VOCs, PCBs and pesticides, and TPH.

Groundwater samples were submitted for analyses of dissolved metals, PAHs, VOCs, and TPH.

Summary of Soil Quality Results from Previous Investigations

The existing soil quality data are primarily from bank samples collected in the intertidal area. Figure 3 presents a summary map of concentrations which exceed the Consent Decree cleanup levels. Data from samples UBAT-95-3 and UBAT-95-4 had not been found at the time of this report. Sediment within the intertidal zone exceeding the Sediment Quality Objectives (SQOs) for Commencement Bay are being addressed under the Thea Foss Waterway cleanup.

Concentrations in the intertidal zone do not necessarily indicate a source from the adjacent upland property; however, they are presented here as indications of the types of contaminants that may be present.

As might be expected with the occurrence of slag and a history of metal foundries, the data indicate elevated metals concentrations. Concentrations of antimony, arsenic, chromium, copper, and lead were above Consent Decree cleanup levels. In one sample, (11ROW-L1), lead (4,680 mg/kg) was above the Maximum Soil Concentration Level of 2,500 mg/kg under the Cleanup Action Plan.

Total PCBs, total carcinogenic PAH (cPAHs), and TPH as heavy oil were detected in the recent fill beneath the 11th Street ROW at concentrations above the screening criteria. These concentrations are likely related to cutting oils and other lubricants that may be present in machined metal.

In addition, one bank sample (RD-B32) also contained elevated concentrations of total cPAHs. Total PCBs were also detected at RD-S21 and RD-S24 at concentrations above the screening level. The concentrations detected in the bank and nearshore sediments may be related to potential isolated sloughing of recent fill material.

Both TCLP and ASTM leaching tests were conducted on slag samples collected from the bank. The ASTM test method more closely resembles freshwater leaching (e.g., from precipitation infiltration and/or upgradient groundwater) and the TCLP test data are used to assess the feasibility of landfilling the material. The ASTM leaching test indicated that low concentrations of copper, lead, and nickel may be leached from the slag. These data are discussed further in the groundwater quality section below. The lead concentration from the TCLP testing of sample 11ROW-L1 indicates the potential for a characteristic

dangerous waste that would not be accepted for RCRA Subtitle D landfill disposal.

Summary of Groundwater Quality Results from Previous Investigations

As shown on Figure 3, dissolved arsenic, copper, lead, nickel, and silver in groundwater exceeded the Consent Decree cleanup levels at R11-MW01. Total zinc was detected at concentrations above the Consent Decree cleanup levels for dissolved zinc at UBAT-94-Seep. No information is available on dissolved zinc concentrations at this location.

ASTM leaching data for slag samples do not exceed Consent Decree cleanup levels for groundwater, indicating that slag is likely not impacting groundwater. However, as discussed above the more aggressive TCLP testing does indicate that some slag or soil may not be suitable for RCRA Subtitle D landfill disposal.

Current Site Investigation

Slag outcrops on the bank, investigations from adjacent properties, and available historical information suggest that past activities on these properties have impacted local environmental conditions. The current investigation focused on characterizing the nature and extent of impacts to soil and groundwater on the site with the following specific goals:

- Evaluate current soil quality in fill materials at the site;
- Evaluate groundwater quality entering the waterway; and
- Determine vertical and lateral extent of slag and other waste material and identify potential sources of contamination to soil and groundwater.

The field investigation was completed by Hart Crowser between March 7 and 21, 2001, with additional groundwater and seep sampling performed on December 10, 2001. The purpose of the field investigations was to collect site characterization data to support evaluation of any potential site cleanup needs. The locations of test pits and borings completed for this investigation are shown on Figures 4 and 5. Boring logs and field investigation procedures are presented in Appendix A.

Test Pits

Ten test pits were excavated at the site using a backhoe on March 7 and 8, 2001. One shallow sample and one deep sample from each test pit were

submitted to the City of Tacoma laboratory for analysis of diesel- and oil-range petroleum hydrocarbons, PAHs, metals, and total solids. The shallow samples were collected from a depth of less than 2.5 feet and the deeper samples were collected from depths of between 5 and 10 feet. Occasionally, when there were multiple distinct fill layers, a third sample was collected and submitted for chemical analysis to better characterize fill soil quality.

Soil Borings

Five borings (HB-B01, HB-B02, and HB-MW01 through HB-MW03) were drilled at the site using a hollow-stem auger drill rig on March 8 and 9, 2001. The borings were advanced to a depth of 17 feet. Soil samples were collected at 2.5-foot-depth intervals using an 18-inch split-spoon sampler. One shallow and one deep sample were submitted for laboratory analysis per boring, except at HB-MW01 where no shallow sample was collected because of poor sample recovery. The shallow sample was collected from within the upper 5 feet, and the deep sample was collected from across the water table at a depth of approximately 10 feet. The samples were submitted to the City of Tacoma laboratory for analysis of diesel- and oil-range petroleum hydrocarbons, PAHs, metals, and total solids. One sample (HB-MW01 S-4), where a strong odor was noted and where photoionization detector (PID) readings were elevated above background levels, was also submitted for analysis of gasoline-range petroleum hydrocarbons and BTEX.

Monitoring Wells

Three of the soil borings (HB-MW01 through HB-MW03) were completed as monitoring wells. Monitoring wells were completed using 2-inch-diameter PVC casing with 10-foot-long well screens. The wells were screened across the water table, with screened intervals between approximately 4 and 14 feet below ground surface. The wells were developed on March 15, 2001, prior to sampling. Groundwater elevations were measured in site monitoring wells before each sampling event and on three other occasions, as summarized in Table 1.

Groundwater and Seep Sampling

Groundwater quality samples were collected from the three new monitoring wells and the existing shallow well RD3-UMW-2A on March 20 and 21, 2001. Samples were collected at low (March 20) and high (March 21) tides to assess variability in groundwater quality due to potential mixing with seawater. A seep sample was also collected from location HB-S01 at low tide on March 27, 2001. These samples were submitted to the City of Tacoma laboratory for analysis of

diesel- and oil-range petroleum hydrocarbons, dissolved metals, and PAHs. Due to high salinities in the groundwater and seep samples, metals analyses were performed by Sound Analytical of Fife, Washington. Samples from HB-MW01 and HB-MW03 were also submitted for analysis of gasoline-range hydrocarbons and BTEX.

To confirm detections of elevated concentrations of metals in groundwater and seep samples, and to evaluate possible interference with analytical techniques due to high salinities, an additional round of groundwater and seep sampling was performed on December 10, 2001. Wells HB-MW02, HB-MW03, and RD3-UMW-2A, and seep HB-S01 were sampled at low tide. Well HB-MW01 was underneath a parked car and could not be accessed. A surface water reference sample was collected from Owens Beach at Point Defiance Park. These samples were submitted for analysis of dissolved arsenic, copper, and nickel.

PHYSICAL SUBSURFACE CONDITIONS

The subsurface soil and groundwater conditions were evaluated to understand the physical setting with respect to contaminant occurrence and migration. In general, the upper fill soils are the most significant with respect to direct contact risk (e.g., to site workers during soil excavation for utilities work). Deeper soils are of more concern with respect to groundwater impact and contaminant migration to the Thea Foss Waterway. A summary of the soil and groundwater conditions is presented in the following sections.

Subsurface Stratigraphy

Our interpretation of subsurface stratigraphy is based on the soil explorations performed for this and previous investigations and knowledge of site history. The location of the explorations are shown on Figures 4 and 5 and the exploration logs are presented in Appendix A.

The general stratigraphy at the site consists of surface soils or asphalt pavement over a Mixed Fill unit, containing varying amounts of slag, wood, and debris. This is underlain by black sand with shells, interpreted as being early Dredge Fill and Native Tideflat deposits. The Mixed Fill is generally thickest near the waterway and appears to pinch out to the west. Although the exact western boundary of this unit was not defined, it was not encountered in borings DSN-MW01 and DSN-MW02 on Dock Street immediately west of the site.

Figures 8 and 9 present cross sections running north-south through Development Sites 9 and 8. Development Site 9 is overlain by asphalt parking. Between 1 and 12 feet of Mixed Fill was encountered beneath the asphalt. Non-soil materials described in the Mixed Fill included brick, concrete, wood, burnt wood, coal, and orange or reddish-brown slag. Silvery-gray ash or cinders, possibly boiler ash, were observed in the upper 2 feet of test pits HB-TP03 and HB-TP04, located between the former Coast Iron Works/Tacoma Boiler Works and Hicks-Bull Machine Shop.

Development Site 8 is partially covered by the Sea Scouts building. With the exception of a sidewalk leading to the Public Esplanade, the rest of the site is unpaved parking. Approximately 1 to 8 feet of Mixed Fill was encountered beneath surface soils. Non-soil materials described in the Mixed Fill included brick, concrete, asphalt chunks, wood, burnt wood, coal, and orange or reddish brown slag. Black slag was also noted at HB-TP05. White or silver ash or cinders were also observed in HB-TP05 and HB-TP06, located at the former Coast Iron Works and Tacoma Boiler Works. A tan ash material was noted at a depth of 1 to 2 feet in HB-TP10, located on the former Steam-Electricity Plant site. Deep pilings, which were likely supports the former Steam-Electricity Plant, were encountered to the full depth explored of 9 feet at HB-TP09.

Groundwater Conditions

Groundwater elevations were measured at several high and low tides in site monitoring wells and the two off-site wells located in Dock Street (Table 1). In 1997 a tidal monitoring study was performed at the site using well RD3-UMW2A (City of Tacoma 1999). Based on these data, groundwater elevations at the site are expected to vary between approximately 4 and –3 feet Tacoma Public Works Datum (TPWD), depending on tide stage and location. Average groundwater elevations at the site are expected to be around 2 feet TPWD. Most of the site is at an elevation of approximately 11 feet TPWD, so that the minimum expected depth to water will typically be around 7 feet, with an average depth of about 9 feet. Results of the tidal monitoring study also indicate that net groundwater flow is toward the waterway, although short-term flow reversals occur during high tide.

NATURE AND EXTENT OF CONTAMINATION

This section describes the nature and extent of constituents identified in soil and groundwater at concentrations above the site cleanup levels. The results of chemical testing on soil and groundwater from the investigations were compared to the cleanup standards for soil and groundwater developed as part

of the Consent Decree (Table 2). This table has been modified from the original values developed in the Consent Decree to reflect changes under new MTCA Amendments (Hart Crowser 2001). The basis of the cleanup levels is as follows:

- Soil cleanup levels are based on the protection of human health under a residential use scenario (MTCA Method B direct contact criteria); and

- Groundwater cleanup levels are based on the protection of marine surface water. Groundwater at the site has been determined by Ecology to not be a current or future source of drinking water based on MTCA criteria. Groundwater cleanup levels include protection of aquatic life (marine chronic criteria; Chapter 173-201A WAC) and the protection of human health from consumption of aquatic organisms (40 CFR 131).

As defined by the Consent Decree Cleanup Action Plan (CAP), groundwater contamination above applicable standards is not expected on the upland properties. Thus, soil quality criteria for groundwater protection is considered only if groundwater quality has been impacted such that active remediation is required, or an active source in the soil is encountered.

The Consent Decree CAP was based on the concept that the properties had similar physical characteristics, past land uses, and similar contaminant problems, which allowed for similar cleanup remedies. Given these conditions, a contaminant scenario was developed within which the CAP would be applicable. The contaminant scenario included "Soil Contaminant Maximums" applicable to the CAP contamination scenario. The Soil Contaminant Maximums are presented in Table 2, along with the soil and groundwater cleanup levels. Each site is evaluated relative to the nature and extent of the contaminants identified as well as the Soil Contaminant Maximums to assess applicability of the Consent Decree CAP.

Soil Quality Results

In total, 33 soil samples were collected at 15 locations. Table 3 presents a summary of the soil chemical analyses completed by location and depth. A summary of the soil cleanup level exceedences is presented in Table 4. Soil exceedences are shown in plan view on Figures 6 and 7, and in cross section on Figures 8 and 9.

Exceedences of Consent Decree soil cleanup levels are limited to the Mixed Fill unit. Total cPAHs exceed soil cleanup levels throughout much of the site, primarily in shallow soils. Lead exceeds soil cleanup levels in the vicinity of the former Coast Iron Works (currently the Sea Scouts building) in the central

portion of the site and at one location on the former Steam-Electricity Plant. Lead exceedences are also primarily limited to shallow soils. One arsenic exceedence was also encountered at the former Coast Iron Work. One heavy oil exceedence was encountered in the upper foot at test pit HB-TP01 located at the northeast corner of the site near the 11th Street ROW.

With the exception of lead from one sample at HB-TP05, analyte concentrations in soil samples were below the Soil Contamination Maximums outlined in the CAP. The lead concentration of 2,630 mg/kg at a depth of 3 to 5 feet at this location slightly exceeds the Soil Contamination Maximum of 2,500 mg/kg.

The complete results of the soil quality analyses are presented in Tables B-1 through B-5 of Appendix B, which are sorted by chemical groups and exploration location. Appendix C provides a chemical data quality review summary and laboratory certificates of analysis for the current samples. All chemical analytical results were deemed acceptable for use on this project.

Petroleum Hydrocarbons

Results of petroleum-range hydrocarbon analyses are presented in Table B-4. Gasoline-range hydrocarbons were not detected in the one sample (HB-MW01 S-4) submitted for analysis. This sample was selected for analysis of gasoline-range hydrocarbons based on elevated PID readings during field screening. Diesel-range hydrocarbons were detected in 1 of 33 samples submitted for analysis. In HB-TP05 S-2, diesel-range hydrocarbons were detected at a concentration of 43 mg/kg, well below the soil cleanup level of 2,000 mg/kg (Table 2).

Oil-range hydrocarbons were detected in 17 of 33 samples, with detections occurring throughout much of the site. The only sample to exceed the heavy oil cleanup level of 2,000 mg/kg was HB-TP01 S-1, with a concentration of 4,000 mg/kg. Detected concentrations at other locations ranged from 44 to 1,300 mg/kg, and were typically less than 500 mg/kg.

Polycyclic Aromatic Hydrocarbons

Results of PAH analyses are presented in Tables B-1 and B-2. Relatively low concentrations, well below Consent Decree cleanup criteria, of several non-carcinogenic PAHs were detected in samples from throughout the site. Detected non-carcinogenic PAH compounds included 2-methylnaphthalene, benzo(g,h,i)perylene, acenaphthene, acenaphthylene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene at concentrations ranging up to 21 mg/kg.

Individual cPAHs were detected throughout the site, with the highest concentrations generally occurring in shallow soils. Total cPAH concentrations were calculated using the toxicity equivalent methodology presented in WAC 173-340-708(8). Total cPAH concentrations exceeded the cleanup criteria of 0.137 mg/kg in 18 of 33 soil samples, as summarized in Table 4. Locations and depths of cPAH exceedences are shown on Figures 6 and 7.

A comparison of total cPAH exceedences with soil descriptions on the exploration logs (Appendix A) indicate three different likely sources for cPAHs in site soils. The relatively low-level exceedences in the upper 2 feet of soil on the northern half of the site (HB-TP01 through HB-TP03) may be the result of near-surface soils in direct contact with the asphalt paving. Similarly, asphalt chunks were noted in the upper 2 feet of soil at HB-TP05. The second likely source of total cPAHs is the occurrence of creosote-treated wood planking and pilings, as observed in deeper samples from HB-TP01, HB-TP02, and HB-MW01 and along one side of HB-TP09. The final likely source of cPAHs, burnt wood and/or coal, was observed in HB-TP04 through HB-TP06 and HB-TP10.

Metals

Results of metals analyses are presented in Table B-3. As summarized in Table 4 and shown on Figures 6 and 7, lead was detected above the cleanup level of 250 mg/kg in five samples, with concentrations ranging from 252 to 2,630 mg/kg. Arsenic was detected above the cleanup level of 20 mg/kg in one sample, at a concentration of 77.2 mg/kg. Concentrations of other metals analyzed for in soils at the site were below soil cleanup levels.

Four of the lead exceedences (HB-TP3 S-1, HB-TP04 S-1, HB-TP05 S-2, and HB-TP06 S-1) occurred in the vicinity of the former Coast Iron Works. These exceedences appear to be associated with red-orange slag and/or silvery-gray cinders or ash encountered in the Mixed Fill in this area. The lead concentration at HB-TP05 S-2 (depth of 3 to 5 feet) was 2,630 mg/kg, which exceeds the Maximum Soil Concentration of 2,500 mg/kg defined in the Consent Decree. Lead concentrations in test pits north and south (HB-TP04 and HB-TP06) of this location were well below the 2,500 mg/kg maximum and the lead concentration immediately below this sample (HB-TP05 S-3, 5 to 7 feet) was only 4.67 mg/kg. This indicates that the extent of soil exceeding the maximum concentration is relatively limited.

The fifth lead exceedence was at HB-TP10 S-1, on the former Steam-Electricity Plant, with a concentration of 252 mg/kg. Non-soil material encountered in this sample included tan ashy material, which may be the source of the elevated lead concentration.

Arsenic was detected in one sample (HB-TP05 S-2) at a concentration of 77.2 mg/kg. This sample location also had the highest lead concentration. Black slag was encountered at this location in addition to the red-orange slag and gray ash discussed above.

Concentrations of other metals from samples in the Mixed Fill were elevated above typical background concentrations; however, these concentrations are well below consent decree cleanup levels.

Groundwater Quality Results

Petroleum Hydrocarbons

Results of petroleum hydrocarbon analyses are summarized in Table B-9. Diesel- and oil-range hydrocarbons were not detected in groundwater and seep samples collected at the site. Gasoline-range hydrocarbons and BTEX compounds were not detected in groundwater samples collected from HB-MW01 and HB-MW03.

Polycyclic Aromatic Hydrocarbons

Results of PAH analyses are summarized in Tables B-6 and B-7. Carcinogenic PAHs were not detected in groundwater and seep samples collected at the site. Low concentrations, below cleanup levels, of the non-carcinogenic PAHs acenaphthene, anthracene, fluoranthene, fluorene, and phenanthrene were detected in groundwater samples collected from HB-MW01. Creosote-treated wood timbers and pilings encountered during drilling of this monitoring well likely account for these detections. No other non-carcinogenic PAHs were detected in site groundwater or seep samples.

Dissolved Metals

Results of dissolved metals analyses are presented in Table B-8. As summarized in Table 6, dissolved metals (arsenic, copper, and nickel) were the only constituents detected at concentrations above groundwater cleanup levels on the site. Figure 10 presents arsenic, copper, and nickel concentrations from previous and ongoing upland investigations along the waterway. Concentrations of each of these constituents are elevated at the properties north of South 15th Street along the west side of the waterway. With the exception of nickel at HB-MW02, the detected concentrations at the site are in the general range of those detected at other upland parcels with high salinity groundwater.

The elevated metal concentrations are believed to be the result in part to saltwater interferences with the laboratory analyses. The inductively coupled

argon plasma-mass spectrometry (ICP-MS) method used for the metals analysis to achieve extra-low detection limits, can cause either false positive results or reported results higher than actually present in the sample for a number of metals in the presence of seawater because of sodium and chloride interferences. These interferences result from ions formed in the plasma that have the same mass as metals of interest. While the laboratory applies interference correction factors, high concentrations of salt such as those in seawater, still cause a positive bias to analytical results. In particular, arsenic and copper are metals that may be positively biased in saline water samples.

To evaluate this, a surface water reference sample (OB-1) collected from Owen's Beach at Point Defiance State Park was analyzed for dissolved arsenic, copper, and nickel. As seen in Table 6, concentrations of arsenic and copper measured in this sample are higher than those measured in any of the site groundwater or seep samples. With the exception of samples collected from monitoring well HB-MW02 (concentrations ranging from 25.8 to 47 ug/L), the nickel concentration measured in OB-1 (10.8 ug/L) is similar to what was measured in other seep and groundwater samples at the site (8.8 to 13 ug/L). Based on this, HB-MW02 appears to be the only location where groundwater is being adversely impacted.

Summary of Subsurface Contaminant Conditions

The primary contaminant issues identified at the site are total cPAHs, lead, and arsenic in soil and nickel in groundwater. With the exception of nickel, contaminated soils at the site do not appear to be impacting groundwater quality.

In soil, contamination appears to be contained within the upper 1 to 2 feet in the central and western portions of the site, with the exception of HB-TP09 where total cPAH contamination was observed at a depth of 9 feet. Nearer to the waterway the depth of contaminated soil increases to as much as 10 feet.

Total cPAH exceedences are associated with the occurrence of asphalt, creosote-treated wood, and coal or burnt wood. Generally these exceedences are confined to shallow soils, except where creosote-treated wood pilings are encountered at depth or where the Mixed Fill unit thickens near the waterway.

Elevated metals concentrations are generally associated with the occurrence of slag in the Mixed Fill. However, the slag does not seem to be resulting in widespread exceedences of soil cleanup levels. Samples with arsenic and lead exceedences around the Coast Iron Works contained silver or gray to white ash and/or cinder materials in addition to slag. Similarly, no slag was noted in

association with the lead exceedence at HB-TP10; however, there was a tan ashy material. It seems likely the main source of soil exceedences is ash or cinders, possibly boiler ash.

Concentration of nickel in groundwater at HB-MW02 exceeds cleanup levels and is higher than that measured in the surface water reference sample. The highest nickel concentrations in soil at the site were measured in samples HB-TP05 S-2 (72.1 mg/kg), HB-TP06 S-1 (103 mg/kg), and HB-TP07 S-1 (168 mg/kg), which are the three explorations located closest to HB-MW02, indicating that soils in this area are most likely the source of nickel in groundwater.

The data indicate the site meets the intent of the Consent Decree Cleanup Action Plan with expected contaminant types, land use history, and analyte concentrations. With the exception of lead in relatively shallow soils at HB-TP05, the identified contamination is below the maximum soil concentrations allowed in the Consent Decree.

CLEANUP ACTION ANALYSIS

The cleanup action analysis identifies general remedial technologies that conform to the objectives of the Consent Decree, and provides a conceptual understanding of the remedial actions applicable to the site under the terms of the Consent Decree CAP. The CAP identifies Alternative 3 Remediation of Soils Based on Future Land Use Development as the appropriate alternative for site cleanup all along the Thea Foss waterfront based on an Area-Wide Feasibility Study (Black & Veatch 1994).

The Hicks-Bull, Coast Iron Works, and Steam Plant properties consist of two development sites (8 and 9) that may potentially be developed separately. An analysis of the cleanup action applicable to the sites taken as a whole and the rationale are described herein. Site-specific cleanup action plans (SCAPs) will be prepared separately for Development Sites 8 and 9. Specific technologies will be addressed in greater detail in the SCAPs.

Proposed Cleanup Action for the Hicks-Bull, Coast Iron Works, and Steam Plant Properties

The Development Sites 8 and 9 SCAPs will address proposed development and land use changes at the sites. Future development of these sites is currently envisioned as mixed-use commercial/residential. Land use plans include an esplanade and public access areas along the waterfront. Structures built within

the parcels could include multi-story buildings with commercial development on the ground floor. Subsurface disturbance associated with development will most likely consists of excavations for pile caps, footings, subsurface parking structures, and/or future sites for utilities.

Detected soil contamination at Development Site 8 occurs beneath approximately 1 foot of surface soils in unpaved parking areas. These soils will either need to be excavated or capped with asphalt or 3 feet of clean soil to be protective of human health and the environment. Detected soil contamination at Development Site 9 occurs beneath an asphalt surface which provides protection of human health and the environment under current conditions.

During construction excavation at both sites contaminated soils will likely be encountered, particularly in shallow soils (upper 3 feet) on the eastern half of the sites. From the perspective of protecting human health during excavation, soil cleanup levels based on commercial or industrial land use represent appropriate remediation action levels.

A potential soil source area has been identified for the nickel contamination in groundwater. Soil cleanup levels based on protection of groundwater would represent the appropriate remediation action levels for nickel in the vicinity of HB-MW02. Using default parameters under MTCA and the Consent Decree Cleanup Levels for nickel in groundwater, the soil remediation level for protection of groundwater would be 10.3 mg/kg. Most of the site soils are above this concentration, while the area of impacted groundwater is limited, indicating that this remediation level is likely too conservative. Therefore, a site-specific soil cleanup level for protection of groundwater will be developed based on leaching tests.

Application of the CAP alternatives are currently envisioned as follows:

- **No Action** is applicable where no contamination is identified or where contamination is isolated beneath a cap (asphalt or 3 feet of clean soil), there is no related groundwater contamination, and no excavation is planned. This alternative applies for most of Development Site 9, which is currently capped, has relatively low soil constituent concentrations, and no evidence of groundwater contamination. This applies to a relatively limited area of Development Site 8, including the vicinity of HB-TP08 and potentially the western part of the site along Dock Street and north of HB-TP10.

- **Isolation by Cap or Cover** is applicable throughout both sites, with the exception of the area around HB-TP05 where lead concentrations exceed the Soil Contaminant Maximum and the area upgradient of HB-MW02,

where nickel in soil is impacting groundwater. A cap/cover is currently provided in most areas of Development Site 9 by the existing building footprints and asphalt/concrete paving. Given the relatively low detected constituent concentrations and the lack of groundwater contamination, the subsurface soils elsewhere on Development Sites 8 and 9 will likely not pose a threat to human health or the environment if left in place and capped by pavement or buildings or covered by 3 feet of clean soil.

- **Excavation and Treatment or Disposal** is applicable in the area around HB-TP05 where lead concentrations exceed the Soil Contaminant Maximum; the area upgradient of HB-MW02, where nickel in soil is impacting groundwater; and if construction excavation activities are planned for areas of contaminated soils.

Soil Excavation in the Vicinity of HB-TP05 and HB-MW02

Soils in the vicinity of HB-TP05 that exceed the Soil Contaminant Maximum concentration for lead will need to be excavated to the extent practicable. The depth of excavation will likely be on the order of 5 feet; however, the lateral extent of these soils has not been determined.

Soils upgradient of HB-MW02 contributing nickel to groundwater will likely need to be excavated. The depth of elevated nickel concentrations in this area is relatively shallow, approximately 1 to 5 feet. The extent of any soil removal will depend on the development of appropriate remediation levels based on groundwater protection.

Landfill disposal and/or stabilization of lead- and nickel-contaminated soils are feasible treatment alternatives.

Soil Excavation during Construction Work

In general, excavation on the site should proceed with caution, particularly in shallow Mixed Fill soils. Elevated cPAHs and/or lead concentrations should be expected. If a significant quantity of observable non-soil material (e.g., slag-like material, ash, coal, burnt or creosote-treated wood) is identified, it should be segregated from other excavated soil for specific testing and appropriate disposal. Soil recycling through the use of off-site thermal desorption (a preferred destructive technology) is a feasible soil treatment alternative for cPAH-contaminated soils. Cleaned soil could be returned to the site and used as backfill where needed. Landfill disposal with or without stabilization are feasible alternatives for metals-contaminated soils.

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Urban Bay Action Team (UBAT) 1994 and 1995. Seep and Sediment Sampling Site Plan with partial list of metals in exceedence of sediment quality objectives for Coast Iron/Sea Scouts.

F:\docs\jobs\467672\HicksBullDraftRI.doc

Table 1 - Groundwater Level Data

Location	Date	Measuring Point Elevation in Feet TPWD	Depth to Water in Feet	Groundwater Elevation in Feet TPWD	Notes
HB-MW01	3/20/2001	10.15	9.20	0.95	Low Tide
	3/21/2001	10.15	9.00	1.15	High Tide
	3/27/2001	10.15	10.39	-0.24	Low Tide
	10/18/2001	10.15	7.75	2.40	High Tide
	10/18/2001	10.15	9.00	1.15	Low Tide
HB-MW02	3/20/2001	10.72	9.20	1.52	Low Tide
	3/21/2001	10.72	9.05	1.67	High Tide
	3/27/2001	10.72	9.59	1.13	Low Tide
	10/18/2001	10.72	8.78	1.94	High Tide
	10/18/2001	10.72	9.38	1.34	Low Tide
	12/10/2001	10.72	8.44	2.28	Low Tide
HB-MW03	3/20/2001	8.70	9.78	-1.08	Low Tide
	3/21/2001	8.70	8.90	-0.20	High Tide
	3/27/2001	8.70	11.40	-2.70	Low Tide
	10/18/2001	8.70	7.54	1.16	High Tide
	10/18/2001	8.70	9.48	-0.78	Low Tide
	12/10/2001	8.70	10.54	-1.84	Low Tide
RD3-UMW2A	8/22 to 8/25/97	11.09	9.12	1.97	Average from 72-hour tidal monitoring study
	8/22/1997	11.09	7.70	3.39	Maximum during tidal monitoring study
	8/25/1997	11.09	10.91	0.18	Minimum during tidal monitoring study
	3/20/2001	11.09	9.77	1.32	Low Tide
	3/21/2001	11.09	9.02	2.07	High Tide
	3/27/2001	11.09	11.29	-0.20	Low Tide
	10/18/2001	11.09	8.62	2.47	High Tide
	10/18/2001	11.09	9.60	1.49	Low Tide
	12/10/2001	11.09	10.37	0.72	Low Tide
DSN-MW01	3/20/2001	10.92	9.50	1.42	Low Tide
	3/21/2001	10.92	9.15	1.77	High Tide
	3/27/2001	10.92	9.78	1.14	Low Tide
	10/18/2001	10.92	9.55	1.37	High Tide
	10/18/2001	10.92	9.70	1.22	Low Tide
DSN-MW02	3/20/2001	11.26	9.58	1.68	Low Tide
	3/21/2001	11.26	9.22	2.04	High Tide
	3/27/2001	11.26	9.93	1.33	Low Tide
	10/18/2001	11.26	9.49	1.77	High Tide
	10/18/2001	11.26	9.75	1.51	Low Tide

Notes:
TPWD = Tacoma Public Works Datum, NGVD 1929.
Measuring point elevations for wells are surveyed top of casing elevations.

Table 2 - Soil and Groundwater Cleanup Levels and Soil Contamination Maximums

Constituent	Soil Cleanup Level in mg/kg	Maximum Soil Concentration in mg/kg	Groundwater Cleanup Level in ug/L
TPH[a]:			
Gasoline-Range Organics (BTEX Restrictions)	**100**	5,000	**1,000**
Gasoline-Range Organics (All other GRO)	**30**	5,000	**800**
Diesel-Range Organics	**2,000**	5,000	**500**
Heavy Oil	**2,000**	5,000	**500**
Benzene	34.5	250	71.0
Toluene	16,000	5,000	200,000
Ethylbenzene	8,000	5,000	29,000
Xylenes	160,000	5,000	16,000
Total cPAHs (as BAP)[d]	**0.137**	10.0	0.031
Antimony	32.0	320	4,300
Arsenic	**0.7** (20[b])	200	**0.14**[g]
Cadmium	80.0	400	**9.3**[f]
Chromium (VI)[e]	**240**	4,000	50.0
Copper	2,960	29,600	**3.1**[f]
Lead	250[c]	2,500	**8.1**[f]
Mercury	24.0	240	0.025
Nickel	1,600	16,000	**8.2**[f]
Zinc	24,000	240,000	**81**[f]
PCB (Total)	**0.5**	50.0	0.030

Notes:

Bold values have been revised from original Table 1 in the Consent Decree to reflect new MTCA Amendments of February 2001.

[a] TPH cleanup criteria are based on Method A Cleanup Standards. TPH Cleanup levels may be adjusted using site-specific risk assessment procedures outlined in MTCA Method B and C equations.

[b] The arsenic Method B risk-based cleanup standard is 0.7 mg/kg, while the cleanup level based on Washington State background is 20 mg/kg. The arsenic Method B and C soil cleanup criteria no longer use a GI absorption fraction of 0.4.

[c] Soils cleanup levels for lead are not defined under Method B or Method C. The Method A cleanup level is used for the direct contact value.

[d] Total cPAHs calculated using toxicity equivalent methodology presented in WAC 173-340-708(8).

[e] The chromium VI cleanup standards are based on an updated oral reference dose of 0.003 mg/kg/day (previous oral RfD was 0.005 mg/kg/day).

[f] Cleanup standard based on WAC 173-201A Marine Water Chronic.

[g] Cleanup standard based on Federal Ambient Water Quality Criteria (40CFR 131) for human consumption of aquatic organisms

Table 3 - Soil Chemistry Results Count
Hick's-Bull

Sample ID	Depth in Feet	Sampling Date	Conven-tionals	Metals, Total	PAHs	BTEX	TPH
HB-B01 S-1	2.5 - 4	3/9/2001	1	8	17		2
HB-B01 S-4	10 - 11.5	3/9/2001	1	8	17		2
HB-B02 S-1	3 - 4.5	3/9/2001	1	8	17		2
HB-B02 S-4	10.5 - 12	3/9/2001	1	8	17		2
HB-MW01 S-4	10 - 11.5	3/9/2001	1	8	17	4	3
HB-MW01 S-6	14.5 - 15	3/9/2001	1	8	17		2
HB-MW02 S-1	3 - 4.5	3/9/2001	1	8	17		2
HB-MW02 S-3	8 - 9.5	3/9/2001	1	8	17		2
HB-MW03 S-1	3 - 4.5	3/9/2001	1	8	17		2
HB-MW03 S-4	10.5 - 12	3/9/2001	1	8	17		2
HB-TP01 S-1	0 - 1	3/8/2001	1	8	17		2
HB-TP01 S-2	6.5 - 8	3/8/2001	1	8	17		2
HB-TP01 S-3	8.5 - 10	3/8/2001	1	8	17		2
HB-TP02 S-1	0.5 - 1.5	3/8/2001	1	8	17		2
HB-TP02 S-2	6 - 7	3/8/2001	1	8	17		2
HB-TP03 S-1	0.5 - 1.5	3/7/2001	1	8	17		2
HB-TP03 S-2	7.5 - 8.5	3/7/2001	1	8	17		2
HB-TP04 S-1	1 - 2	3/7/2001	1	8	17		2
HB-TP04 S-2	5 - 6	3/7/2001	1	8	17		2
HB-TP05 S-1	0.5 - 2	3/8/2001	1	8	17		2
HB-TP05 S-2	3 - 5	3/8/2001	1	8	17		2
HB-TP05 S-3	5 - 7	3/8/2001	1	8	17		2
HB-TP06 S-1	0.5 - 1.5	3/8/2001	1	8	17		2
HB-TP06 S-2	6.5 - 8.5	3/8/2001	1	8	17		2
HB-TP07 S-1	0.5 - 1.5	3/7/2001	1	8	17		2
HB-TP07 S-2	9 - 10	3/7/2001	1	8	17		2
HB-TP08 S-1	0.5 - 1	3/7/2001	1	8	17		2
HB-TP08 S-2	9 - 10	3/7/2001	1	8	17		2
HB-TP09 S-1	1 - 2.5	3/7/2001	1	8	17		2
HB-TP09 S-2	4.5 - 6	3/7/2001	1	8	17		2
HB-TP09 S-3	8.5 - 9	3/7/2001	1	8	17		2
HB-TP10 S-1	1 - 2	3/8/2001	1	8	17		2
HB-TP10 S-2	8.5 - 9.5	3/8/2001	1	8	17		2

Blank indicates sample not analyzed for specific analyte.

Table 4 - Summary of Soil Exceedences
Hick's-Bull

Analyte Group	Analyte Name	Analyte Value in mg/kg	Qualifier	Depth in Feet	Sampling Date	Sample ID	Screening Level Value in mg/kg
Metals, Total	Arsenic	77.2		3 - 5	3/8/2001	HB-TP05 S-2	20
Metals, Total	Lead	694		0.5 - 1.5	3/7/2001	HB-TP03 S-1	250
Metals, Total	Lead	696		1 - 2	3/7/2001	HB-TP04 S-1	250
Metals, Total	Lead	2630		3 - 5	3/8/2001	HB-TP05 S-2	250
Metals, Total	Lead	297		0.5 - 1.5	3/8/2001	HB-TP06 S-1	250
Metals, Total	Lead	252		1 - 2	3/8/2001	HB-TP10 S-1	250
PAHs	Total cPAHs BaP	0.250		3 - 4.5	3/9/2001	HB-B02 S-1	0.137
PAHs	Total cPAHs BaP	0.387		10.5 - 12	3/9/2001	HB-B02 S-4	0.137
PAHs	Total cPAHs BaP	0.571		10 - 11.5	3/9/2001	HB-MW01 S-4	0.137
PAHs	Total cPAHs BaP	0.302		3 - 4.5	3/9/2001	HB-MW03 S-1	0.137
PAHs	Total cPAHs BaP	0.413		0 - 1	3/8/2001	HB-TP01 S-1	0.137
PAHs	Total cPAHs BaP	0.503		8.5 - 10	3/8/2001	HB-TP01 S-3	0.137
PAHs	Total cPAHs BaP	0.728		0.5 - 1.5	3/8/2001	HB-TP02 S-1	0.137
PAHs	Total cPAHs BaP	0.478		6 - 7	3/8/2001	HB-TP02 S-2	0.137
PAHs	Total cPAHs BaP	0.155		0.5 - 1.5	3/7/2001	HB-TP03 S-1	0.137
PAHs	Total cPAHs BaP	3.219		1 - 2	3/7/2001	HB-TP04 S-1	0.137
PAHs	Total cPAHs BaP	4.298		0.5 - 2	3/8/2001	HB-TP05 S-1	0.137
PAHs	Total cPAHs BaP	1.233		3 - 5	3/8/2001	HB-TP05 S-2	0.137
PAHs	Total cPAHs BaP	0.236		0.5 - 1.5	3/8/2001	HB-TP06 S-1	0.137
PAHs	Total cPAHs BaP	0.298		0.5 - 1.5	3/7/2001	HB-TP07 S-1	0.137
PAHs	Total cPAHs BaP	0.230		1 - 2.5	3/7/2001	HB-TP09 S-1	0.137
PAHs	Total cPAHs BaP	7.242		4.5 - 6	3/7/2001	HB-TP09 S-2	0.137
PAHs	Total cPAHs BaP	5.959		8.5 - 9	3/7/2001	HB-TP09 S-3	0.137
PAHs	Total cPAHs BaP	2.544		1 - 2	3/8/2001	HB-TP10 S-1	0.137
Petroleum	Heavy Oil	4000		0 - 1	3/8/2001	HB-TP01 S-1	2000

Table 5 - Groundwater Chemistry Results Count
Hick's-Bull

Sample ID	Sampling Date	Conven-tionals	Metals, Diss.	PAHs	BTEX	TPH
HB-MW01	3/20/2001	1	9	17	4	3
HB-MW01-High	3/21/2001	1	9	17	4	3
HB-MW02	3/20/2001	1	9	17		2
HB-MW02-High	3/21/2001	1	9	17		2
HB-MW02	12/10/2001		3			
HB-MW03	3/20/2001	1	9	17	4	3
HB-MW03-High	3/21/2001	1	9	17	4	3
HB-MW03	12/10/2001		3			
HB-MWA (DUP of HB-MW01)	3/21/2001	1	9	17	4	3
HB-S01	3/27/2001	1	9	17		2
HB-S01	12/10/2001		3			
OB-1	12/10/2001		3			
UMW2A	3/20/2001	1	9	17		2
UMW2A-High	3/21/2001	1	9	17		2
UMW2A	12/10/2001		3			

Blank indicates sample not analyzed for specific analyte.

Table 6 - Summary of Groundwater Exceedences
Hick's-Bull

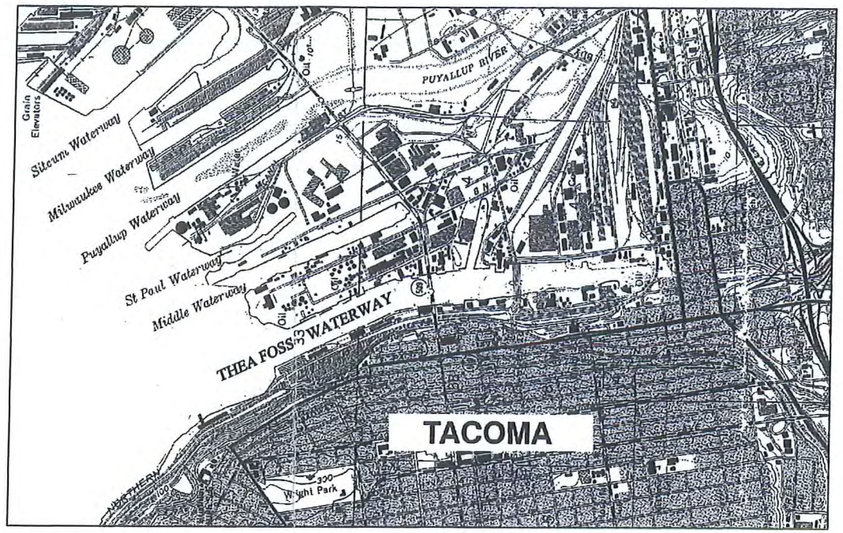
Analyte Group	Analyte	Analyte Value in ug/L	Qualifier	Sampling Date	Sample ID	Screening Level Value in ug/L
Metals, Dissolved	Arsenic	26		3/20/2001	HB-MW01	0.14
Metals, Dissolved	Arsenic	16		3/20/2001	HB-MW01 High	0.14
Metals, Dissolved	Arsenic	26		3/20/2001	HB-MW02	0.14
Metals, Dissolved	Arsenic	26		3/20/2001	HB-MW02-High	0.14
Metals, Dissolved	Arsenic	20.6		12/10/2001	HB-MW02	0.14
Metals, Dissolved	Arsenic	28		3/20/2001	HB-MW03	0.14
Metals, Dissolved	Arsenic	27		3/20/2001	HB-MW03-High	0.14
Metals, Dissolved	Arsenic	35.6		12/10/2001	HB-MW03	0.14
Metals, Dissolved	Arsenic	19		3/21/2001	HB-MWA	0.14
Metals, Dissolved	Arsenic	31		3/27/2001	HB-S01	0.14
Metals, Dissolved	Arsenic	38.8		12/10/2001	HB-S01	0.14
Metals, Dissolved	Arsenic	42.7		12/10/2001	OB-1	0.14
Metals, Dissolved	Arsenic	26		3/20/2001	UMW2A	0.14
Metals, Dissolved	Arsenic	28		3/20/2001	UMW2A-High	0.14
Metals, Dissolved	Arsenic	15.6		12/10/2001	UMW2A	0.14
Metals, Dissolved	Copper	7.2		3/20/2001	HB-MW01	2.5
Metals, Dissolved	Copper	6.4		3/20/2001	HB-MW01-High	2.5
Metals, Dissolved	Copper	9.1		3/20/2001	HB-MW02	2.5
Metals, Dissolved	Copper	8.2		3/20/2001	HB-MW02-High	2.5
Metals, Dissolved	Copper	4.33	J	12/10/2001	HB-MW02	2.5
Metals, Dissolved	Copper	11		3/20/2001	HB-MW03	2.5
Metals, Dissolved	Copper	7.8		3/20/2001	HB-MW03-High	2.5
Metals, Dissolved	Copper	6.24	J	12/10/2001	HB-MW03	2.5
Metals, Dissolved	Copper	5.9		3/21/2001	HB-MWA	2.5
Metals, Dissolved	Copper	6.3		3/27/2001	HB-S01	2.5
Metals, Dissolved	Copper	7.16	J	12/10/2001	HB-S01	2.5
Metals, Dissolved	Copper	9.05	J	12/10/2001	OB-1	2.5
Metals, Dissolved	Copper	5.1		3/20/2001	UMW2A	2.5
Metals, Dissolved	Copper	7.3		3/20/2001	UMW2A-High	2.5
Metals, Dissolved	Copper	3.79	J	12/10/2001	UMW2A	2.5
Metals, Dissolved	Nickel	13		3/20/2001	HB-MW01	7.9
Metals, Dissolved	Nickel	8.8		3/20/2001	HB-MW01 High	7.9
Metals, Dissolved	Nickel	47		3/20/2001	HB-MW02	7.9
Metals, Dissolved	Nickel	45		3/20/2001	HB-MW02-High	7.9
Metals, Dissolved	Nickel	25.8		12/10/2001	HB-MW02	7.9
Metals, Dissolved	Nickel	12		3/20/2001	HB-MW03	7.9
Metals, Dissolved	Nickel	11		3/20/2001	HB-MW03-High	7.9
Metals, Dissolved	Nickel	11.2		12/10/2001	HB-MW03	7.9
Metals, Dissolved	Nickel	9.3		3/21/2001	HB-MWA	7.9
Metals, Dissolved	Nickel	13		3/27/2001	HB-S01	7.9
Metals, Dissolved	Nickel	10.7		12/10/2001	HB-S01	7.9
Metals, Dissolved	Nickel	10.8		12/10/2001	OB-1	7.9
Metals, Dissolved	Nickel	11		3/20/2001	UMW2A	7.9
Metals, Dissolved	Nickel	9.3		3/20/2001	UMW2A-High	7.9

J = Estimated value.

Vicinity Map

Hicks-Bull, Coast Iron Works, and Steam Plant

Regional Vicinity Map

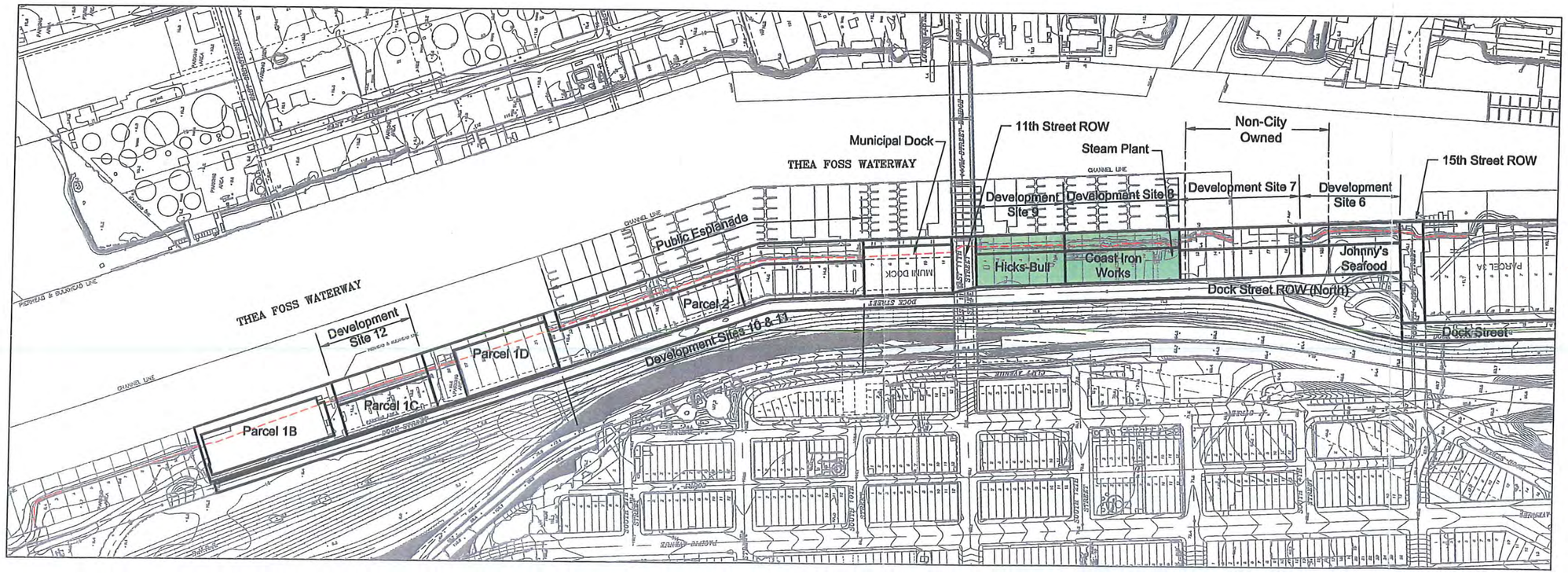


N

0 3000 6000

Scale in Feet

Project Index Map



Remedial Investigation Study Area with Development Site Boundary from City Map X_SAP(12-99).dwg Dated December 1999

Hicks-Bull, Coast Iron Works, and Steam Plant

MHHW Line

N

0 400 800

Scale in Feet

HARTCROWSER

J-4676-72 1/02

Figure 1

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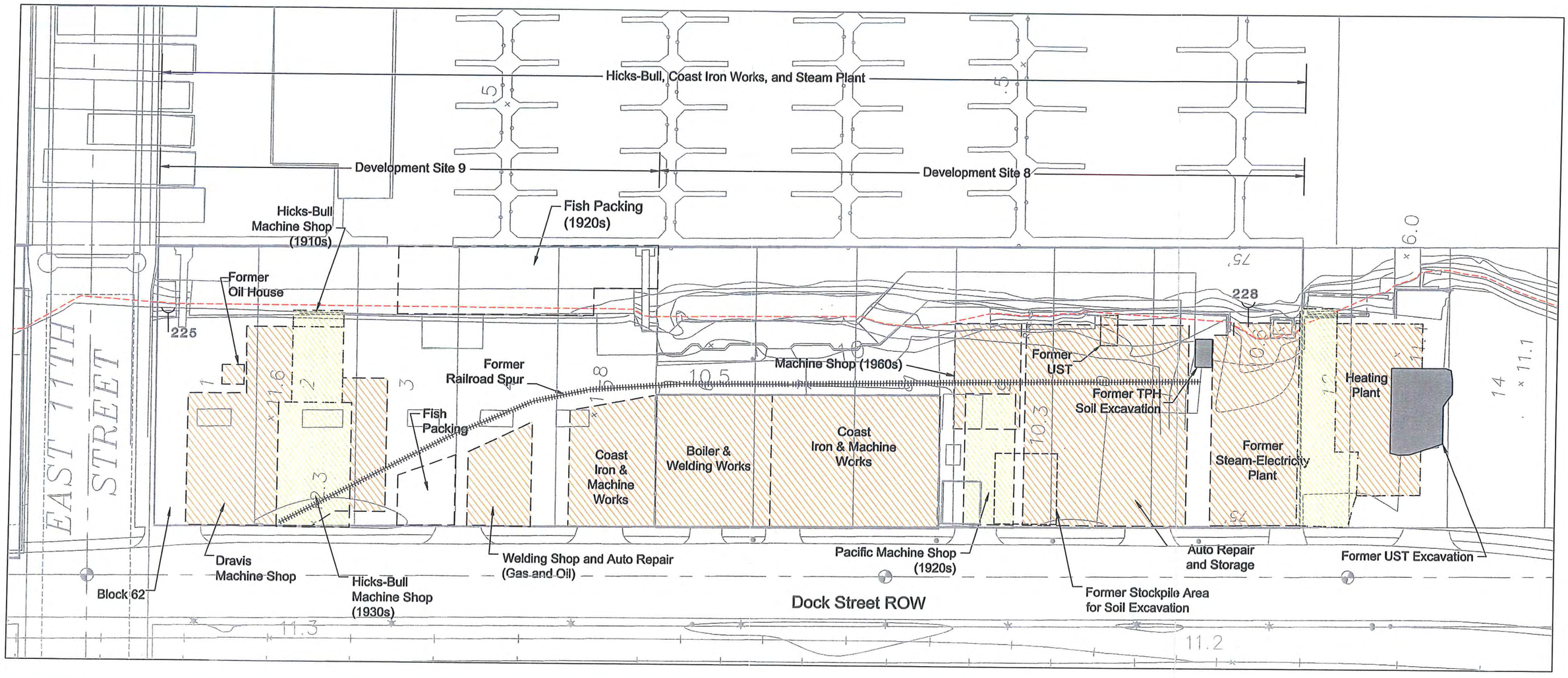
46767222

Significant Historical Features Map

Hicks-Bull, Coast Iron Works, and Steam Plant



228 Stormwater Outfall Location and Number

Former Building

Mean Higher High Water

Potentially Significant Historical Area

Area of Completed Cleanup Action

N

0 60 120

Scale in Feet

DTN 2/26/02 1=1 xref=ease drawing color.pc2
46767219

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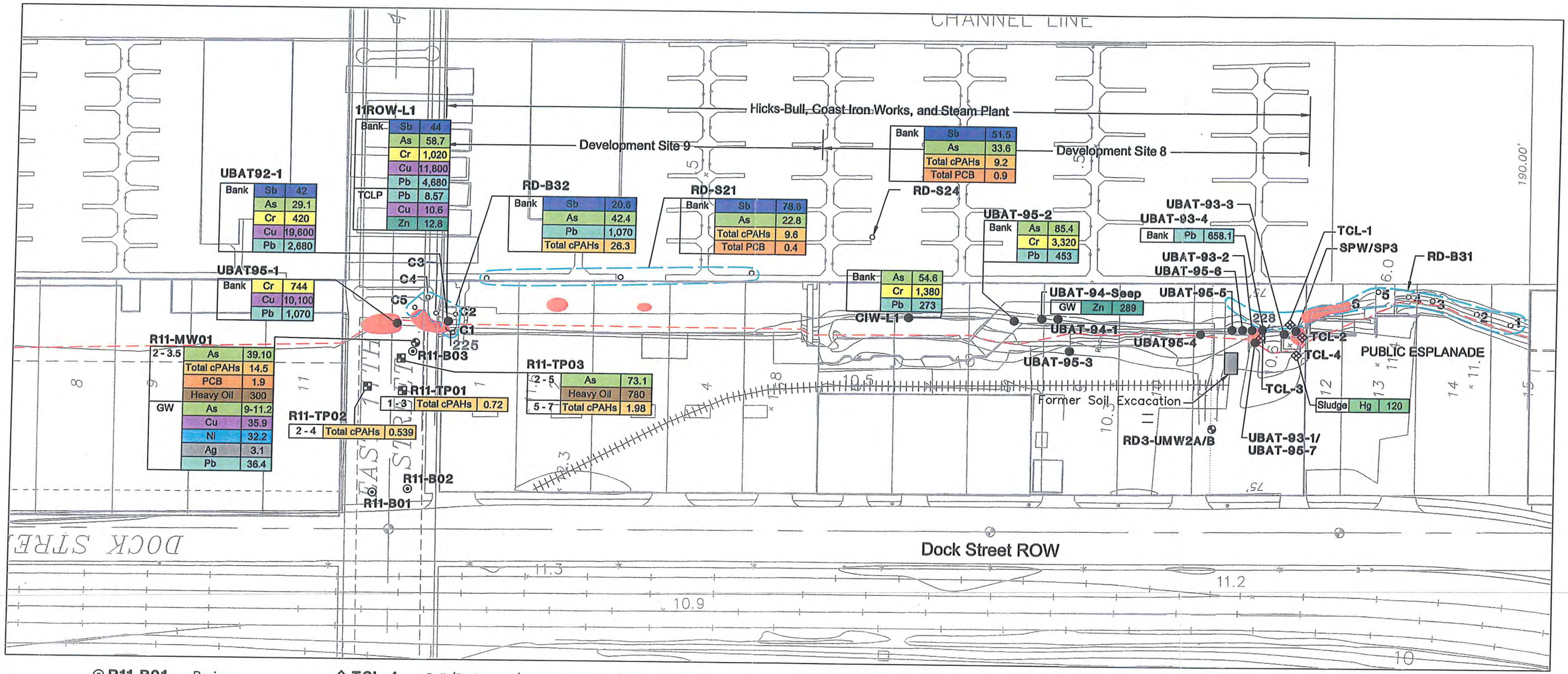
Figure 2

Summary of Soil and Groundwater Exceedence Data from Previous Investigations

Hicks-Bull, Coast Iron Works, and Steam Plant



⊙ R11-B01	Boring	◈ TCL-4	Soil/Sediment/Sludge Sample (TCL, 1987)		Building Footprint
■ R11-TP01	Test Pit	● UBAT-95-2	Bank (Slag) (Ecology, 1992, 1994, and 1995)		Mean Higher High Water
◔ R11-MW01	Monitoring Well	228	Stormwater Outfall Location and Number	AA'	Cross Section Location and Designation
	Slag or Metal Shavings Noted	C1, C2, C3	Composite Sample (Hart Crowser, 1994)		

Note: Explorations without soil or groundwater exceedences are shown in gray.

Leaching Test / Analyte / TCLP Pb 8.57 — Concentration in mg/L

Chemical data identified where soil concentration exceeds Consent Decree cleanup levels. Note that Consent Decree cleanup levels are not applicable to cleanup of bank samples.

Groundwater / Analyte / GW Zn 289 — Concentration in µg/L

Depth in Feet / Analyte / 2 - 3.5 As 39.10 — Concentration in mg/kg

N

0 80 160

Scale in Feet

HARTCROWSER

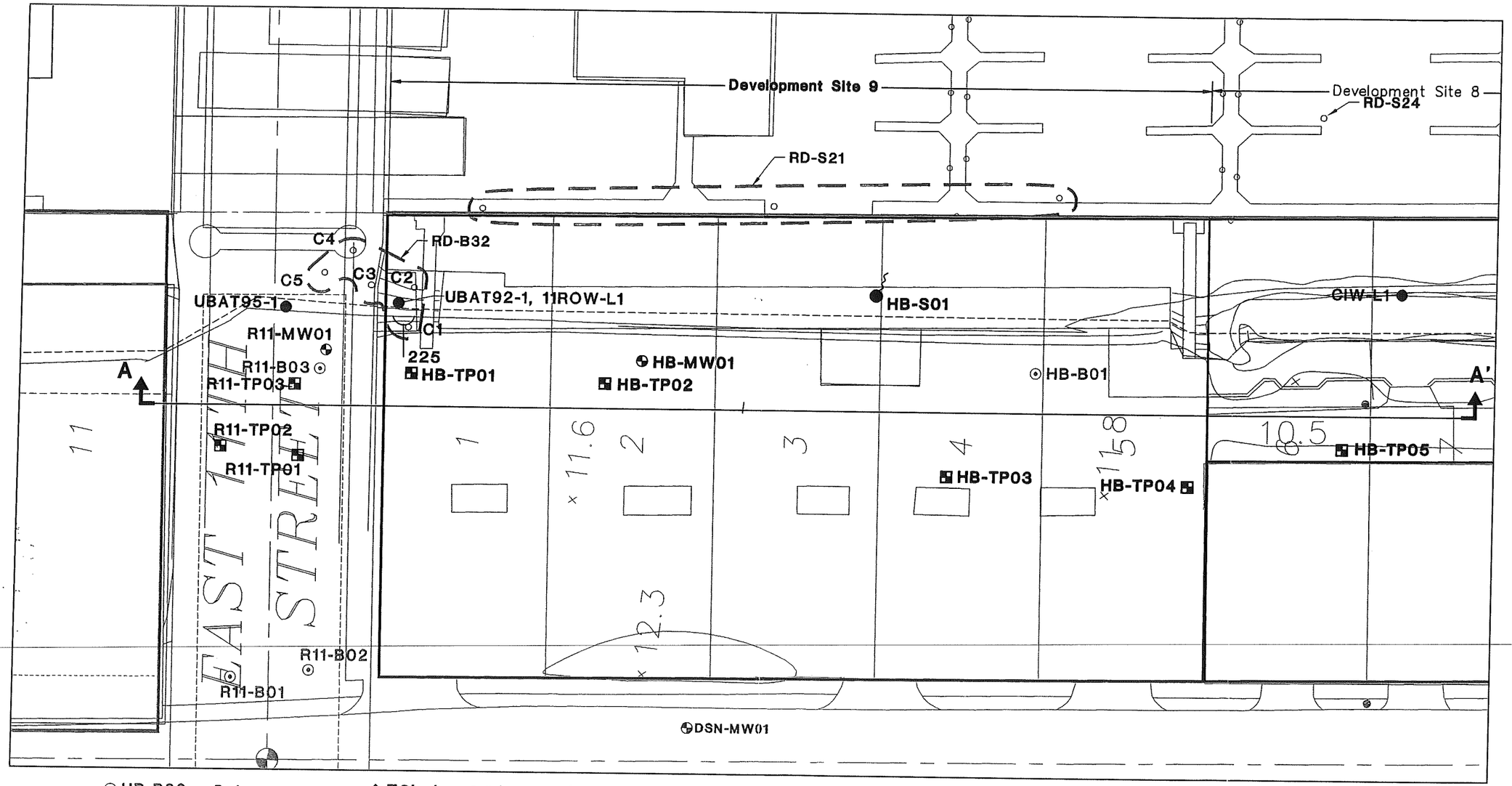
J-4676-72 1/02

Figure 3

DTN 2/26/02 1=1 xref=see drawing color.pc2
46767220

Site Exploration Plan

Development Site 9, Hicks-Bull Property



HB-B02 Boring

HB-S01 Seep

HB-TP05 Test Pit

HB-MW02 Monitoring Well

TCL-4 Soil/Sediment/Sludge Sample (TCL, 1987)

UBAT-95-2 Bank (Slag) (Ecology, 1992, 1994, and 1995)

228 Stormwater Outfall Location and Number

C1, C2, C3 Composite Sample (Hart Crowser, 1994)

Note: Explorations from previous investigations are shown in gray.

Building Footprint

Mean Higher High Water

AA' Cross Section Location and Designation

N

0 40 80

Scale in Feet

HARTCROWSER

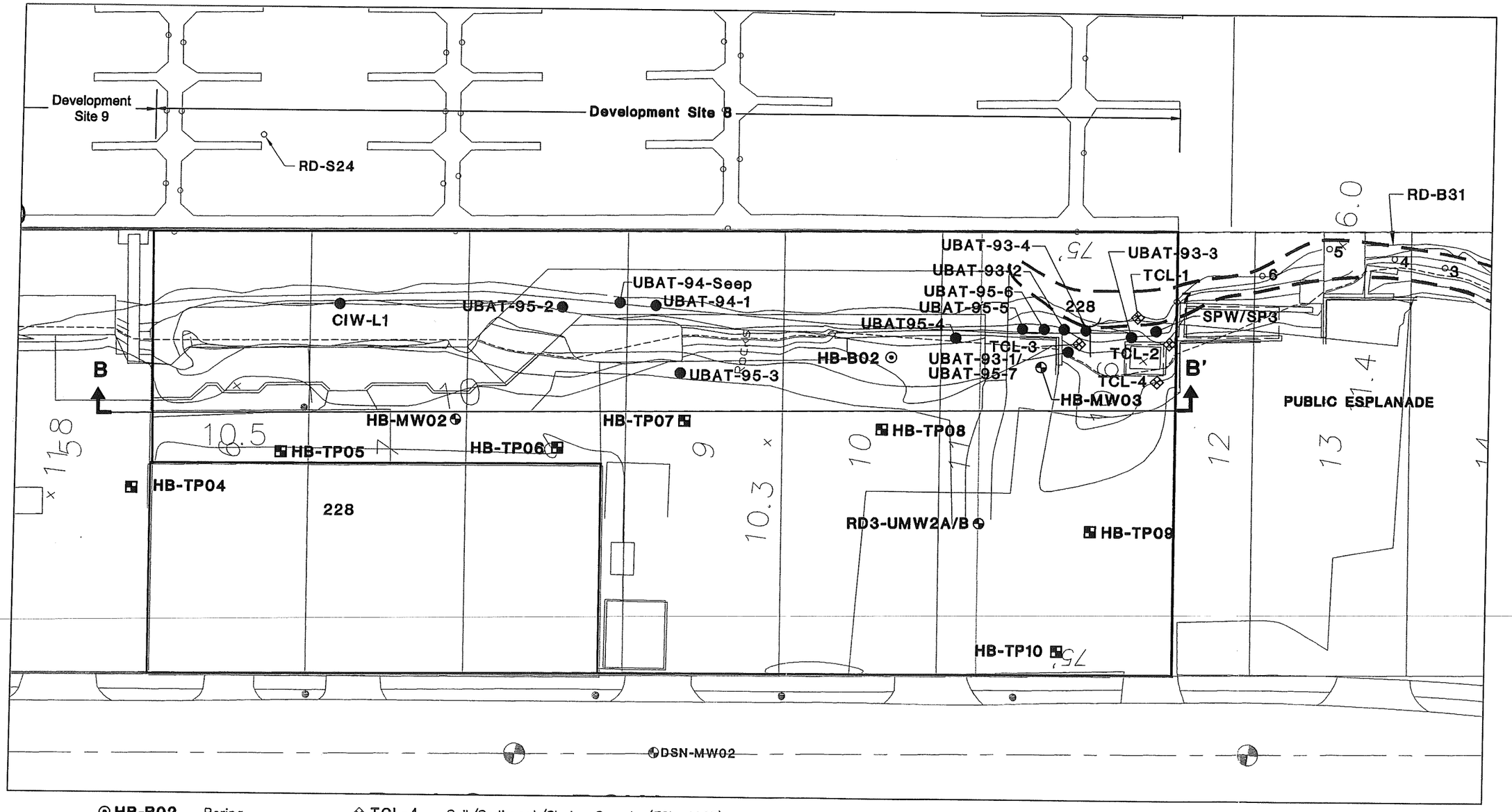
J-4676-72 1/02

Figure 4

DTN 2/26/02 1=1 xref=see drawing color.pc2
48767217

Site Exploration Plan

Development Site 8, Coast Iron Works and Steam Plant



HB-B02	Boring	TCL-4	Soil/Sediment/Sludge Sample (TCL, 1987)
HB-S01	Seep	UBAT-95-2	Bank (Slag) (Ecology, 1992, 1994, and 1995)
HB-TP05	Test Pit	228	Stormwater Outfall Location and Number
HB-MW02	Monitoring Well	C1, C2, C3	Composite Sample (Hart Crowser, 1994)

Note: Explorations from previous investigations are shown in gray.

Building Footprint

Mean Higher High Water

BB' Cross Section Location and Designation

N

0 40 80

Scale in Feet

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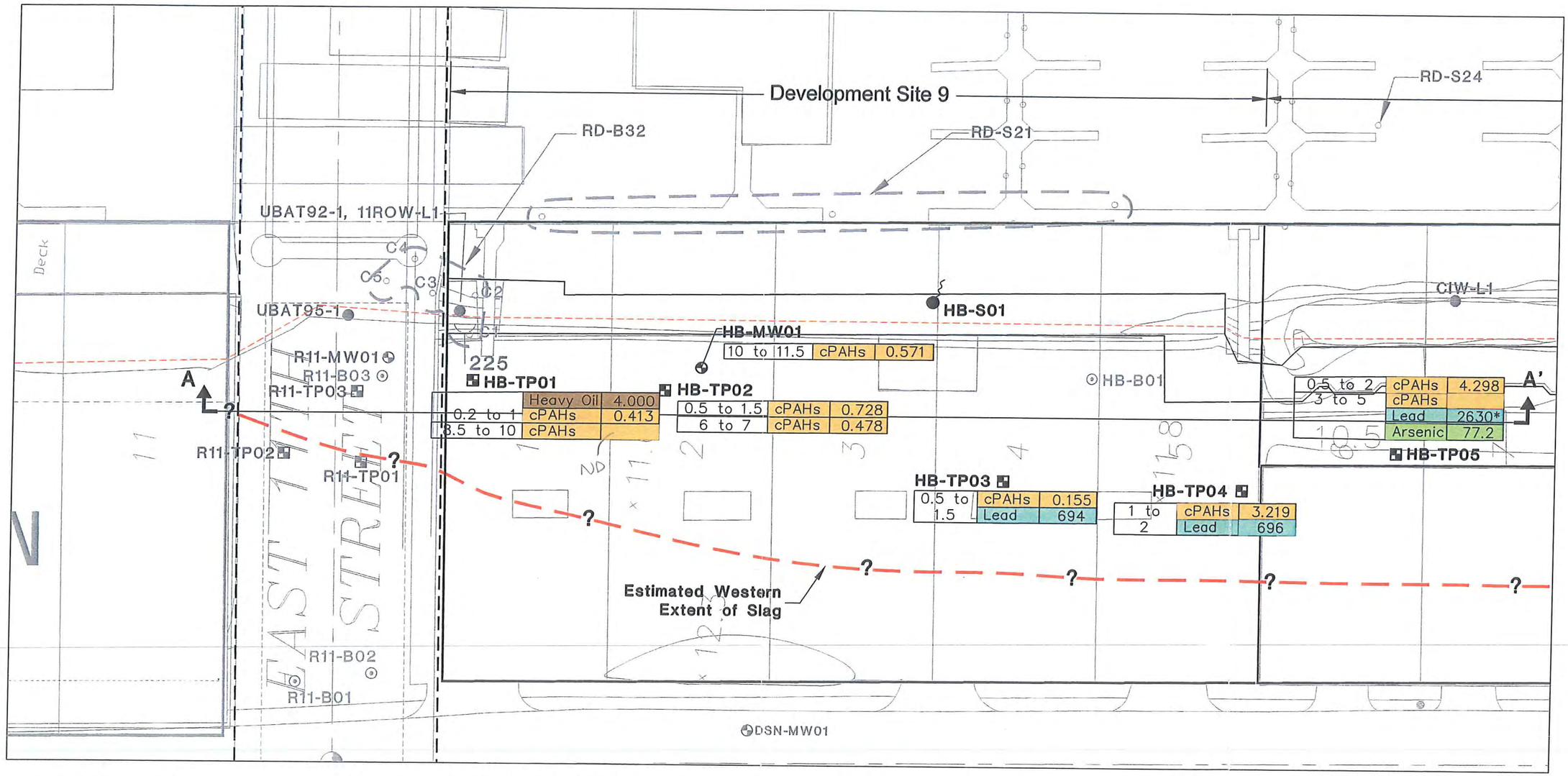
Figure 5

DTN 2/26/02 1=1 xref=see drawing color.pc2
46767218

Soil Exceedence Data Summary

Development Site 9, Hicks-Bull Property



HB-B01	Boring	TCL-1	Soil/Sediment/Sludge Sample (TCL, 1987)		Building Footprint
HB-S01	Seep	228	Storm Water Outfall Location and Number		Mean Higher High Water
HB-TP01	Test Pit	UBAT92-1	Bank (Slag) (Ecology, 1992, 1994, and 1995)	AA'	Cross Section Location and Designation
HB-MW01	Monitoring Well	C1, C2, C3	Composite Sample (Hart Crowser, 1994)		

Note: Explorations from previous investigations are shown in gray.

Depth in Feet — Analyte — Concentration in mg/kg

10 to 11.5 | Lead | 2630*

Indicates Concentration Exceeds Consent Decree Maximum Soil Concentration

N

0 40 80

Scale in Feet

DTN 2/26/02 1=1 xref=see drawing color.pc2
4676721A

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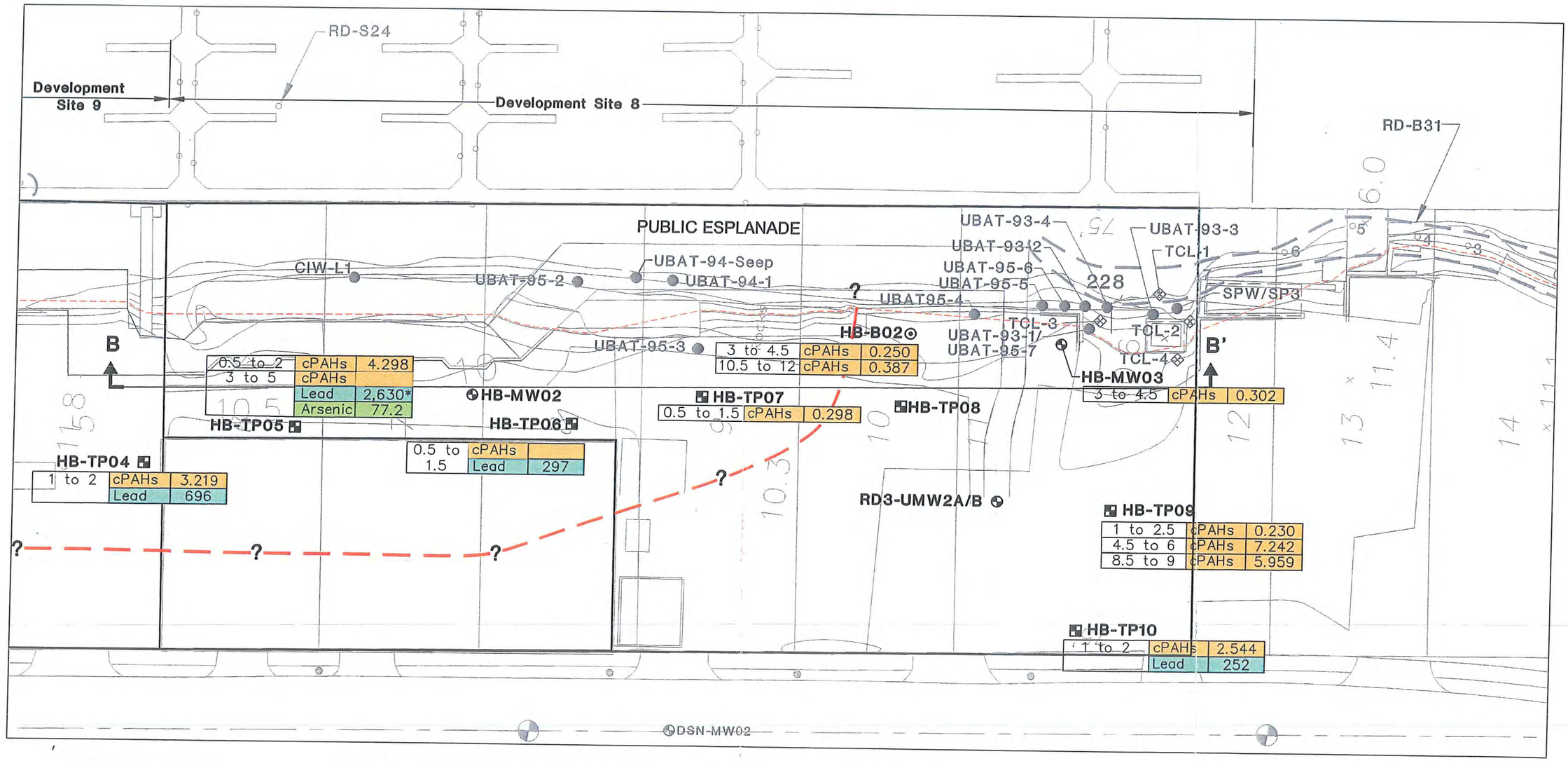
Figure 6

Soil Exceedence Data Summary

Development Site 8, Coast Iron Works and Steam Plant



HB-B02	Boring	TCL-1	Soil/Sediment/Sludge Sample (TCL, 1987)
HB-TP04	Test Pit	228	Storm Water Outfall Location and Number
HB-MW02	Monitoring Well	UBAT92-1	Bank (Slag) (Ecology, 1992, 1994, and 1995)
		C1, C2, C3	Composite Sample (Hart Crowser, 1994)

Note: Explorations from previous investigations are shown in gray.

Building Footprint

Mean Higher High Water

AA' Cross Section Location and Designation

N

0 40 80

Scale in Feet

0.5 to 2 | cPAHs | 4.298 — Analyte; Concentration in mg/kg; Depth in Feet

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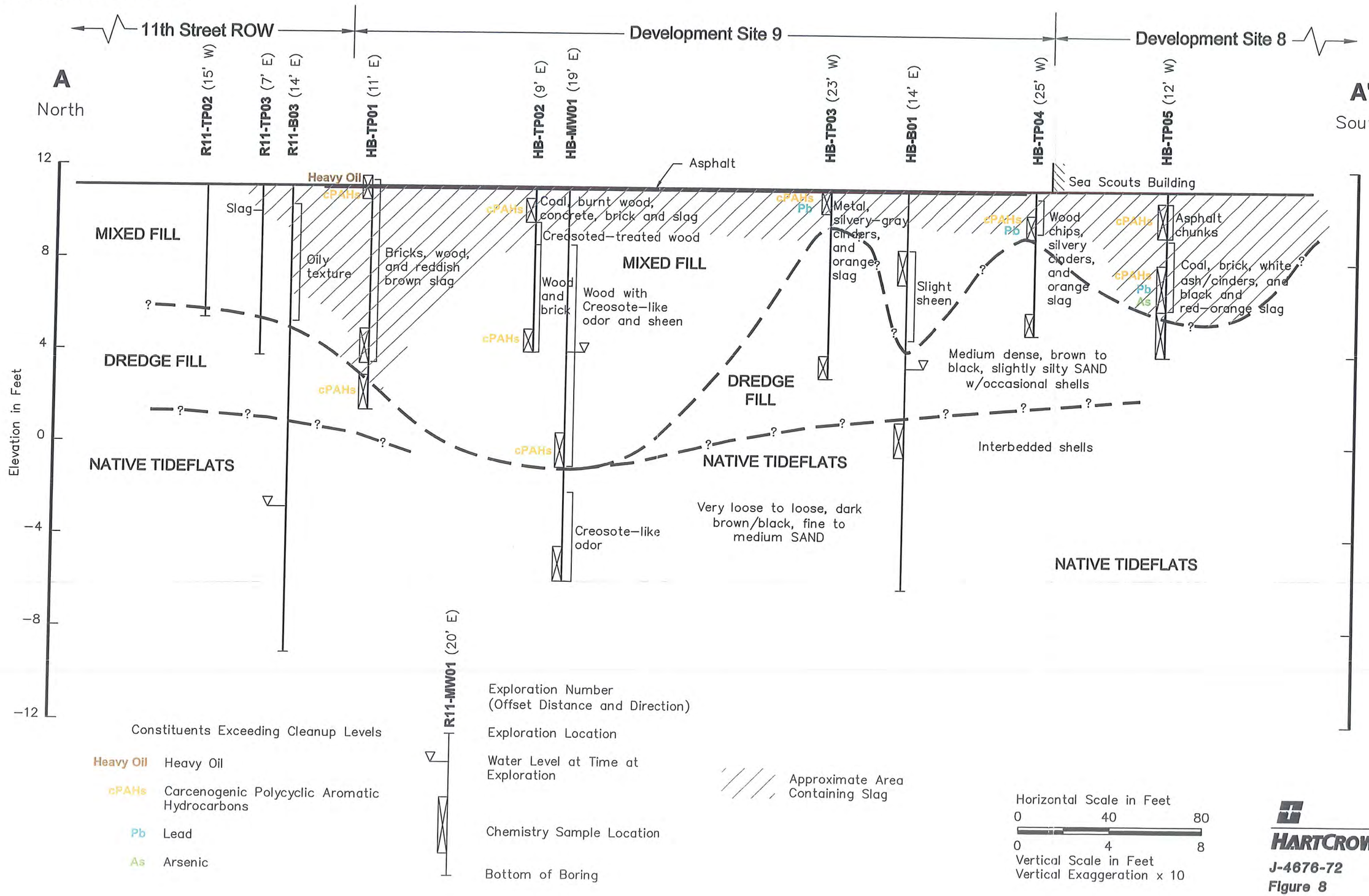
Figure 7

DTN 2/26/02 1=1 xref=sae drawing color.pc2
46767216

Generalized Subsurface Cross Section

Development Site 9



Constituents Exceeding Cleanup Levels

Heavy Oil	Heavy Oil
cPAHs	Carcenogenic Polycyclic Aromatic Hydrocarbons
Pb	Lead
As	Arsenic

R11-MW01 (20' E) — Exploration Number (Offset Distance and Direction)

Exploration Location

Water Level at Time at Exploration

Chemistry Sample Location

Bottom of Boring

Approximate Area Containing Slag

Horizontal Scale in Feet
0 40 80
0 4 8
Vertical Scale in Feet
Vertical Exaggeration x 10

DTN 2/26/02 1=40 charlie.pc2
4676721O.dwg

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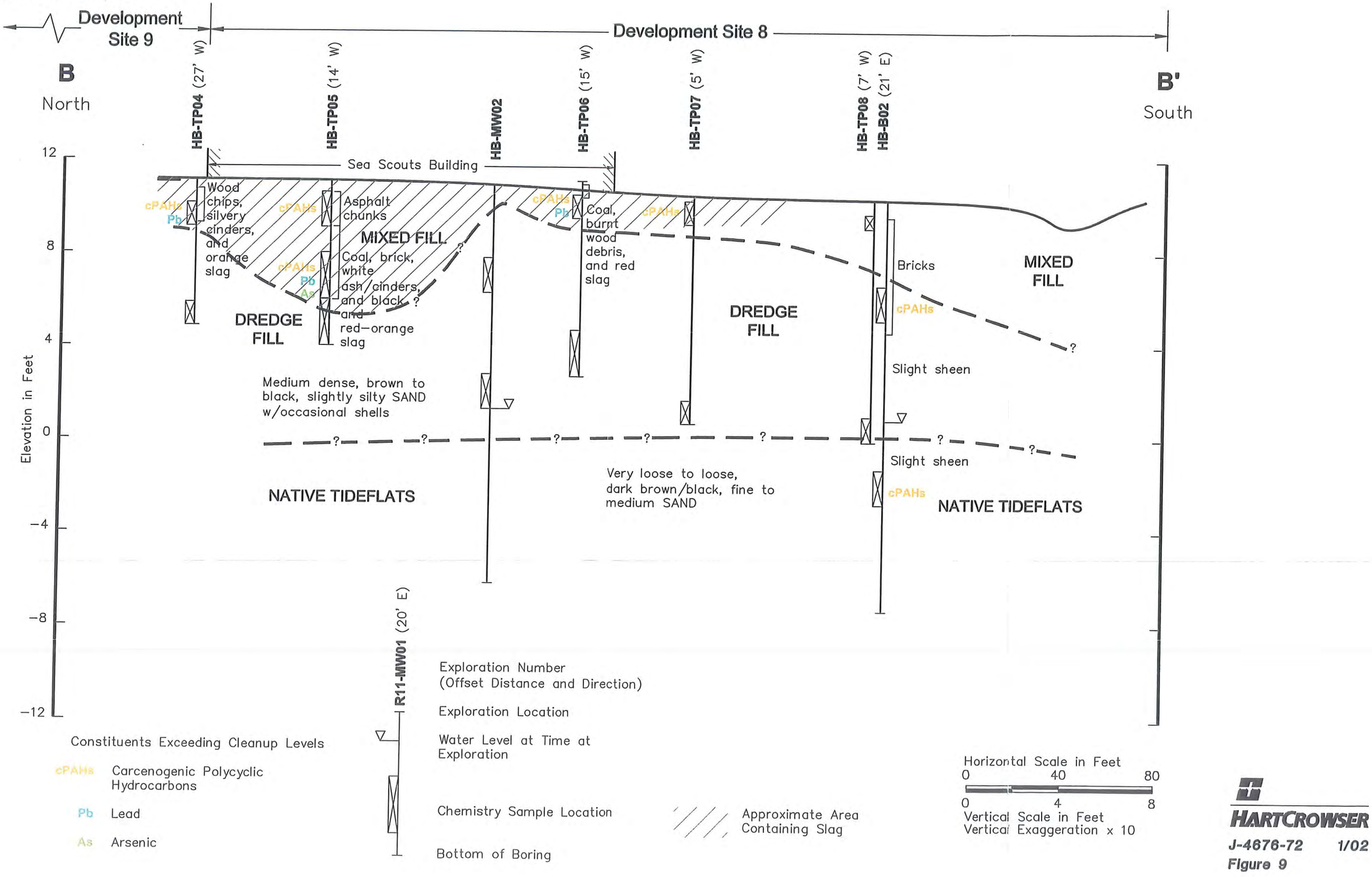
J-4676-72 1/02
Figure 8

Generalized Subsurface Cross Section

Development Site 8



DTN 2/26/02 1=40 charlie.pc2
4676721O.dwg

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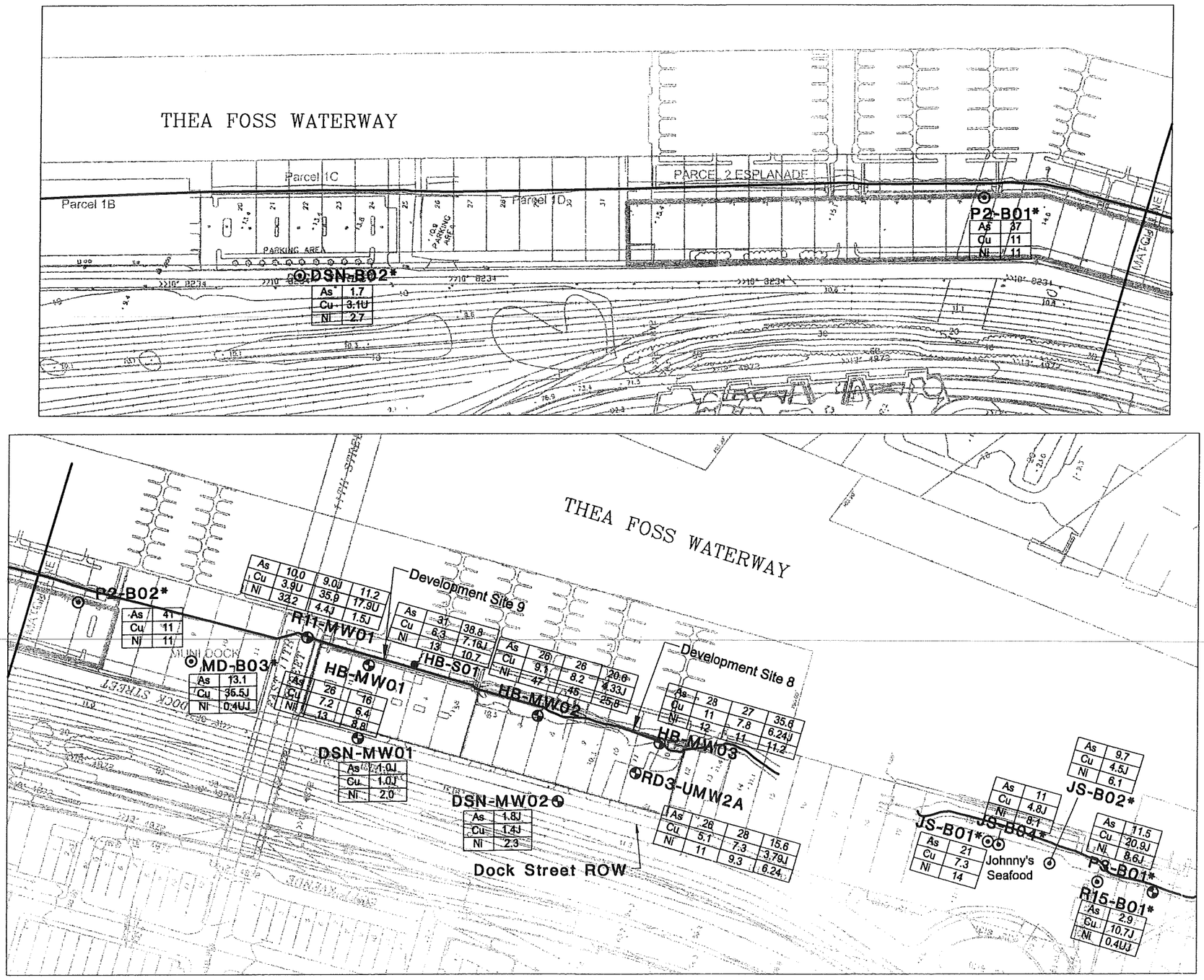
Figure 9

Area-Wide Concentrations of Arsenic, Copper, and Nickel in Groundwater

Properties North of South 15th Street



Mean Higher High Water

Exploration Location and Number

- **DSN-B01*** Boring — Indicates Groundwater Grab Sample Collected
- **HC-MW01** Monitoring Well
- **HB-S01** Seep

As Arsenic

Cu Copper

Ni Nickel

Concentrations are in µg/L

U Not Detected at Detection Limit Indicated

J Estimated Value

N

0 200 400

Scale in Feet

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Figure 10

DTN 2/26/02 1=1 xref=See Dwg charlie.pc2
4676722A.DWG

APPENDIX A
FIELD EXPLORATION PROCEDURES AND EXPLORATION LOGS

APPENDIX A
FIELD EXPLORATION PROCEDURES AND EXPLORATION LOGS

At the Hicks-Bull Property, Coast Iron Works, and Steam Plant properties, Hart Crowser drilled six hollow-stem auger soil borings, completing three as monitoring wells, and excavated ten test pits. Three rounds of groundwater samples were collected from the monitoring wells. The field procedures and methods used for this work are described below. Volume II Appendix B of the Thea Foss Uplands RI Work Plan (Hart Crowser 1997) has additional discussion of field methods. Exploration locations are illustrated on Figures 4 and 5.

Exploration logs are presented on Figures A-2 through A-11 at the end of this appendix. The exploration logs show our interpretation of conditions encountered in the explorations. They indicate the depth where the soils change. In the field, we classified the samples taken from the explorations according to the methods presented on Figure A-1—Key to Explorations Logs. Figure A-1 also provides a legend explaining the symbols and abbreviations in the logs.

The following sections describe the specific methods used for drilling explorations, monitoring well installation, test pit excavation, soil classification, organic vapor detection, and groundwater sampling.

Drilling and Soil Sampling

Under subcontract to Hart Crowser, Holt Drilling of Puyallup, Washington, used a 4-inch-diameter hollow-stem auger on a truck-mounted drill rig to complete five soil borings (HB-B01, HB-B02, and HB-MW01 through HB-MW03) on March 8 and 9, 2001. A groundwater monitoring well was installed in three of the soil borings (HB-MW01 through HB-MW03). The borings were advanced to depths of approximately 17 feet below ground surface. Boring and monitoring well logs are presented on Figures A-2 through A-6.

During drilling, soil samples were obtained at 2.5-foot-depth intervals using a nominal 3-inch-diameter split-spoon sampler. After each sample drive, the sampler was retrieved and placed on a clean surface. The split-barrel of the sampler was then opened and the soil sample split, with a portion for laboratory analyses transferred to precleaned, labeled sample jars using a clean stainless steel spoon. Each sample jar was wiped clean, capped with a Teflon-lined lid, and then placed in an insulated cooler with ice. Each sample jar was packed tightly with minimal headspace. The remaining portion of each sample was then placed in a clean, sealed plastic sample container for PID organic vapor headspace measurements as discussed below.

Soil types were described on field logs and used to determine the occurrence and contacts between units.

Groundwater Monitoring Well Installation

Each groundwater monitoring well was installed in accordance with applicable state regulations listed in Chapter 173-160 WAC "Minimum Standards for Construction and Maintenance of Wells." The following procedure was used to install the wells:

- Following completion of each soil boring to the target depth, a 2-inch-diameter, flush-threaded, Schedule-40 PVC screen (0.020-inch slot size) and riser pipes were lowered through the hollow-stem auger casing. Ten-foot-long screens were placed in each of the borings.

- As the auger was pulled out, Colorado silica sand (No. 10-20) was placed around and approximately 2 feet above the screened section in each boring. The depth to the top of the sand pack was recorded by sounding inside the annular space with weighted measuring tape.

- The annular space of the well was sealed between the top of the sand pack to the bottom of the surface monument by placing bentonite chips in the hole.

- A concrete surface seal was then placed above the bentonite seal at the ground surface, and a flush-mounted set in concrete was placed over finished groundwater monitoring wells.

To increase the hydraulic connection between the well and surrounding soils, and to decrease the turbidity of the groundwater samples, the wells were developed using a submersible electric pump before sampling. A minimum of five casing volumes was removed during development of each well.

Test Pit Excavation and Sampling

Ten test pits (HB-TP01 through HB-TP10) were excavated between March 6 and 8, 2001, using a backhoe subcontracted to Hart Crowser. The test pit logs are presented on Figures A-7 through A-11. The objectives of the test pit excavations were to visually characterize stratigraphy, assess the soil for visual indications of potential contamination, collect soil samples for laboratory analysis, and evaluate the potential for contaminant migration.

The test pits varied in depth from 6 to 10 feet below grade. The depth at any given test pit was dependent on the tendency of the soils to cave in and the maximum reach of the backhoe. The test pits were typically 10 to 12 feet in length and 3 feet in width. Two to three soil samples were collected from each test pit for chemical analysis.

Each sample typically represented a 1-foot-square area (1 foot vertically by 1 foot horizontally) on the side of the test pit. Samples were taken from within the same stratigraphic unit or depth interval using long-handled stainless steel tools. Samples were collected and placed in a stainless steel bowl, inspected and described in the test pit log, and mixed thoroughly using a stainless steel spoon until the sample was relatively homogeneous. Sample jars were filled to obtain the sample volume required for the analyses. Soil samples were analyzed for constituents discussed in the main text. Additional soil was collected from each sample location and placed in a clean, sealed plastic sample container for PID organic vapor headspace measurements as discussed below.

Each test pit was logged by a Hart Crowser field representative, prior to being backfilled. Test pit excavations were backfilled with the excavated soil. The surface soils were piled separately and replaced on the surface of the backfill to minimize exposure potential. Care was taken to avoid placing suspected contaminated materials (i.e., debris fill) at the surface. The test pit were located in the field by hand taping from existing physical features.

Soil Classification

The field representative visually classified the soil samples in general accordance with ASTM Method D 2488 as depicted on Figure A-1, prepared a log of soils encountered in the exploration, and recorded pertinent observations regarding conditions, types of soils encountered, and the depth to water at time of drilling. Soil descriptions include the following properties: relative density of sands and gravels/consistency of silts and clays, moisture, color, minor constituents, and major constituents. The presence of non-soil substances (e.g., debris etc.) was also noted.

Organic Vapor Detection

Organic vapors were measured in soil sample jar headspace during the field investigation using a portable HNU photoionization detector (PID). These sample jar organic vapor readings are presented on the exploration logs. The PID has sealed ultraviolet light sources which emit photons that ionize trace organics but does not ionize the major components of air. PID measurements were made by piercing the foil-covered jar with the PID probe after the air in the

jar had been allowed to equilibrate with the soil. PID measurements were recorded on a field log relative to 0.2 PID unit background level for ambient air at the project site.

Groundwater Sampling

Groundwater samples were collected from site monitoring wells on March 20, March 21, and December 10, 2001.

Sampling Equipment

The equipment that was used for the collection of groundwater samples from boreholes included:

- pH, temperature, electrical conductivity, and salinity meters;
- Peristaltic pump with poly tubing;
- Laboratory-supplied pre-cleaned sample containers with appropriate preservatives added;
- Coolers with blue ice; and
- Hart Crowser Sample Custody Record.

Groundwater Sampling Procedures

Groundwater samples were collected from site monitoring wells on March 20, March 21, and December 10, 2001. Upon arrival at the site, field personnel recorded site conditions, depth to water in the wells, and other requested information on the Groundwater Sampling Data form. Groundwater samples were collected using low-flow sampling techniques to minimize suspended solids in the samples. The wells were purged and sampled with a peristaltic pump. Clean sample tubing was used for each well and disposed of after use.

The field parameters temperature, pH, electrical conductivity, and salinity were measured and recorded periodically during purging of the well. Once the field parameters remained stable between measurements (i.e., specific conductivity 610 percent; pH 60.1 pH units, temperature 60.1° C, salinity 61 unit), the groundwater sample was collected. The final stabilized readings measured just before sampling were recorded on the Groundwater Sampling Data form and are presented in Table A-1. Samples to be analyzed for dissolved metals were

filtered using a clean 0.45 µm in-line filter, and placed in sample containers with preservative.

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Table A-1 - Goundwater Field Parameters
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	pH	Temperature in °C	Specific Conductivity in µS	Salinity in o/oo
HB-MW01	3/20/2001	7.0	10.7	>19,900	21.5
HB-MW01	3/21/2001	7.1	11.3	17,300	13.5
HB-MW02	3/20/2001	7.4	10.7	18,100	18.0
HB-MW02	3/21/2001	7.5	10.5	18,400	17.5
HB-MW02	12/10/2001	6.9	11.5	10,000	13.5
HB-MW03	3/20/2001	7.0	10.8	>19,900	22.0
HB-MW03	3/21/2001	7.1	11.3	>19,900	21.0
HB-MW03	12/10/2001	7.1	12.0	11,000	19.0
HB-S01	3/27/2001	7.6	9.6	>19,900	24.0
HB-S01	12/10/2001	7.5	10.4	10,400	23.5
OB-1	12/10/2001	6.4	9.1	10,500	24.0
UMW2A	3/20/2001	7.0	12.4	>19,900	22.0
UMW2A	3/21/2001	7.1	11.7	>19,900	20.5
UMW2A	12/10/2001	7.6	12.5	NM	16.0

NM - Not measured

Key to Exploration Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance.
Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 – 4	Very soft	0 – 2	<0.125
Loose	4 – 10	Soft	2 – 4	0.125 – 0.25
Medium dense	10 – 30	Medium stiff	4 – 8	0.25 – 0.5
Dense	30 – 50	Stiff	8 – 15	0.5 – 1.0
Very dense	>50	Very stiff	15 – 30	1.0 – 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 – 5
Slightly (clayey, silty, etc.)	5 – 12
Clayey, silty, sandy, gravelly	12 – 30
Very (clayey, silty, etc.)	30 – 50

Legends

Sampling Test Symbols

BORING SAMPLES

- Split Spoon
- Shelby Tube
- Cuttings
- Core Run
- * No Sample Recovery
- P Tube Pushed, Not Driven

TEST PIT SAMPLES

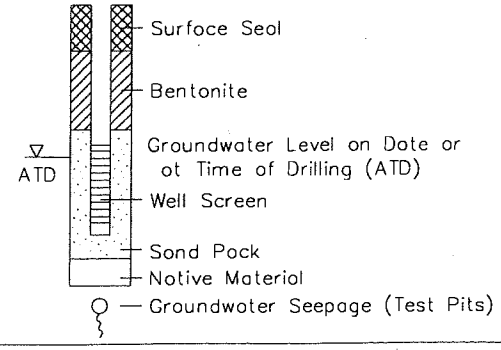
- Grab (Jar)
- Bag
- Shelby Tube

Test Symbols

GS	Grain Size Classification
CN	Consolidation
UU	Unconsolidated Undrained Trioxial
CU	Consolidated Undrained Trioxial
CD	Consolidated Drained Trioxial
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits
PID	Photoionization Detector Reading
CA	Chemical Analysis
DT	*In Situ* Density Test

Water Content in Percent
Liquid Limit
Natural
Plastic Limit

Groundwater Observation Wells



1=1 A-1 STANDARD

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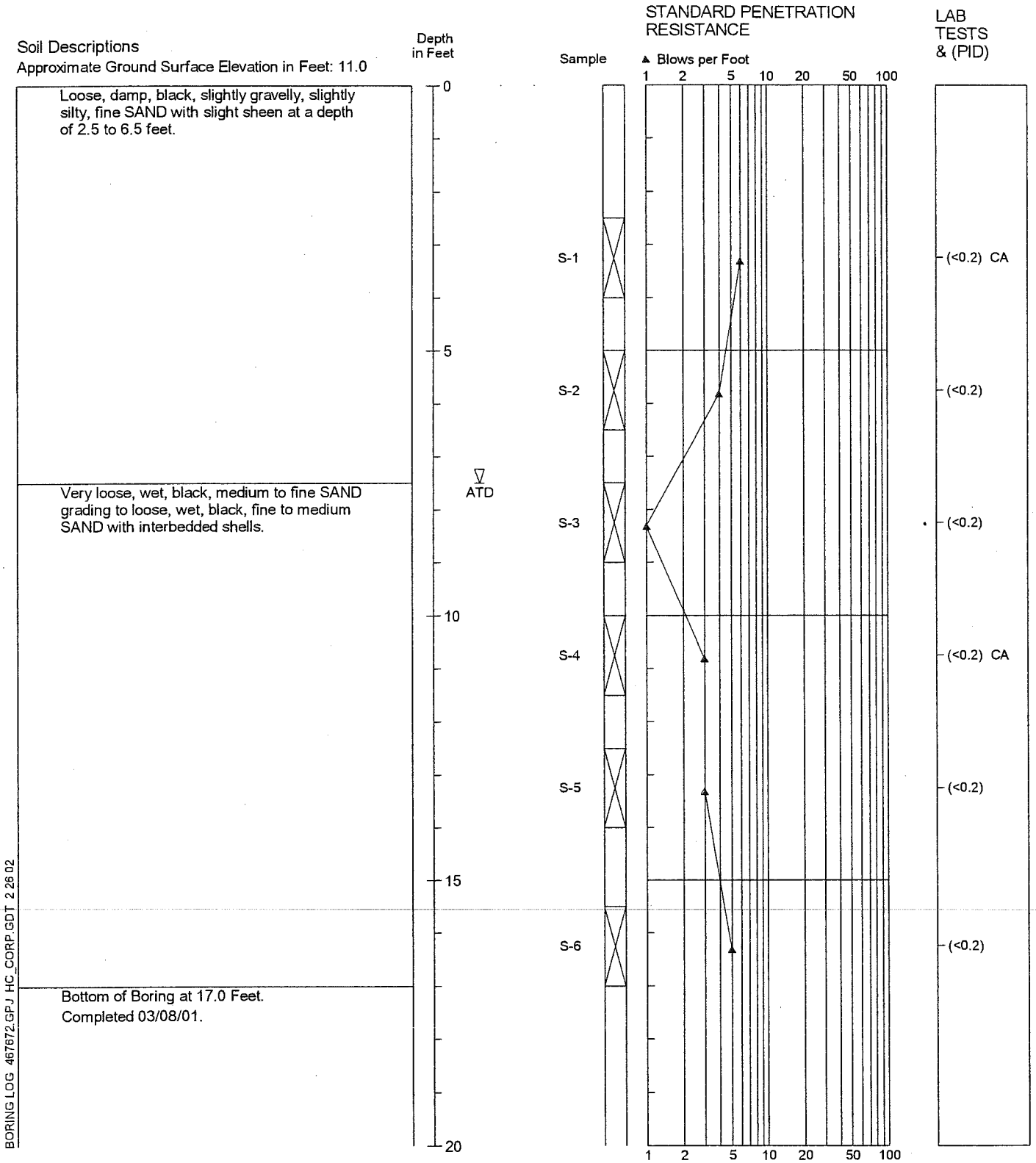
Figure A-1

Boring Log HB-B01



BORING LOG 467672.GPJ HC_CORP.GDT 2.26.02

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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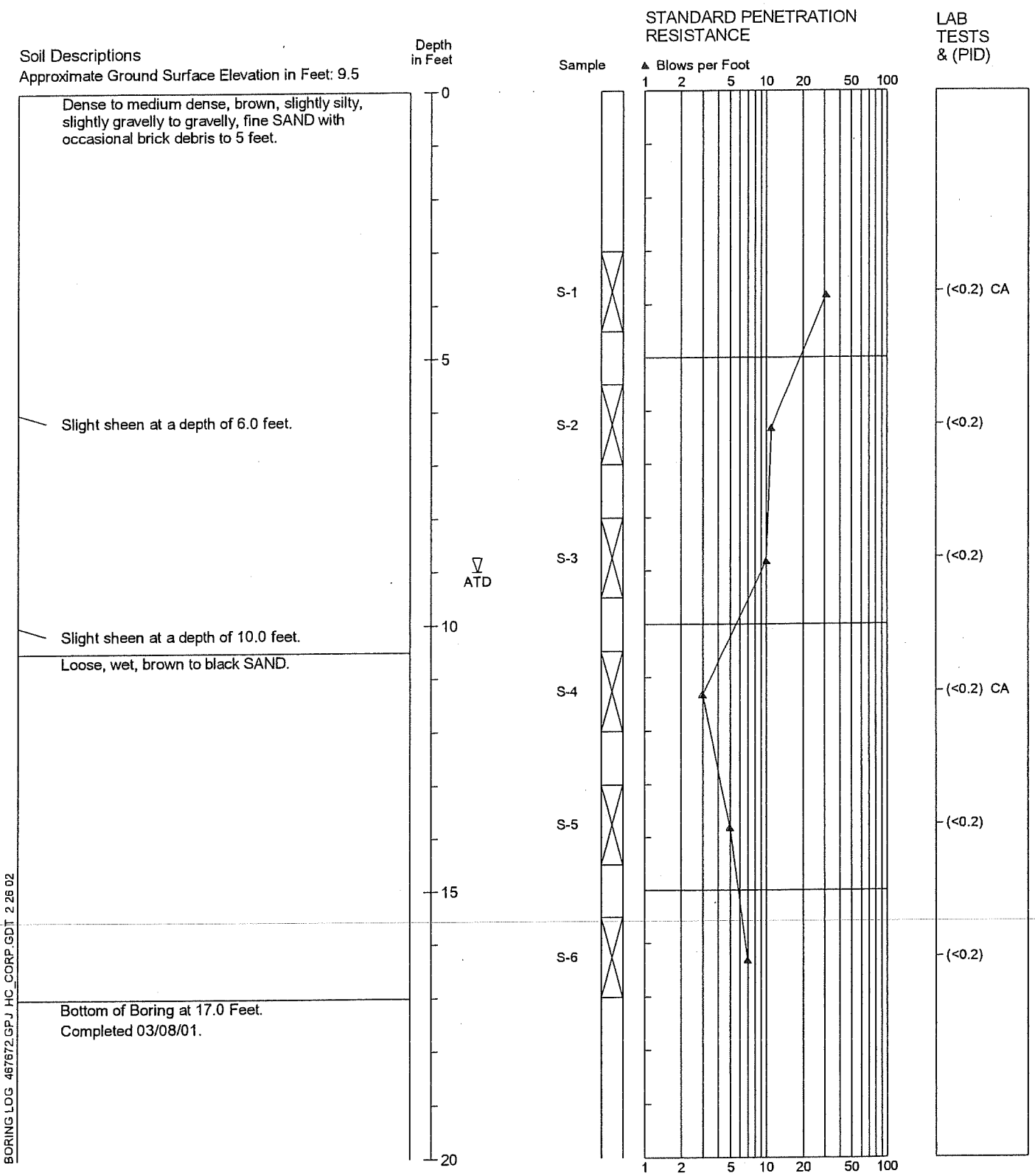
Figure A-2

Boring Log HB-B02



BORING LOG 467672.GPJ HC_CORP.GDT 2 26 02

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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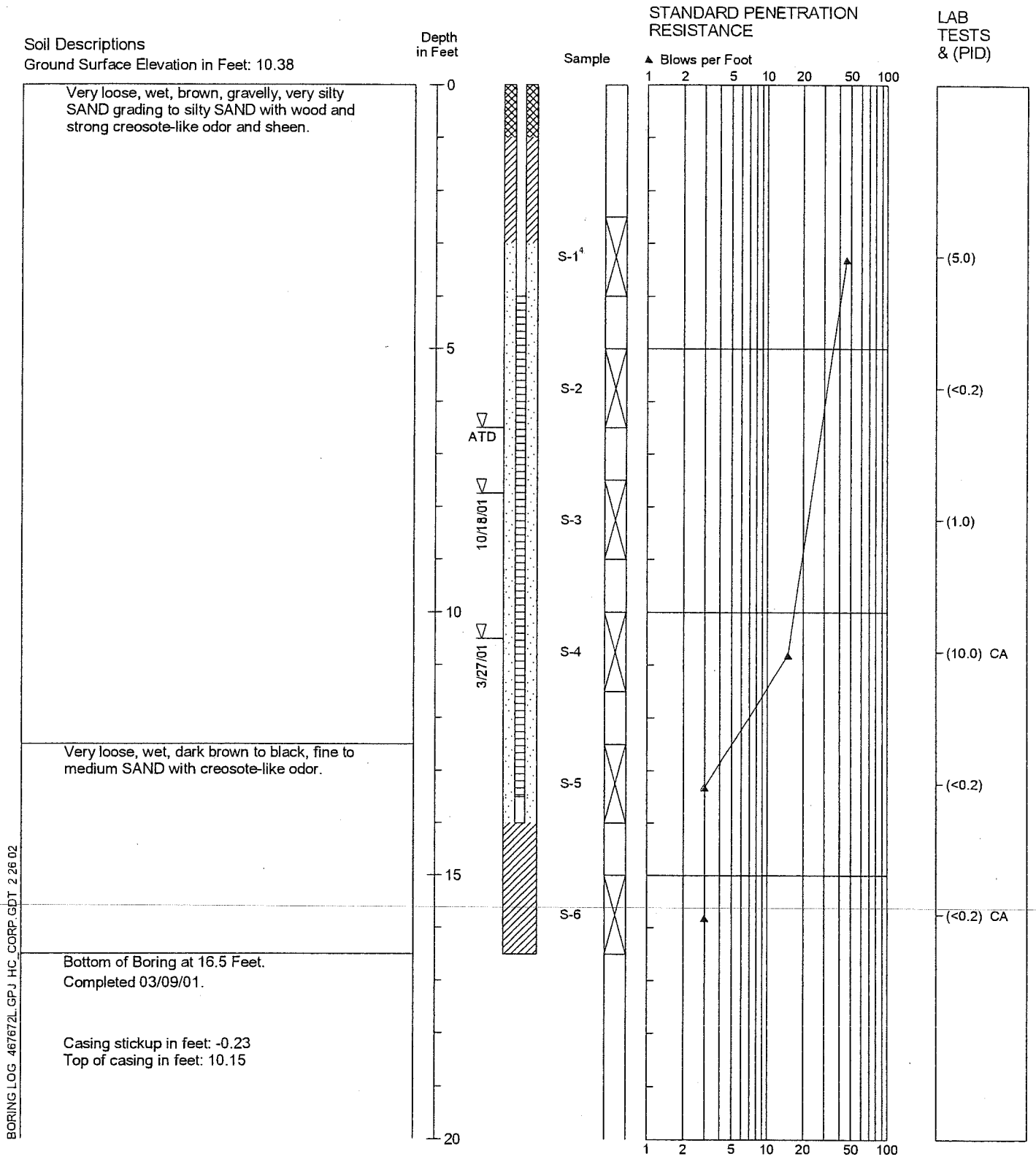
Figure A-3

Monitoring Well Log HB-MW01



BORING LOG 467672L.GPJ HC_CORP.GDT 2 26 02

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
4. Blow counts are not representative of density due to wood in sampler.

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Figure A-4

Monitoring Well Log HB-MW02

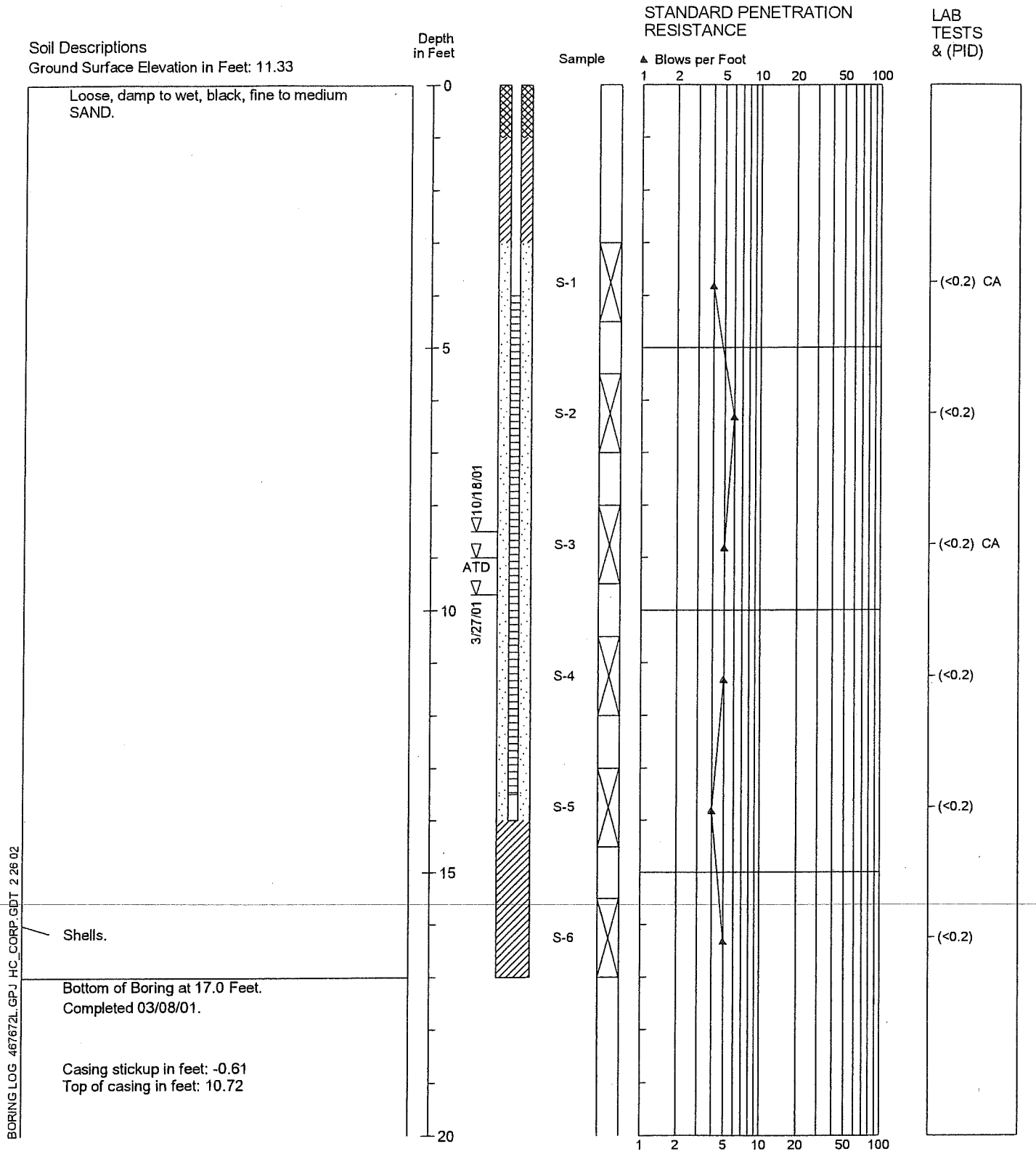

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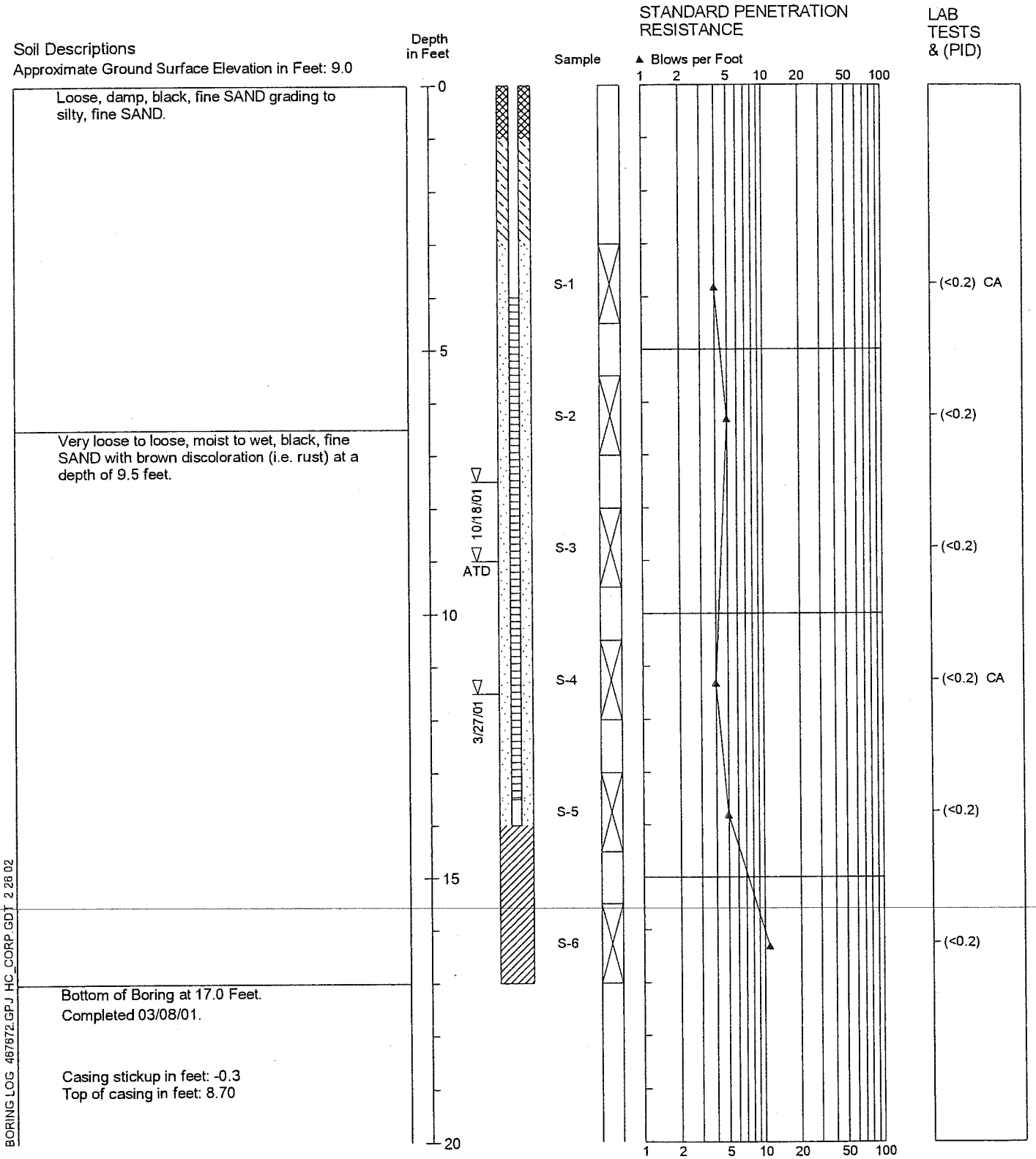
Figure A-5

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Monitoring Well Log HB-MW03



BORING LOG 467672.GPJ HC_CORP.GDT 2.26.02

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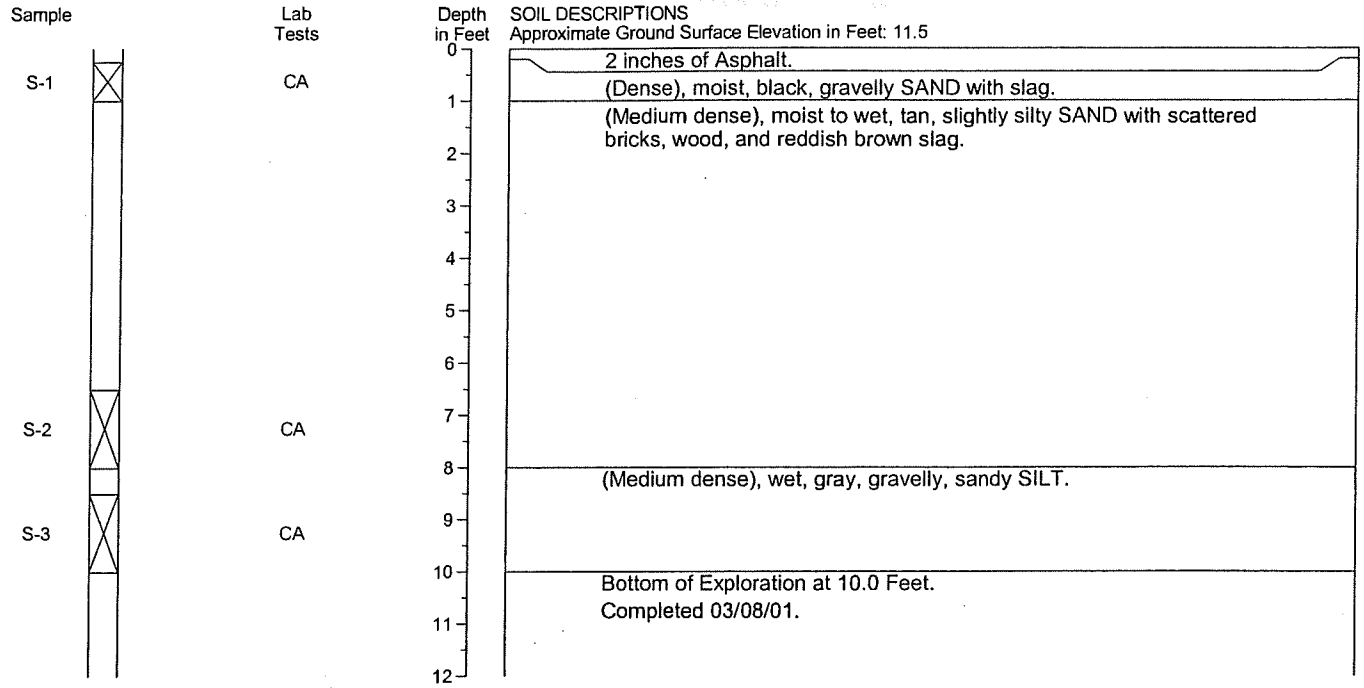
J-4676-72 03/01

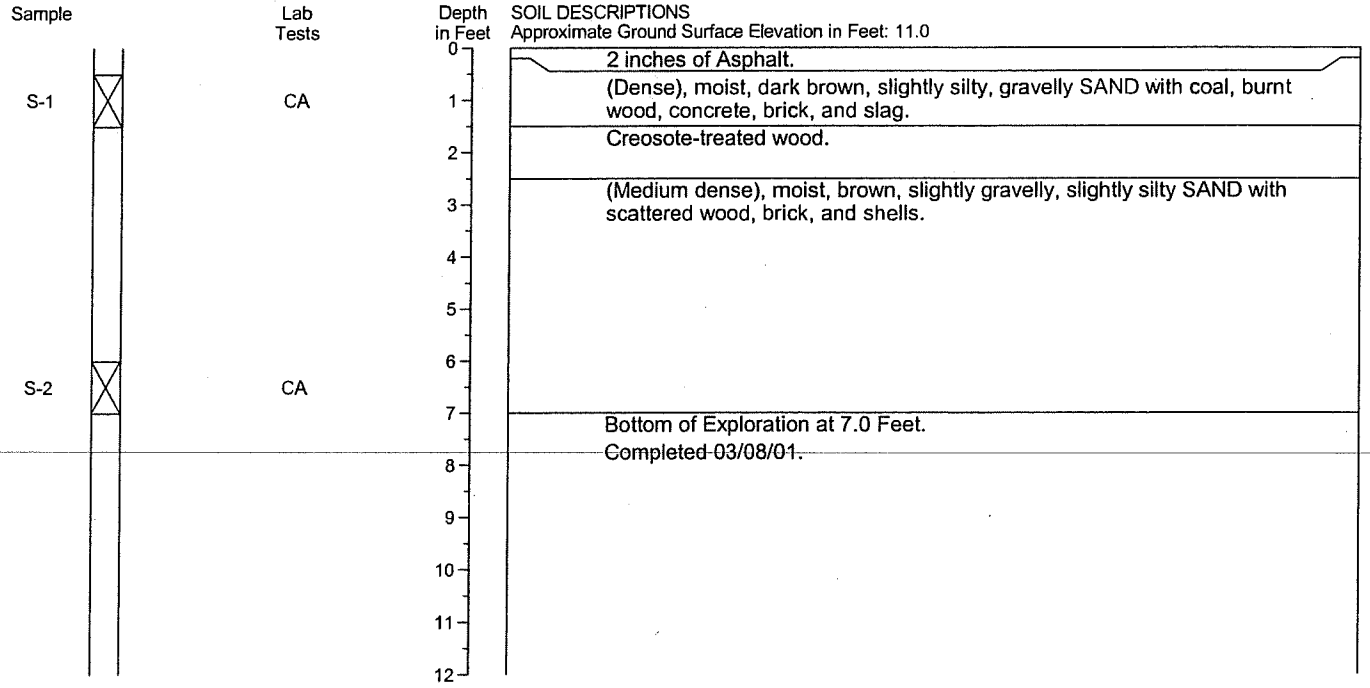
Figure A-6

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

Test Pit Log HB-TP01



Test Pit Log HB-TP02



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

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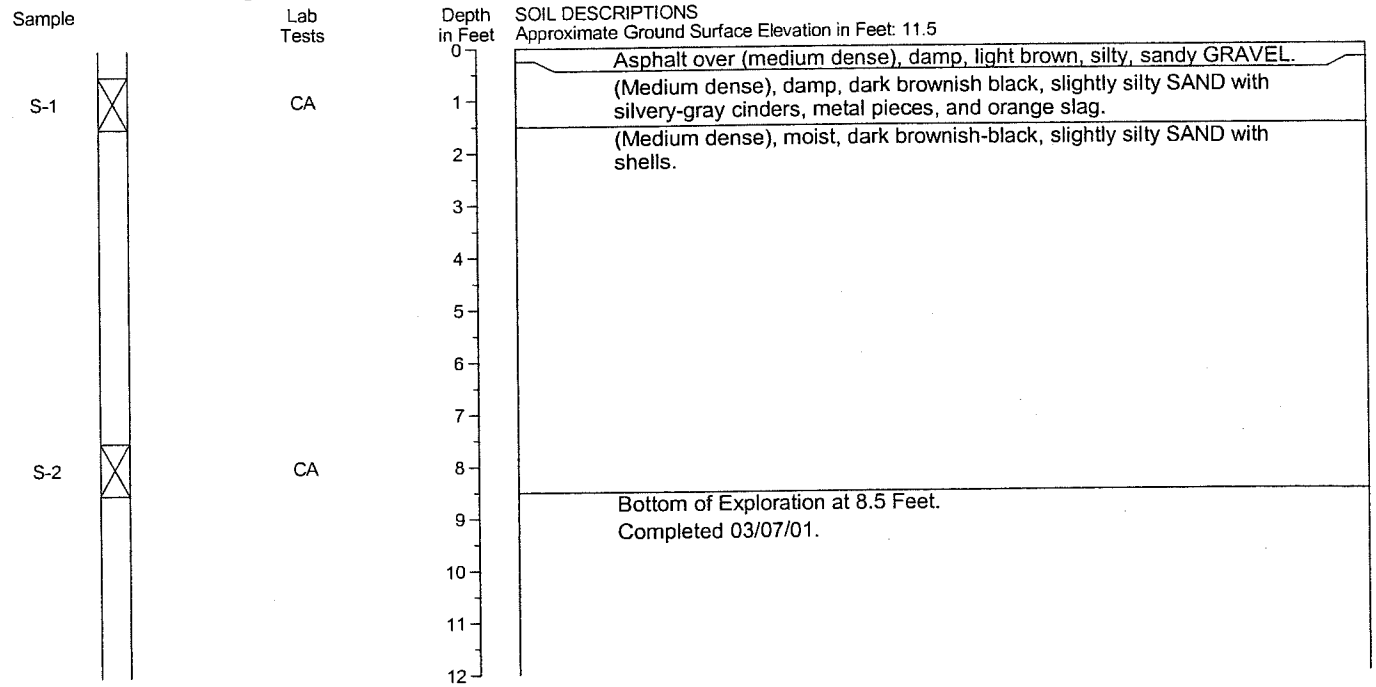
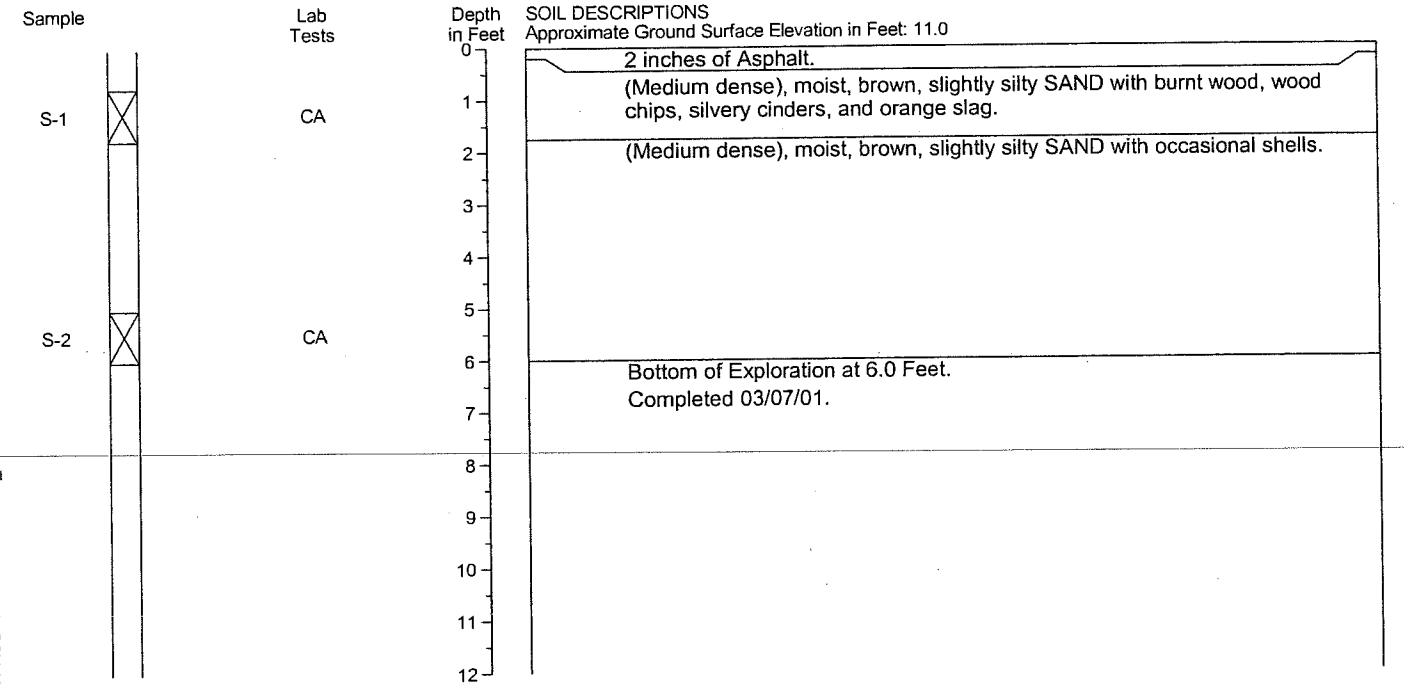
Figure A-7

Test Pit Log HB-TP03



Test Pit Log HB-TP04



2 LOGS PER PAGE 4676?2TP.GPJ HC_CORP.GDT 2/26/02

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

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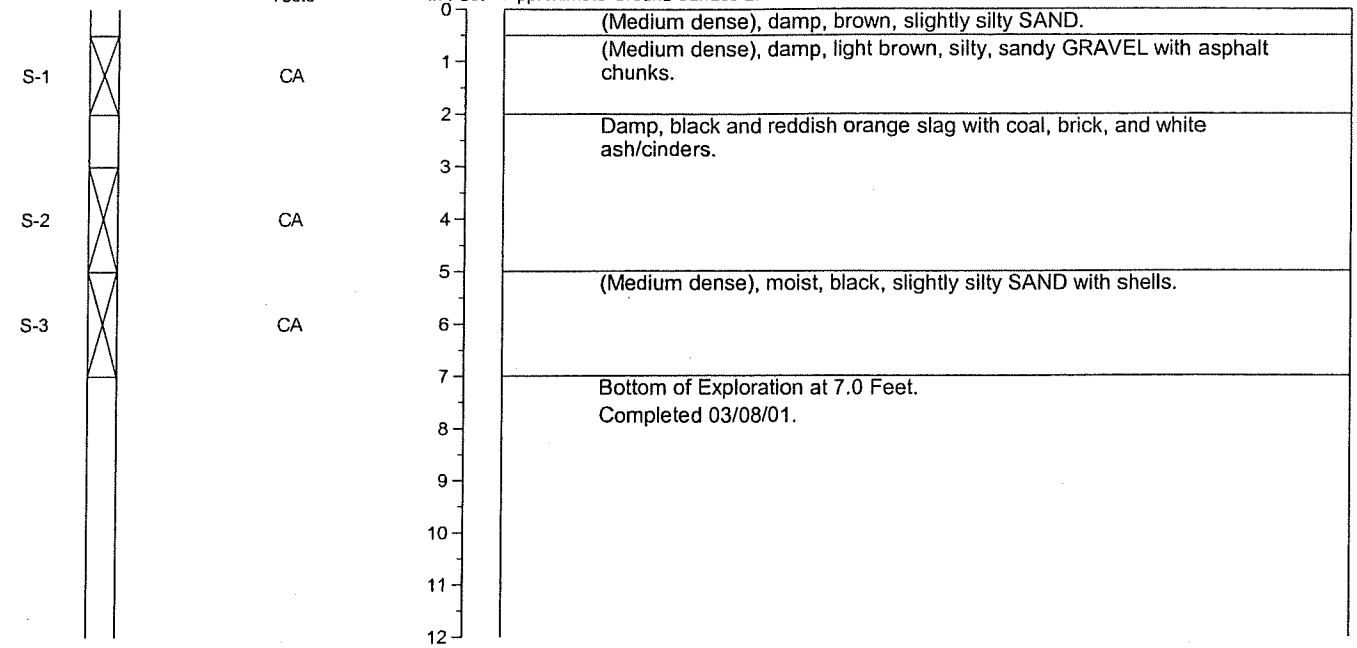
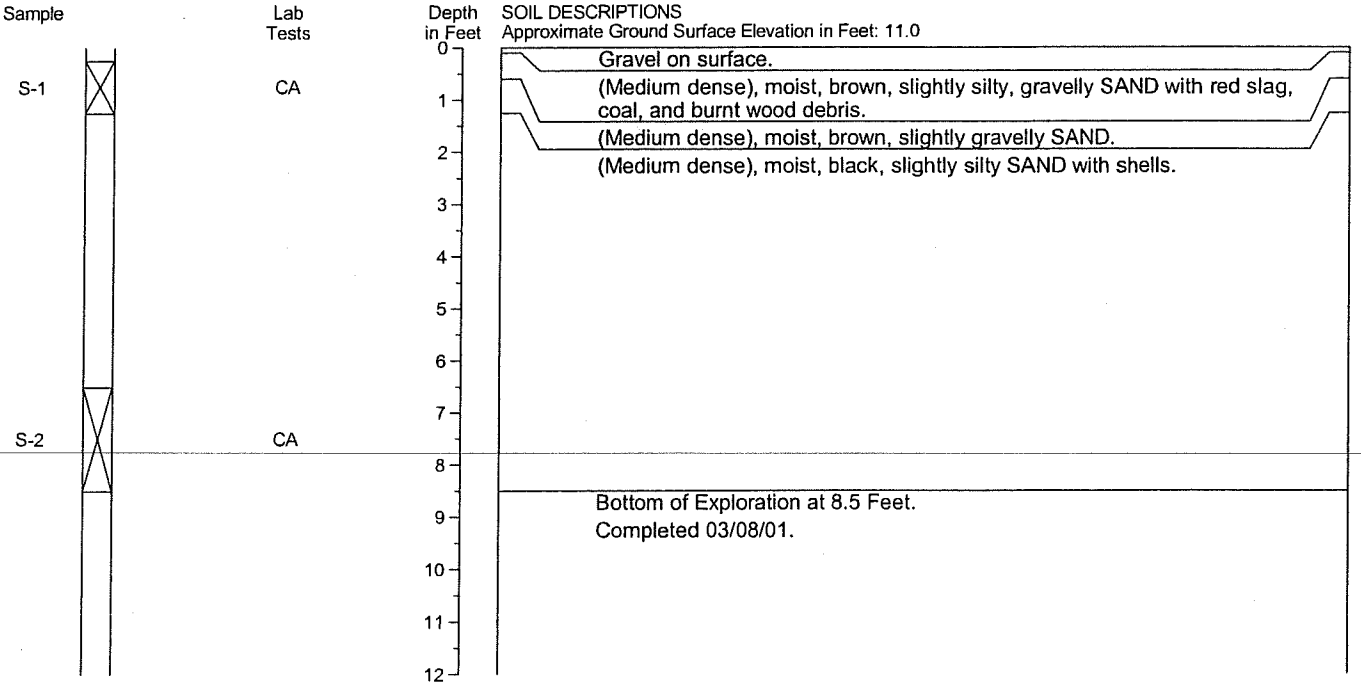
Figure A-8

Test Pit Log HB-TP05



Test Pit Log HB-TP06



2 LOGS PER PAGE 467672TP.GPJ HC_CORP.GDT 2/26/02

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

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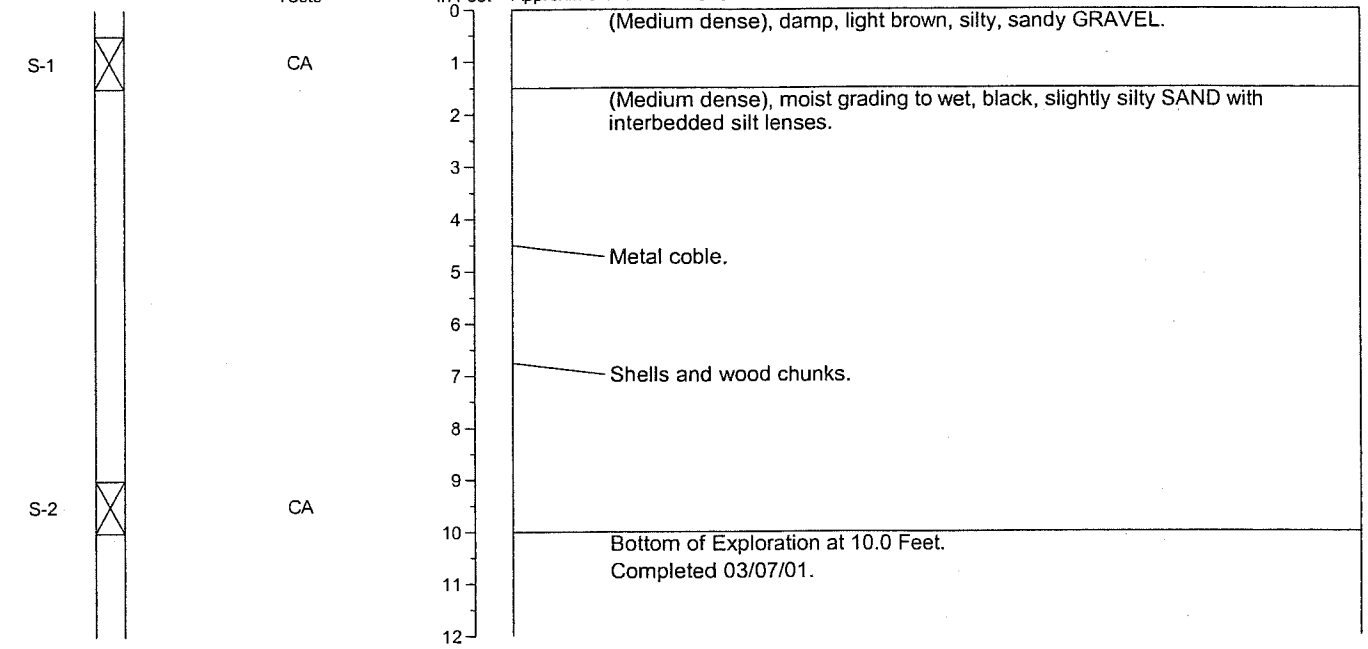
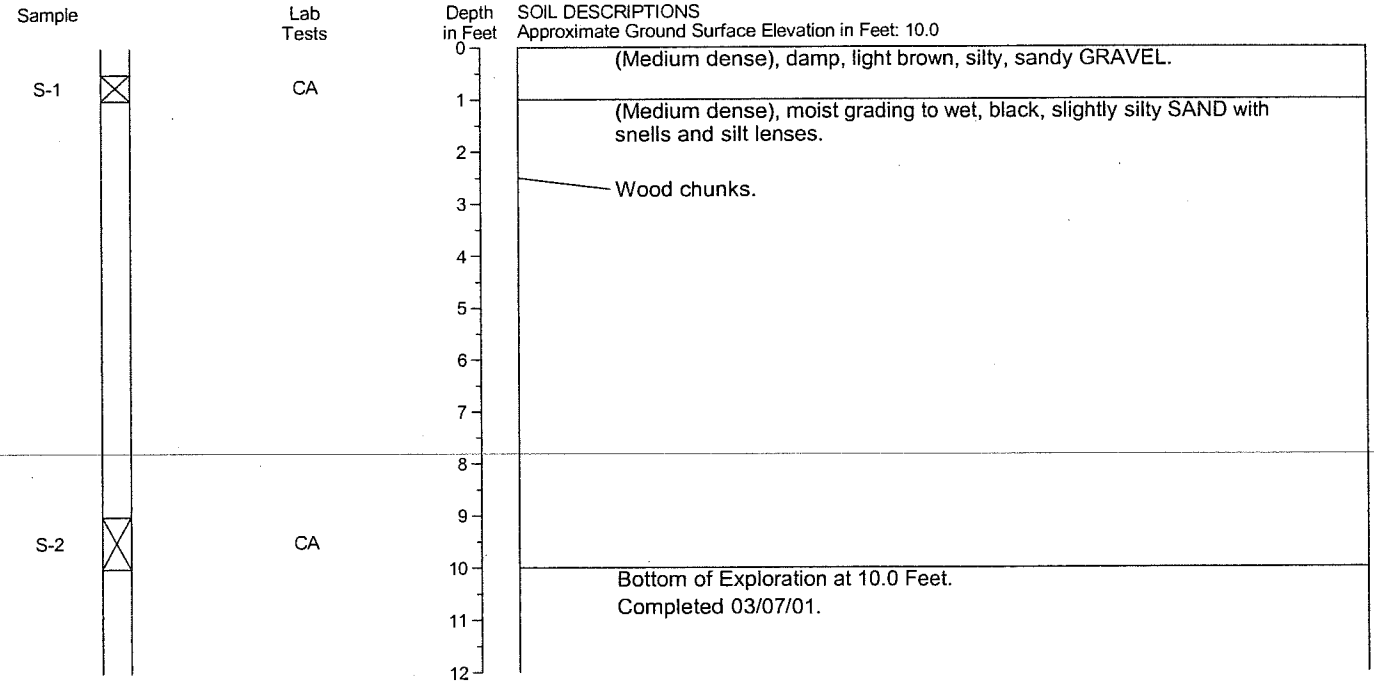
Figure A-9

Test Pit Log HB-TP07



Test Pit Log HB-TP08



2 LOGS PER PAGE 467672TP.GPJ HC_CORP.GDT 2/26/02

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

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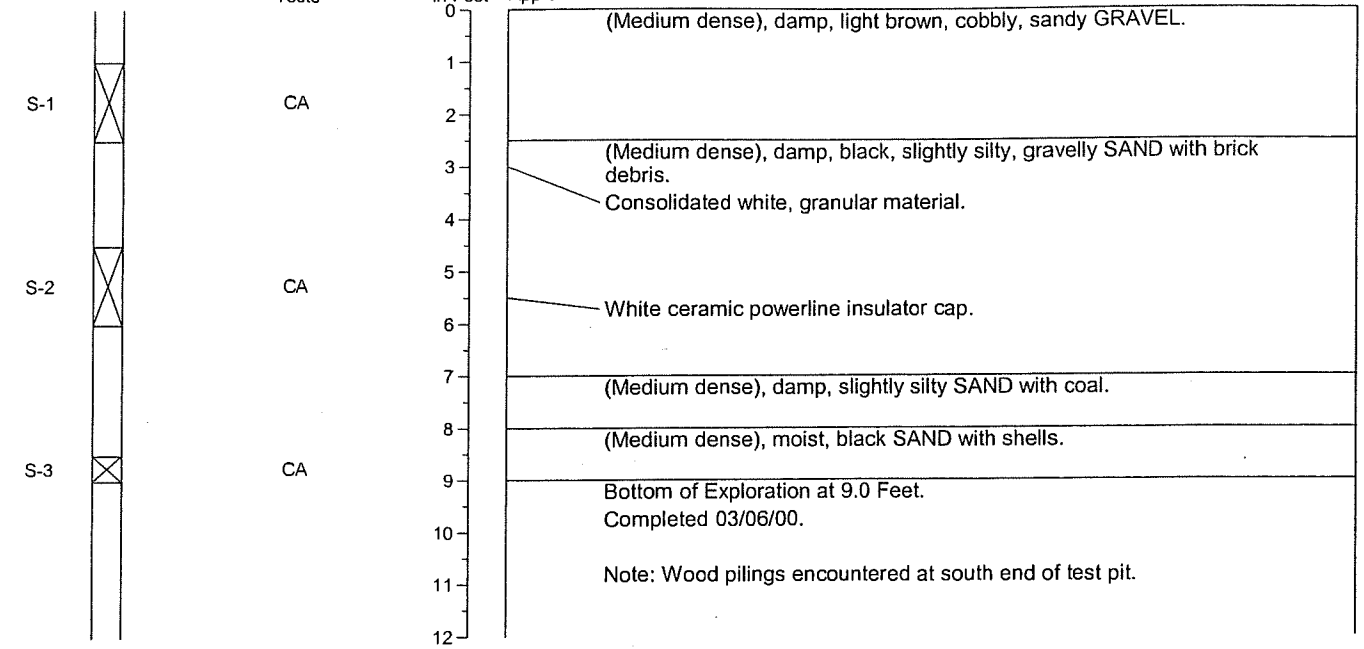
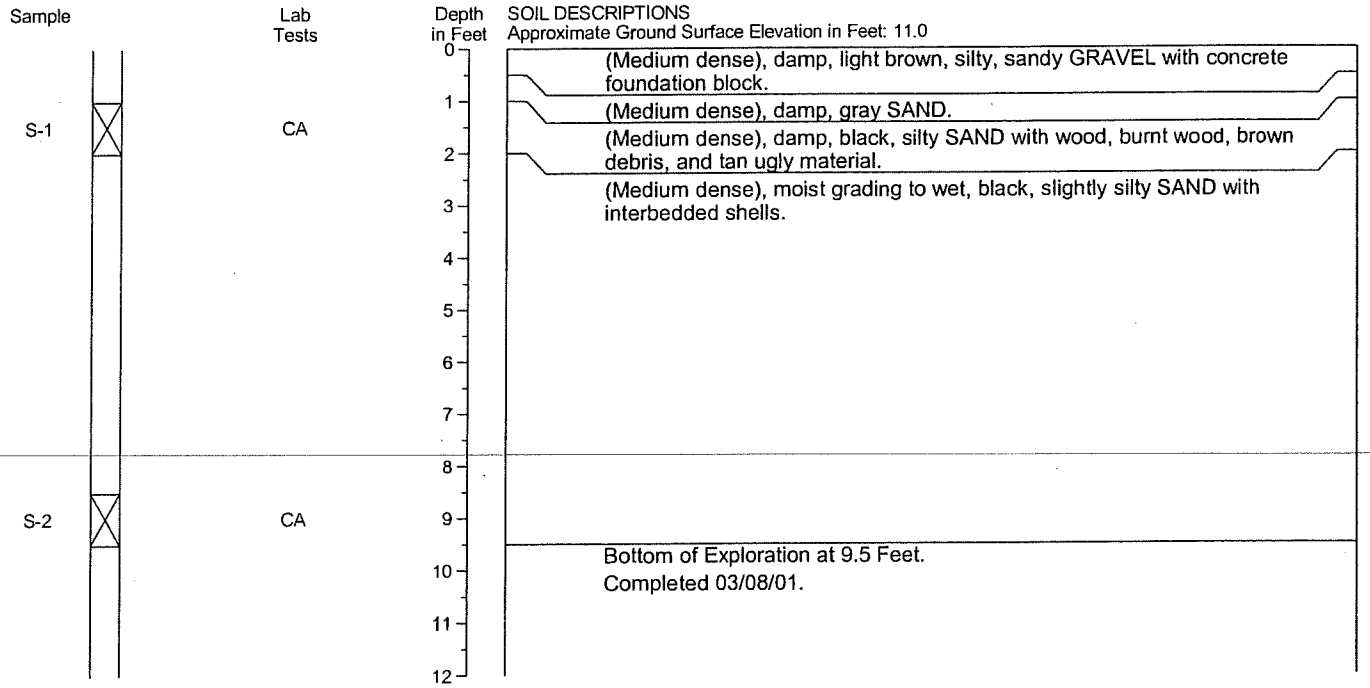
Figure A-10

Test Pit Log HB-TP09



Test Pit Log HB-TP10



2 LOGS PER PAGE 467672TP.GPJ HC_CORP.GDT 2/26/02

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater conditions, if indicated, are at time of excavation. Conditions may vary with time.

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Figure A-11

APPENDIX B
SAMPLE RESULTS SUMMARY TABLES

APPENDIX B
SAMPLE RESULTS SUMMARY TABLES

The following tables provide summaries of the available soil and groundwater quality data collected during the current investigations of the Hicks-Bull, Coast Iron Works, and Steam Plant properties. The soil quality tables are presented first, followed by the groundwater quality tables. The tables within each of these media are ordered by the following compound groups:

- Carcinogenic PAHs
- Non-Carcinogenic PAHs
- Metals
- Petroleum Hydrocarbons
- Conventionals

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Table B-1 - Carcinogenic PAH Results for Soil Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Units	Benzo(a) anthracene	Benzo(a) pyrene	Total Benzo-fluoranthenes	Chrysene	Dibenz(ah) anthracene	Indeno (1,2,3-cd)pyrene	Total cPAHs BaP
HB-B01 S-1	3/9/2001	µg/kg	94.0 U	94.0 U	110.0	94.0 U	94.0 U	94.0 U	86.67
HB-B01 S-4	3/9/2001	µg/kg	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	76.10 U
HB-B02 S-1	3/9/2001	µg/kg	200.0	180.0	240.0	220.0	96.0 U	96.0 U	250.2
HB-B02 S-4	3/9/2001	µg/kg	270.0	290.0	360.0	290.0	97.0 U	120.0	387.3
HB-MW01 S-4	3/9/2001	µg/kg	1300.0	330.0	680.0	1300.0	97.0 U	110.0	571.4
HB-MW01 S-6	3/9/2001	µg/kg	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	76.10 U
HB-MW02 S-1	3/9/2001	µg/kg	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	82.08 U
HB-MW02 S-3	3/9/2001	µg/kg	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	83.79 U
HB-MW03 S-1	3/9/2001	µg/kg	210.0	220.0	340.0	230.0	97.0 U	97.0 U	301.6
HB-MW03 S-4	3/9/2001	µg/kg	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	82.08 U
HB-TP01 S-1	3/8/2001	µg/kg	94.0 J	310.0 J	700.0 J	200.0 J	88.0 UJ	88.0 UJ	413.4
HB-TP01 S-2	3/8/2001	µg/kg	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	84.65 U
HB-TP01 S-3	3/8/2001	µg/kg	430.0	370.0	490.0	420.0	96.0 U	180.0	503.4
HB-TP02 S-1	3/8/2001	µg/kg	290.0	480.0	850.0	780.0	190.0	500.0	727.8
HB-TP02 S-2	3/8/2001	µg/kg	300.0	350.0	540.0	400.0	97.0 U	210.0	478.4
HB-TP03 S-1	3/7/2001	µg/kg	120.0	100.0	210.0	110.0	83.0 U	83.0 U	154.9
HB-TP03 S-2	3/7/2001	µg/kg	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	82.94 U
HB-TP04 S-1	3/7/2001	µg/kg	1700.0	2300.0 J	4800.0 J	2700.0	330.0 J	1100.0 J	3219.0
HB-TP04 S-2	3/7/2001	µg/kg	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	64.98 U
HB-TP05 S-1	3/8/2001	µg/kg	2600.0 J	3300.0 J	4400.0 J	3200.0	340.0 J	1300.0 J	4298.0
HB-TP05 S-2	3/8/2001	µg/kg	810.0	920.0	1400.0	1100.0	110.0	370.0	1233.0
HB-TP05 S-3	3/8/2001	µg/kg	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	61.56 U
HB-TP06 S-1	3/8/2001	µg/kg	120.0	170.0	260.0	220.0	86.0 U	88.0	236.2
HB-TP06 S-2	3/8/2001	µg/kg	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	82.94 U
HB-TP07 S-1	3/7/2001	µg/kg	250.0	220.0	270.0	270.0	95.0 U	95.0 U	298.5
HB-TP07 S-2	3/7/2001	µg/kg	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	79.52 U
HB-TP08 S-1	3/7/2001	µg/kg	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	85.50 U
HB-TP08 S-2	3/7/2001	µg/kg	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	79.52 U
HB-TP09 S-1	3/7/2001	µg/kg	150.0	160.0	230.0	150.0	94.0 U	120.0	230.3
HB-TP09 S-2	3/7/2001	µg/kg	6500.0	4900.0	11000.0	7600.0	690.0	2400.0	7242.0
HB-TP09 S-3	3/7/2001	µg/kg	3400.0	4600.0	6100.0	4100.0	470.0	1800.0	5959.0
HB-TP10 S-1	3/8/2001	µg/kg	2100.0	1900.0	2500.0	2600.0	230.0	660.0	2544.0
HB-TP10 S-2	3/8/2001	µg/kg	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	84.65 U

U - Indicates value was not detected at associated detection limit
J - Indicates value was estimated

Table B-2 - Non-Carcinogenic PAH Results for Soil Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Units	2-Methyl-naphthalene	2-Chloro-naphthalene	Benzo(g,h,i) perylene	Acenaph-thene	Acenaph-thylene	Anthra-cene	Fluoran-thene	Fluorene	Naph-thalene	Phenan-threne	Pyrene
HB-B01 S-1	3/9/2001	µg/kg	94.0 U	94.0 U	94.0 U	94.0 U	94.0 U	94.0 U	94.0 U	94.0 U	94.0 U	94.0 U	120.0
HB-B01 S-4	3/9/2001	µg/kg	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U
HB-B02 S-1	3/9/2001	µg/kg	96.0 U	96.0 U	120.0	96.0 U	96.0 U	130.0	410.0	96.0 U	96.0 U	420.0	510.0
HB-B02 S-4	3/9/2001	µg/kg	97.0 U	97.0 U	180.0	97.0 U	97.0 U	110.0	490.0	97.0 U	97.0 U	400.0	640.0
HB-MW01 S-4	3/9/2001	µg/kg	1900.0	97.0 U	110.0	3500.0	97.0 U	2500.0	6700.0	3700.0	4700.0	12000.0	6300.0
HB-MW01 S-6	3/9/2001	µg/kg	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	89.0 U	380.0	120.0	99.0	700.0	300.0
HB-MW02 S-1	3/9/2001	µg/kg	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U
HB-MW02 S-3	3/9/2001	µg/kg	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U	98.0 U
HB-MW03 S-1	3/9/2001	µg/kg	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	420.0	97.0 U	97.0 U	320.0	530.0
HB-MW03 S-4	3/9/2001	µg/kg	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U	96.0 U
HB-TP01 S-1	3/8/2001	µg/kg	88.0 U	88.0 U	88.0 UJ	88.0 U	88.0 U	88.0 U	160.0	88.0 U	88.0 U	200.0	210.0 P
HB-TP01 S-2	3/8/2001	µg/kg	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U	99.0 U
HB-TP01 S-3	3/8/2001	µg/kg	96.0 U	96.0 U	220.0	96.0 U	96.0 U	190.0	710.0	96.0 U	96.0 U	550.0	1000.0
HB-TP02 S-1	3/8/2001	µg/kg	99.0 U	99.0 U	1200.0	99.0 U	110.0	150.0	320.0	99.0 U	99.0 U	320.0	520.0
HB-TP02 S-2	3/8/2001	µg/kg	97.0 U	97.0 U	320.0	97.0 U	97.0 U	97.0 U	370.0	97.0 U	97.0 U	280.0	490.0
HB-TP03 S-1	3/7/2001	µg/kg	83.0 U	83.0 U	83.0 U	83.0 U	83.0 U	83.0 U	140.0	83.0 U	83.0 U	83.0 U	160.0
HB-TP03 S-2	3/7/2001	µg/kg	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U
HB-TP04 S-1	3/7/2001	µg/kg	96.0 U	96.0 U	1800.0 J	96.0 U	310.0	140.0	3500.0	96.0 U	96.0 U	1600.0	6400.0
HB-TP04 S-2	3/7/2001	µg/kg	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U	76.0 U
HB-TP05 S-1	3/8/2001	µg/kg	96.0 UJ	96.0 UJ	1800.0 J	410.0 J	96.0 UJ	620.0 J	5000.0 J	200.0 J	96.0 UJ	3800.0 J	6700.0 J
HB-TP05 S-2	3/8/2001	µg/kg	380.0	99.0 U	460.0	110.0	130.0	160.0	1100.0	99.0 U	170.0	1200.0	1400.0
HB-TP05 S-3	3/8/2001	µg/kg	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U	72.0 U
HB-TP06 S-1	3/8/2001	µg/kg	86.0 U	86.0 U	100.0	86.0 U	86.0 U	86.0 U	150.0	86.0 U	86.0 U	140.0	200.0
HB-TP06 S-2	3/8/2001	µg/kg	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U	97.0 U
HB-TP07 S-1	3/7/2001	µg/kg	95.0 U	95.0 U	120.0	95.0 U	95.0 U	110.0	370.0	95.0 U	95.0 U	470.0	600.0
HB-TP07 S-2	3/7/2001	µg/kg	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U
HB-TP08 S-1	3/7/2001	µg/kg	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U	100.0 U
HB-TP08 S-2	3/7/2001	µg/kg	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U	93.0 U
HB-TP09 S-1	3/7/2001	µg/kg	94.0 U	94.0 U	160.0	94.0 U	94.0 U	94.0 U	270.0	94.0 U	94.0 U	160.0	390.0
HB-TP09 S-2	3/7/2001	µg/kg	1200.0	96.0 U	2900.0	4000.0	96.0 U	4800.0	15000.0	2600.0	640.0	21000.0	19000.0
HB-TP09 S-3	3/7/2001	µg/kg	96.0	91.0 U	2300.0	1000.0	91.0 U	1600.0	6800.0	580.0	91.0 U	6100.0	9600.0
HB-TP10 S-1	3/8/2001	µg/kg	270.0	98.0 U	740.0	710.0	98.0 U	950.0	4400.0	520.0	470.0	7300.0	6600.0
HB-TP10 S-2	3/8/2001	µg/kg	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ	99.0 UJ

U - Indicates value was not detected at associated detection limit
J - Indicates value was estimated

Table B-3 - Metal Results for Soil Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Basis	Units	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
HB-B01 S-1	3/9/2001	TOT	mg/kg	4.15	0.48 J	34.6	52.2 J	72.2	0.0897 J	34.0	67.4
HB-B01 S-4	3/9/2001	TOT	mg/kg	2.79	0.25 U	5.73	8.82 J	5.64	0.0117 J	6.73	15.9
HB-B02 S-1	3/9/2001	TOT	mg/kg	2.29	0.37 J	16.3	18.9 J	8.9 U	0.0201 J	24.7	30.6
HB-B02 S-4	3/9/2001	TOT	mg/kg	1.76	0.25 U	6.67	14.5 J	29.6	0.0516 J	7.54	42.2
HB-MW01 S-4	3/9/2001	TOT	mg/kg	4.72	0.48 U	14.7	28.2 J	21.6	0.0254 J	18.4	46.5
HB-MW01 S-6	3/9/2001	TOT	mg/kg	2.07	0.26 U	5.34	11.8 J	2.86	0.0077 J	6.32	196.0
HB-MW02 S-1	3/9/2001	TOT	mg/kg	2.33	0.24 U	6.99	7.1 UJ	2.7 U	0.0071 U	6.17	14.4
HB-MW02 S-3	3/9/2001	TOT	mg/kg	2.04	0.25 U	5.87	6.5 UJ	2.1 U	0.0069 J	7.86	31.0
HB-MW03 S-1	3/9/2001	TOT	mg/kg	4.02	0.55 J	14.4	22.0 J	33.3	0.11	15.4	156.0
HB-MW03 S-4	3/9/2001	TOT	mg/kg	3.23	0.26 U	6.62	7.98 J	5.2 U	0.0078 J	6.54	26.0
HB-TP01 S-1	3/8/2001	TOT	mg/kg	4.3	0.51 U	14.9	18.5	15.3	0.0175 J	35.3 J	46.3
HB-TP01 S-2	3/8/2001	TOT	mg/kg	3.0	0.35 J	27.5	10.9	5.11	0.0219 J	39.9 J	31.4
HB-TP01 S-3	3/8/2001	TOT	mg/kg	3.59	0.49 J	25.8	23.0 J	36.5	0.159	34.1	55.9
HB-TP02 S-1	3/8/2001	TOT	mg/kg	8.81	0.9 J	23.0	115.0 J	207.0	0.14	23.6	171.0
HB-TP02 S-2	3/8/2001	TOT	mg/kg	3.11	0.43 J	24.2	112.0 J	60.0	0.072 J	34.9	70.2
HB-TP03 S-1	3/7/2001	TOT	mg/kg	9.1	1.16	11.4	498.0	694.0	0.179	14.7 J	398.0
HB-TP03 S-2	3/7/2001	TOT	mg/kg	2.6	0.23 U	14.4	5.9	2.54	0.0076 U	7.6 J	15.7
HB-TP04 S-1	3/7/2001	TOT	mg/kg	13.0	4.42	17.9	232.0	696.0	0.231	32.3 J	542.0
HB-TP04 S-2	3/7/2001	TOT	mg/kg	2.2	0.26 U	8.56	4.6	1.95	0.0095 J	8.1 J	12.1
HB-TP05 S-1	3/8/2001	TOT	mg/kg	3.92	0.57 J	25.9	53.8 J	53.9	0.0771 J	36.3	80.8
HB-TP05 S-2	3/8/2001	TOT	mg/kg	77.2	5.29	51.1	869.0 J	2630.0	0.52	72.1	1290.0
HB-TP05 S-3	3/8/2001	TOT	mg/kg	18.2	0.27 J	6.74	11.0 J	4.67	0.0162 J	6.7	13.9
HB-TP06 S-1	3/8/2001	TOT	mg/kg	7.82	11.2	43.3	326.0 J	297.0	0.168	103.0	306.0
HB-TP06 S-2	3/8/2001	TOT	mg/kg	2.08	0.29 U	15.7	8.5 J	2.56	0.0066 U	10.1	13.1
HB-TP07 S-1	3/7/2001	TOT	mg/kg	4.8	6.94	49.0	179.0	130.0	0.0903 J	168.0 J	133.0
HB-TP07 S-2	3/7/2001	TOT	mg/kg	2.6 U	0.41 J	7.14	12.7	7.55	0.0124 J	13.3 J	21.9
HB-TP08 S-1	3/7/2001	TOT	mg/kg	2.3 U	0.25 U	7.82	6.1	3.07	0.0066 J	6.2 J	14.0
HB-TP08 S-2	3/7/2001	TOT	mg/kg	2.3	0.23 U	7.01	5.6	1.86	0.0057 J	5.7 J	12.4
HB-TP09 S-1	3/7/2001	TOT	mg/kg	4.4	0.51 J	23.0	61.6	39.4	0.751	27.0 J	51.6
HB-TP09 S-2	3/7/2001	TOT	mg/kg	7.5	0.95 J	24.9	75.9	166.0	0.592	26.4 J	91.7
HB-TP09 S-3	3/7/2001	TOT	mg/kg	3.7	0.46 U	20.7	41.6	62.6	1.33	24.4 J	77.7
HB-TP10 S-1	3/8/2001	TOT	mg/kg	9.05	2.7	30.0	55.1 J	252.0	7.83	28.1	905.0
HB-TP10 S-2	3/8/2001	TOT	mg/kg	2.62	0.25 U	6.43	9.61 J	7.18	0.0356 J	7.24	26.5

U - Indicates value was not detected at associated detection limit
J - Indicates value was estimated

Table B-4 - BTEX and TPH Results for Soil Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Units	Benzene	Toluene	Ethylbenzene	Total Xylenes
HB-MW01 S-4	3/9/2001	µg/kg	220.0 U	220.0 U	220.0 U	220.0 U

Sample I.D.	Date Sampled	Units	Diesel	Gasoline	Heavy Oil
HB-B01 S-1	3/9/2001	mg/kg	19.0 U		130.0
HB-B01 S-4	3/9/2001	mg/kg	18.0 U		35.0 U
HB-B02 S-1	3/9/2001	mg/kg	19.0 U		93.0
HB-B02 S-4	3/9/2001	mg/kg	19.0 U		100.0
HB-MW01 S-4	3/9/2001	mg/kg	19.0 U	4.5 UJ	39.0 U
HB-MW01 S-6	3/9/2001	mg/kg	18.0 U		36.0 U
HB-MW02 S-1	3/9/2001	mg/kg	19.0 U		38.0 U
HB-MW02 S-3	3/9/2001	mg/kg	20.0 U		39.0 U
HB-MW03 S-1	3/9/2001	mg/kg	19.0 U		300.0
HB-MW03 S-4	3/9/2001	mg/kg	19.0 U		38.0 U
HB-TP01 S-1	3/8/2001	mg/kg	350.0 U		4000.0
HB-TP01 S-2	3/8/2001	mg/kg	20.0 U		40.0 U
HB-TP01 S-3	3/8/2001	mg/kg	19.0 U		44.0
HB-TP02 S-1	3/8/2001	mg/kg	19.0 U		510.0
HB-TP02 S-2	3/8/2001	mg/kg	19.0 U		100.0
HB-TP03 S-1	3/7/2001	mg/kg	17.0 U		82.0 J
HB-TP03 S-2	3/7/2001	mg/kg	19.0 UJ		39.0 UJ
HB-TP04 S-1	3/7/2001	mg/kg	19.0 U		1000.0 J
HB-TP04 S-2	3/7/2001	mg/kg	15.0 UJ		31.0 UJ
HB-TP05 S-1	3/8/2001	mg/kg	380.0 U		1300.0
HB-TP05 S-2	3/8/2001	mg/kg	43.0		250.0
HB-TP05 S-3	3/8/2001	mg/kg	14.0 U		29.0 U
HB-TP06 S-1	3/8/2001	mg/kg	17.0 U		250.0
HB-TP06 S-2	3/8/2001	mg/kg	19.0 U		39.0 U
HB-TP07 S-1	3/7/2001	mg/kg	19.0 UJ		85.0 J
HB-TP07 S-2	3/7/2001	mg/kg	19.0 UJ		37.0 UJ
HB-TP08 S-1	3/7/2001	mg/kg	20.0 UJ		40.0 UJ
HB-TP08 S-2	3/7/2001	mg/kg	19.0 UJ		37.0 UJ
HB-TP09 S-1	3/7/2001	mg/kg	19.0 UJ		37.0 UJ
HB-TP09 S-2	3/7/2001	mg/kg	19.0 U		59.0 J
HB-TP09 S-3	3/7/2001	mg/kg	18.0 U		63.0 J
HB-TP10 S-1	3/8/2001	mg/kg	20.0 U		55.0
HB-TP10 S-2	3/8/2001	mg/kg	20.0 UJ		40.0 UJ

U - Indicates value was not detected at associated detection limit
J - Indicates value was estimated
Blank indicates sample not analyzed for specific analyte.

Table B-5 - Total Solids Results for Soil Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Units	Total Solids
HB-B01 S-1	3/9/2001	%	86.2
HB-B01 S-4	3/9/2001	%	79.2
HB-B02 S-1	3/9/2001	%	92.5
HB-B02 S-4	3/9/2001	%	80.2
HB-MW01 S-4	3/9/2001	%	84.4
HB-MW01 S-6	3/9/2001	%	80.3
HB-MW02 S-1	3/9/2001	%	93.8
HB-MW02 S-3	3/9/2001	%	83.3
HB-MW03 S-1	3/9/2001	%	92.7
HB-MW03 S-4	3/9/2001	%	78.7
HB-TP01 S-1	3/8/2001	%	90.8
HB-TP01 S-2	3/8/2001	%	86.1
HB-TP01 S-3	3/8/2001	%	86.5
HB-TP02 S-1	3/8/2001	%	87.0
HB-TP02 S-2	3/8/2001	%	89.0
HB-TP03 S-1	3/7/2001	%	92.0
HB-TP03 S-2	3/7/2001	%	94.2
HB-TP04 S-1	3/7/2001	%	83.3
HB-TP04 S-2	3/7/2001	%	93.1
HB-TP05 S-1	3/8/2001	%	89.9
HB-TP05 S-2	3/8/2001	%	68.3
HB-TP05 S-3	3/8/2001	%	94.5
HB-TP06 S-1	3/8/2001	%	91.5
HB-TP06 S-2	3/8/2001	%	91.5
HB-TP07 S-1	3/7/2001	%	92.3
HB-TP07 S-2	3/7/2001	%	84.3
HB-TP08 S-1	3/7/2001	%	93.5
HB-TP08 S-2	3/7/2001	%	75.9
HB-TP09 S-1	3/7/2001	%	94.2
HB-TP09 S-2	3/7/2001	%	92.6
HB-TP09 S-3	3/7/2001	%	89.7
HB-TP10 S-1	3/8/2001	%	84.9
HB-TP10 S-2	3/8/2001	%	93.9

Table B-6 - Carcinogenic PAH Results for Groundwater Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Units	Benzo(a) anthracene	Benzo(a) pyrene	Total Benzo-fluoranthenes	Chrysene	Dibenz(ah) anthracene	Indeno (1,2,3-cd)pyrene
HB-MW01	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW01-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MWA (DUP of HB-MW01)	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW02	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW02-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW03	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW03-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-S01	3/27/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UMW2A	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UMW2A-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U - Indicates value was not detected at associated detection limit

Table B-7 - Non-Carcinogenic PAH Results for Groundwater Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Units	2-Methyl-naphthalene	2-Chloro-naphthalene	Benzo(g,h,i) perylene	Acenaph-thene	Acenaph-thylene	Anthra-cene	Fluoran-thene	Fluorene	Naph-thalene	Phenan-threne	Pyrene
HB-MW01	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	12.0	1.0 U	1.7	9.1	3.5	1.0 U	1.0 U	1.0 U
HB-MW01-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	7.1	1.0 U	1.0 U	11.0	2.1	1.0 U	1.3	1.0 U
HB-MWA (DUP of HB-MW01)	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	7.7	1.0 U	1.0 U	12.0	2.8	1.0 U	1.5	1.0 U
HB-MW02	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW02-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW03	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-MW03-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
HB-S01	3/27/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UMW2A	3/20/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UMW2A-High	3/21/2001	µg/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U - Indicates value was not detected at associated detection limit

Table B-8 - Metal Results for Groundwater Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Basis	Units	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
HB-MW01	3/20/2001	DIS	µg/L	2.6 J	26.0	0.083 U	6.1	7.2	0.14 J	0.05 U	13.0	43.0
HB-MW01-High	3/21/2001	DIS	µg/L	2.2 J	16.0	0.083 U	5.4	6.4	0.047 J	0.05 U	8.8	54.0
HB-MW02	3/20/2001	DIS	µg/L	1.9 J	26.0	0.083 U	5.5	9.1	0.023 U	0.05 U	47.0	7.7
HB-MW02-High	3/21/2001	DIS	µg/L	1.6 J	26.0	0.083 U	4.8	8.2	0.042 J	0.05 U	45.0	6.7
HB-MW02	12/10/2001	DIS	µg/L		20.6			4.33 J			25.8	
HB-MW03	3/20/2001	DIS	µg/L	1.0 J	28.0	0.083 U	6.0	11.0	0.042 J	0.05 U	12.0	20.0
HB-MW03-High	3/21/2001	DIS	µg/L	1.1 J	27.0	0.083 U	5.6	7.8	0.041 J	0.05 U	11.0	15.0
HB-MW03	12/10/2001	DIS	µg/L		35.6			6.24 J			11.2	
HB-MWA (DUP of HB-MW01)	3/21/2001	DIS	µg/L	2.2 J	19.0	0.083 U	5.2	5.9	0.029 J	0.05 U	9.3	53.0
HB-S01	3/27/2001	DIS	µg/L	0.44 J	31.0	0.083 U	4.7	6.3	0.37 J	0.01 J	13.0	5.5
HB-S01	12/10/2001	DIS	µg/L		38.8			7.16 J			10.7	
OB-1	12/10/2001	DIS	µg/L		42.7			9.05 J			10.8	
UMW2A	3/20/2001	DIS	µg/L	0.24 J	26.0	0.083 U	6.5	5.1	0.039 J	0.05 U	11.0	4.9 J
UMW2A-High	3/21/2001	DIS	µg/L	0.22 J	28.0	0.083 U	6.4	7.3	0.023 U	0.05 U	9.3	3.5 J
UMW2A	12/10/2001	DIS	µg/L		15.6			3.79 J			6.24	

U - Indicates value was not detected at associated detection limit
J - Indicates value was estimated
Blank indicates sample not analyzed for specific analyte.

Table B-9 - BTEX and TPH Results for Groundwater Samples
Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Units	Benzene	Toluene	Ethylbenzene	Total Xylenes
HB-MW01	3/20/2001	µg/L	0.5 U	0.5 U	0.5 U	0.5 U
HB-MW01-High	3/21/2001	µg/L	0.5 U	0.5 U	0.5 U	0.5 U
HB-MWA (DUP of HB-MW01)	3/21/2001	µg/L	0.5 U	0.5 U	0.5 U	0.5 U
HB-MW03	3/20/2001	µg/L	0.5 U	0.5 U	0.5 U	0.5 U
HB-MW03-High	3/21/2001	µg/L	0.5 U	0.5 U	0.5 U	0.5 U

Sample I.D.	Date Sampled	Units	Diesel	Gasoline	Heavy Oil
HB-MW01	3/20/2001	mg/L	0.25 U	0.5 U	0.5 U
HB-MW01-High	3/21/2001	mg/L	0.25 UJ	0.5 U	0.5 UJ
HB-MWA (DUP of HB-MW01)	3/21/2001	mg/L	0.25 U	0.5 U	0.5 U
HB-MW02	3/20/2001	mg/L	0.25 UJ		0.5 UJ
HB-MW02-High	3/21/2001	mg/L	0.25 UJ		0.5 UJ
HB-MW03	3/20/2001	mg/L	0.25 UJ	0.5 U	0.5 UJ
HB-MW03-High	3/21/2001	mg/L	0.25 UJ	0.5 U	0.5 UJ
HB-S01	3/27/2001	mg/L	0.25 U		0.5 U
UMW2A	3/20/2001	mg/L	0.25 UJ		0.5 UJ
UMW2A-High	3/21/2001	mg/L	0.25 UJ		0.5 UJ

U - Indicates value was not detected at associated detection limit
J - Indicates value was estimated
Blank indicates sample not analyzed for specific analyte.

Table B-10 - Total Suspended Solids Results for Groundwater Samples Hicks-Bull, Coast Iron Works, and Steam Plant Properties

Sample I.D.	Date Sampled	Total Suspended Solids in mg/L
HB-MW01	3/20/2001	2.9
HB-MW01-High	3/21/2001	0.5
HB-MWA (DUP of HB-MW01)	3/21/2001	0.7
HB-MW02	3/20/2001	7.8
HB-MW02-High	3/21/2001	5.0
HB-MW03	3/20/2001	2.6
HB-MW03-High	3/21/2001	1.7
HB-S01	3/27/2001	70.3
UMW2A	3/20/2001	16.8
UMW2A-High	3/21/2001	10.5

APPENDIX C
CHEMICAL DATA QUALITY REVIEW AND LABORATORY CERTIFICATES OF ANALYSIS

APPENDIX C
CHEMICAL DATA QUALITY REVIEW AND LABORATORY CERTIFICATES OF ANALYSIS

Chemical Data Quality Review

In general, the chemical analysis of the soil and groundwater samples met the data quality objectives presented in the Work Plan. Detailed summary tables of analytical data are presented in Tables B-1 through B-10.

Soil

Organic Data Review. The following deviations occurred during organic analyses and required qualification of soil data. The continuing calibration standards for Heavy Oil exceeded laboratory control limits for four intervals. Associated results (HB-TP03 S-1, HB-TP03 S-2, HB-TP04 S-1, HB-TP04 S-2, HB-TP07 S-1, HB-TP07 S-2, HB-TP08 S-1, HB-TP08 S-2, HB-TP09 S-1, HB-TP09 S-2, and HB-TP09 S-3) were qualified as estimated (J).

Surrogate recoveries were outside control limits in the NWTPH-Dx analysis for soil samples HB-TP03 S-2, HB-TP04 S-2, HB-TP07 S-1, HB-TP07 S-2, HB-TP08 S-1, HB-TP08 S-2, HB-TP09 S-1, and HB-TP10 S-2. Associated sample results with detections for Diesel and Heavy Oil were qualified as estimated (J). Surrogate recoveries were above control limits in the SVOA analysis for HB-TP05 S-1 and HB-TP10 S-2. Associated results were qualified as estimated (J). One surrogate was above control limits in the SVOA analysis for HB-TP01 S-1. This sample was not qualified based on one surrogate recovery. Matrix spike recoveries of pyrene were slightly above laboratory control standards. Results were not qualified based on matrix spike recoveries.

Internal standard recoveries of perylene-d12 were below laboratory control limits for soil samples HB-TP01 S-1, HB-TP04 S-1, and HB-TP05 S-1. Associated results were qualified as estimated (J) for benzo(b,k)fluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. Internal standard recoveries of chrysene-d12 were below laboratory control limits for soil sample HB-TP01 S-1. Results from HB-TP01 S-1 were qualified as estimated (J) for pyrene, benzo(a)anthracene, and chrysene. The pyrene value for HB-TP01 S-1 was qualified as estimated due to a change in the internal standard used to calculate the concentration.

Organic results were flagged 'B' by the laboratory to indicate results between the instrument detection limit and the contract reporting limits. The 'B' qualifier was modified to 'J' by the data quality reviewer.

Inorganic Data Review. The following deviations occurred during inorganic analyses and required qualification of the soil data. Due to method blank contamination, the following samples were qualified as non-detect for arsenic (As), cadmium (Cd), copper(Cu), and/or lead (Pb): HB-TP06 S-2(Cd), HB-TP07 S-2(As), HB-TP08 S-1(As), HB-TP10 S-2(Cd), HB-MW01 S-4(Cd), HB-MW02 S-1(Cu, Pb), HB-MW02 S-3(Cu, Pb), HB-MW03 S-4(Pb), and HB-B02 S-1(Pb).

Matrix spike recoveries of copper were above laboratory control standards. Associated results for soil samples HB-TP01 S-3, HB-TP02 S-1, HB-TP02 S-2, HB-TP05 S-1, HB-TP05 S-2, HB-TP05 S-3, HB-TP06 S-1, HB-TP06 S-2, HB-TP10 S-1, HB-TP10 S-2, HB-MW01 S-4, HB-MW01 S-6, HB-MW02 S-1, HB-MW02 S-3, HB-MW03 S-1, HB-MW03 S-4, HB-B01 S-1, HB-B01 S-4, HB-B02 S-1, and HB-B02 S-4 were qualified as estimated (J).

Metals results were flagged 'B' by the laboratory to indicate results between the instrument detection limit and the contract reporting limits. The 'B' qualifier was modified to a 'J' by the data quality reviewer.

Water

Organic Data Review. The following deviations occurred during organic analyses and required qualification of data. One surrogate recovery was below control limits in the NWTPH-Dx analysis for groundwater sample HB-MW01 High (March 2001). This result was qualified as estimated (J). Surrogate recoveries from the March 2001 sampling event were outside control limits in the NWTPH-Dx analysis for samples UMW2A, HB-MW02, HB-MW03, HB-MW02 High, HB-MW03 High, and UMW2A High. Associated sample results for Diesel and Heavy Oil were qualified as estimated (J).

Organic results were flagged 'B' by the laboratory to indicate results between the instrument detection limit and the contract reporting limits. The 'B' qualifier was modified to 'J' by the data quality reviewer.

The data, as qualified, were deemed acceptable for use.

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LABORATORY CERTIFICATES OF ANALYSIS
CITY OF TACOMA LABORATORY

City of Tacoma
Environmental Services
Science and Engineering
Division

Memorandum

TO: Mark D'Andrea, P. E., Project Coordinator, Public Works Engineering

FROM: Christopher L. Getchell, Source Control Supervisor

SUBJECT: Foss Uplands – Hick's Bull WO# AJ212M TEC

DATE: April 24, 2001

Attached are the sample analysis results for the soil and water samples collected by Hart Crowser, March 7, 8, 20, 21, and 27, 2001. The samples were collected in association with the Foss Uplands Investigation.

The Science and Engineering Division analyzed the samples for TSS, NWTPH-G, NWPTH-Dx, Volatile Organics, and Semi-Volatile Organics. Sound Analytical Services performed the ICP-MS analysis for Dissolved Metals. A detailed Quality Control Data Review report was prepared for these samples and is included with the sample reports.

The Heavy Oil values samples HB-TP07 S-1, HB-TP07 S-2, HB-TP08 S-1, HB-TP08 S-2, HB-TP09 S-1, HB-TP09 S-2, and HB-TP09 S-3 are qualified as estimated because of high %D of the continuing calibration standards.

Samples HB-TP07 S-2 and HB-TP08 S-1 are qualified as not detected for Arsenic; samples HB-MW02 S-1 and HB-MW02 S-3 are qualified as not detected for Copper; and samples HB-MW02 S-1, HB-MW02 S-3, HB-MW03 S-4, and HB-B02 S-1 are qualified as not detected for Lead based on the high concentrations in associated blanks. The detection limit goal of 1 mg/Kg for Arsenic in HB-TP07 S-2 and HB-TP08 S-1; Copper in HB-MW02 S-1 and HB-MW02 S-3; and Lead in HB-MW02 S-1, HB-MW02 S-3, HB-MW03 S-4, and HB-B02 S-1 was not met because of the blank concentrations.

Samples HB-TP07 S-1, HB-TP07 S-2, HB-TP08 S-1, HB-TP08 S-2, HB-TP09 S-1, UMW2A, HB-MW02, HB-MW03, HB-MW02 High, HB-MW03 High, and UMW2A High are qualified as estimated for Diesel and Heavy Oil based on surrogate compound recoveries outside of acceptance limits.

The Copper values samples HB-MW02 S-1, HB-MW02 S-3, HB-MW03 S-1, HB-MW03 S-4, HB-B02 S-1, and HB-B02 S-4 qualified as estimated for Copper based on high spike recovery.

If you have any questions concerning these results, call me at (253) 502-2130. Please note, the samples associated with this report will be discarded six months from the date of this report unless requested otherwise.

Christopher L. Getchell
Source Control Supervisor,
Science and Engineering Division.

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Thea Foss Uplands
Hick's Bull
Development Site 8 (AJ212M TEC)

Sample ID	Laboratory ID	Matrix
HB-TP07 S-1	010307048	Soil
HB-TP07 S-2	010307049	Soil
HB-TP08 S-1	010307050	Soil
HB-TP08 S-2	010307051	Soil
HB-TP09 S-1	010307052	Soil
HB-TP09 S-2	010307053	Soil
HB-TP09 S-3	010307054	Soil
HB-MW02 S-1	010312100	Soil
HB-MW02 S-3	010312101	Soil
HB-MW03 S-1	010312102	Soil
HB-MW03 S-4	010312103	Soil
HB-B02 S-1	010312106	Soil
HB-B02 S-4	010312107	Soil
UMW2A	010320168	Groundwater
HB-MW02	010320170	Groundwater
HB-MW03	010320171	Groundwater
HB-MW02 High	010321201	Groundwater
HB-MW03 High	010321202	Groundwater
UMW2A High	010321203	Groundwater
HB-S01	010327227	Groundwater

Quality Control Data Review

TO: Christopher L. Getchell, Source Control Supervisor

FROM: Lori A. Zboralski, Senior Laboratory Analyst

DATE: May 4, 2001

SAMPLES

This report concerns the following samples associated with the **Foss Uplands WO# AJ212M:**

Sample Description	Lab #	Sample Matrix	Date Sampled
HB-TP07 S-1	010307048	Soil	03/07/01
HB-TP07 S-2	010307049	Soil	03/07/01
HB-TP08 S-1	010307050	Soil	03/07/01
HB-TP08 S-2	010307051	Soil	03/07/01
HB-TP09 S-1	010307052	Soil	03/07/01
HB-TP09 S-2	010307053	Soil	03/07/01
HB-TP09 S-3	010307054	Soil	03/07/01
HB-MW02 S-1	010312100	Soil	03/08/01
HB-MW02 S-3	010312101	Soil	03/08/01
HB-MW03 S-1	010312102	Soil	03/08/01
HB-MW03 S-4	010312103	Soil	03/08/01
HB-B02 S-1	010312106	Soil	03/08/01
HB-B02 S-4	010312107	Soil	03/08/01
UMW2A	010320168	Groundwater	03/20/01
HB-MW02	010320170	Groundwater	03/20/01
HB-MW03	010320171	Groundwater	03/20/01
HB-MW02 High	010321201	Groundwater	03/21/01
HB-MW03 High	010321202	Groundwater	03/21/01
UMW2A High	010321203	Groundwater	03/21/01
HB-S01	010327227	Groundwater	03/27/01

HOLDING TIMES

The water samples were extracted within the 7-day holding time for Semi-Volatile Organics and NWTPH-Dx and analyzed within 7 days for TSS, 14 days for Volatile Organics, 28 days for Dissolved Mercury, 40 days for Semi-Volatile Organics and NWTPH-Dx, and 180 days for Dissolved Metals.

The soil samples were extracted within the 14-day holding time for Semi-Volatile Organics and NWTPH-Dx and analyzed within 7 days for Solids, 28 days for Mercury, 40 days for Semi-Volatile Organics and NWTPH-Dx, and 180 days for Total Metals.

METHODS

The samples were analyzed according to NWTPH-G, NWTPH-Dx, CLP ILM04.0 for Metals, CLP OLM01.8 for Semi-Volatile Organics and Science and Engineering Division Standard Operating Procedures.

DAILY INSTRUMENT PERFORMANCE STANDARDS

The criteria for the spectra of Decafluoro-triphenylphosphine (DFTPP) and Bromofluorobenzene (BFB) were met for the twelve-hour sequences when these samples were analyzed, except for mass 51 relative to mass 198 in the tunes performed 3/28 at 9:11 pm and 3/29 5:28 am. The relative abundance of mass 51 is not a critical indicator of the mass spectrometer's function and therefore no data is qualified. The spectra generated by the mass spectrometers can be considered in control for the analysis of these samples.

CALIBRATION AND VERIFICATION

All reported compounds for Volatile and Semi-Volatile Organics had updated relative response factors (RRF) greater than or equal to 0.050 with relative standard deviations (%RSD) of less than 30% for the Initial Calibration and percent differences (%D) of less than 25% for the Continuing Calibration when compared to the average RRF.

The Initial Calibration for the NWTPH-G and NWPTH-Dx analyses were within the method limits with correlation coefficients of greater than 0.990. The continuing calibrations ranged from 0.7% to 30.0%. **The continuing calibration standards for Heavy Oil that exceeded the limits are listed in the table below:**

Analysis	Date	%Difference	Associated Samples
Heavy Oil	03/19/01 9:42 am	15.6	HB-TP07 S-1, HB-TP07 S-2, HB-TP08 S-1
Heavy Oil	03/20/01 4:08 am	30.0	HB-TP08 S-2, HB-TP09 S-1, HB-TP09 S-2, HB-TP09 S-3

The Heavy Oil values samples HB-TP07 S-1, HB-TP07 S-2, HB-TP08 S-1, HB-TP08 S-2, HB-TP09 S-1, HB-TP09 S-2, and HB-TP09 S-3 are qualified as estimated based on the high %D of the continuing calibration standards.

The ICP and FIMS calibrations met method requirements for linearity and accuracy. ICP and FIMS sensitivities were verified by analysis of standards near the detection limits of the instruments. The recoveries ranged from 78 to 121% and all were within laboratory established 50-200% limits.

Independent mid-range standards were analyzed to monitor calibration accuracy for the ICP and FIMS (ICV and CCV). Acceptable recoveries for ICP must be within 90 to 110%. Recoveries for FIMS must be within 80 to 120%. All ICVs and CCVs had recoveries within acceptable limits.

Standards are required to be run to measure the accuracy of ICP interelement correction factors. These samples ICSA and ICSAB must be run at the beginning and end of each analytical run. The ICSAB recoveries for each element must be within 80 to 120% recovery. The recoveries of the ICSAB for the analysis of these samples ranged from 90 to 104%.

METHOD AND CALIBRATION BLANKS

Method and calibration blanks were analyzed at the required frequencies for the methods. The concentrations of these blanks were less than 1/5th the amount found in the sample or the detection limit, **except for the following:**

Parameter	Blank	Concentration	MDL	Associated Samples.
Arsenic	010306040PBS	1.4 ug/L	1.0 ug/L	HB-TP07 S-2, HB-TP08 S-1
Arsenic	010409CCB2	1.5 ug/L	1.0 ug/L	HB-TP07 S-2, HB-TP08 S-1
Arsenic	010409CCB3	1.2 ug/L	1.0 ug/L	HB-TP07 S-2, HB-TP08 S-1
Copper	010308080PBS	4.7 ug/L	3.1 ug/L	HB-MW02 S-1, HB-MW02 S-3
Lead	010308080PBS	2.0 ug/L	0.8 ug/L	HB-MW02 S-1, HB-MW02 S-3
Lead	010312102PBS	4.7 ug/L	0.8 ug/L	HB-MW03 S-4, HB-B02 S-1

Samples HB-TP07 S-2 and HB-TP08 S-1 are qualified as not detected for Arsenic based on the high concentrations in the Method Blank and the two Calibration Blanks. Samples HB-MW02 S-1 and HB-MW02 S-3 are qualified as not detected for Copper and Lead based on the levels found in the associated Method Blank. Samples HB-MW03 S-4 and HB-B02 S-1 are qualified as not detected for Lead based on the level found in the Method Blank.

SURROGATE COMPOUNDS

Two Surrogate compounds were added to the NWTPH-Dx analysis, 2 Surrogate compounds were added to the NWTPH-G/BTEX, and 2 Surrogate compounds were added to the Semi-Volatile Organics analysis. The Surrogate compound recoveries ranged from 42.5 to 152%. All the recoveries were within the control limits of the methods, **except for the following:**

Analysis	Sample	Surrogate Compound	Recovery	Limits
NWTPH-Dx	HB-TP07 S-1	2-Fluorobiphenyl	44	50-150
NWTPH-Dx	HB-TP07 S-2	2-Fluorobiphenyl	30	50-150
NWTPH-Dx	HB-TP08 S-1	2-Fluorobiphenyl	34	50-150
NWTPH-Dx	HB-TP08 S-2	2-Fluorobiphenyl	42	50-150
NWTPH-Dx	HB-TP09 S-1	2-Fluorobiphenyl	33	50-150
NWTPH-Dx	UMW2A	2-Fluorobiphenyl	47	50-150
NWTPH-Dx	UMW2A	p-Terphenyl-d14	45	50-150
NWTPH-Dx	HB-MW02	2-Fluorobiphenyl	48	50-150
NWTPH-Dx	HB-MW02	p-Terphenyl-d14	44	50-150
NWTPH-Dx	HB-MW03	2-Fluorobiphenyl	40	50-150
NWTPH-Dx	HB-MW03	p-Terphenyl-d14	42	50-150
NWTPH-Dx	HB-MW02 High	2-Fluorobiphenyl	35	50-150
NWTPH-Dx	HB-MW02 High	p-Terphenyl-d14	37	50-150
NWTPH-Dx	HB-MW03 High	2-Fluorobiphenyl	44	50-150
NWTPH-Dx	HB-MW03 High	p-Terphenyl-d14	45	50-150
NWTPH-Dx	UMW2A High	2-Fluorobiphenyl	48	50-150
NWTPH-Dx	UMW2A High	p-Terphenyl-d14	46	50-150

Samples HB-TP07 S-1, HB-TP07 S-2, HB-TP08 S-1, HB-TP08 S-2, HB-TP09 S-1, UMW2A, HB-MW02, HB-MW03, HB-MW02 High, HB-MW03 High, and UMW2A High are qualified as estimated for Diesel and Heavy Oil based on the surrogate compound recoveries outside of acceptance limits.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples (LCS) monitor the analytical system by carrying a standard through every step of the analytical method including extraction or digestion. All LCS recoveries were within laboratory established control limits.

DUPLICATE SAMPLE ANALYSIS

All associated duplicate samples had differences of less than the reporting limits for analytes with concentrations less than 5 times the reporting limits and Relative Percent Differences (RPD) of less than 35% for metals analytes with concentrations greater than 5 times the reporting limits.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Matrix spike analysis was performed for the metals analysis. All recoveries were within the required CLP limits. Matrix spike and matrix spike duplicate analysis was performed for NWTPH-G, NWTPH-Dx, and Volatile and Semi-Volatile Organics with these samples. The spike recoveries were within the method recovery limits, **except for the following:**

Spiked Sample	Analyte	% Recovery	Limits	Associated Samples
HB-TP02 S-2	**Copper**	**930**	**75-125**	**HB-MW02 S-1, HB-MW02 S-3, HB-MW03 S-1, HB-MW03 S-4, HB-B02 S-1, HB-B02 S-4**

The Copper values samples HB-MW02 S-1, HB-MW02 S-3, HB-MW03 S-1, HB-MW03 S-4, HB-B02 S-1, and HB-B02 S-4 qualified as estimated for Copper based on the high spike recovery. The RPDs for all of the MS/MSD pairs were within the method limits. No data is qualified based on Matrix Spike and Matrix Spike Duplicate analysis.

ICP SERIAL DILUTIONS

Serial dilution of samples analyzed by ICP provides information about physical or chemical interferences that may exist due to sample matrix.

Associated sample HB-TP02 S-2 was analyzed at a five-fold dilution. All analytes had %D of the diluted sample compared to the undiluted sample of less than 10% for analytes greater than 50 times the IDL.

INTERNAL STANDARDS

Performance of the Internal Standards (IS) monitors GC/MS sensitivity and stability during each analysis. Internal Standards must not vary more than -50% to +100% from the continuing calibration response and be within +/- 30 seconds from the continuing calibration retention time. All internal standard responses in the samples were within the required method limits.

DATA ASSESSMENT

The qualifiers assigned to these samples include the following:

U indicates that the analysis of the parameter did not detect a positive hit above the Reporting Limit.

UJ indicates that the analysis of the parameter did not detect a positive hit above the Reporting Limit, however the value should be considered estimated.

J the value should be considered estimated.

All data including qualified values are acceptable for use.

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010307048
Sample ID: HB-TP07 S-1
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	**92.3**	per cent
CV		
Mercury	0.0903 B J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	95 U	ug/Kg
2-Methylnaphthalene	95 U	ug/Kg
Acenaphthene	95 U	ug/Kg
Acenaphthylene	95 U	ug/Kg
Anthracene	**110**	ug/Kg
Benzo(a)anthracene	**250**	ug/Kg
Benzo(a)pyrene	**220**	ug/Kg
Benzo(g,h,i)perylene	**120**	ug/Kg
Benzofluoranthenes	**270**	ug/Kg
Chrysene	**270**	ug/Kg
Dibenz(a,h)anthracene	95 U	ug/Kg
Fluoranthene	**370**	ug/Kg
Fluorene	95 U	ug/Kg
Indeno(1,2,3-cd)pyrene	95 U	ug/Kg
Naphthalene	95 U	ug/Kg

DLC 5/5/02

U indicates not detected at the associated value

B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010307048
Sample ID: HB-TP07 S-1
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result		Units
	Phenanthrene	470		ug/Kg
	Pyrene	600		ug/Kg
ICP				
	Arsenic	4.8		mg/Kg
	Cadmium	6.94		mg/Kg
	Chromium	49.0		mg/Kg
	Copper	179		mg/Kg
	Lead	130		mg/Kg
	Nickel	168	J	mg/Kg
	Zinc	133		mg/Kg
NWTPH-Dx				
	Diesel	19 U	J	mg/Kg
	Heavy Oil	85	J	mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010307050
Sample ID: HB-TP08 S-1
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	93.5	per cent
CV		
Mercury	0.0066 B J DLC 7/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	100 U	ug/Kg
2-Methylnaphthalene	100 U	ug/Kg
Acenaphthene	100 U	ug/Kg
Acenaphthylene	100 U	ug/Kg
Anthracene	100 U	ug/Kg
Benzo(a)anthracene	100 U	ug/Kg
Benzo(a)pyrene	100 U	ug/Kg
Benzo(g,h,i)perylene	100 U	ug/Kg
Benzofluoranthenes	100 U	ug/Kg
Chrysene	100 U	ug/Kg
Dibenz(a,h)anthracene	100 U	ug/Kg
Fluoranthene	100 U	ug/Kg
Fluorene	100 U	ug/Kg
Indeno(1,2,3-cd)pyrene	100 U	ug/Kg
Naphthalene	100 U	ug/Kg

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UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010307050
Sample ID: HB-TP08 S-1
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result	Units
	Phenanthrene	100 U	ug/Kg
	Pyrene	100 U	ug/Kg
ICP			
	Arsenic	**2.3** U	mg/Kg
	Cadmium	0.25 U	mg/Kg
	Chromium	**7.82**	mg/Kg
	Copper	**6.1**	mg/Kg
	Lead	**3.07**	mg/Kg
	Nickel	**6.2** J	mg/Kg
	Zinc	**14.0**	mg/Kg
NWTPH-Dx			
	Diesel	20 U J	mg/Kg
	Heavy Oil	40 U J	mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010307051
Sample ID: HB-TP08 S-2
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	75.9	per cent
CV		
Mercury	0.0057 B J DLC 2/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	93 U	ug/Kg
2-Methylnaphthalene	93 U	ug/Kg
Acenaphthene	93 U	ug/Kg
Acenaphthylene	93 U	ug/Kg
Anthracene	93 U	ug/Kg
Benzo(a)anthracene	93 U	ug/Kg
Benzo(a)pyrene	93 U	ug/Kg
Benzo(g,h,i)perylene	93 U	ug/Kg
Benzofluoranthenes	93 U	ug/Kg
Chrysene	93 U	ug/Kg
Dibenz(a,h)anthracene	93 U	ug/Kg
Fluoranthene	93 U	ug/Kg
Fluorene	93 U	ug/Kg
Indeno(1,2,3-cd)pyrene	93 U	ug/Kg
Naphthalene	93 U	ug/Kg

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Lab#: 010307051
Sample ID: HB-TP08 S-2
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result	Units
	Phenanthrene	93 U	ug/Kg
	Pyrene	93 U	ug/Kg
ICP			
	Arsenic	**2.3**	mg/Kg
	Cadmium	0.23 U	mg/Kg
	Chromium	**7.01**	mg/Kg
	Copper	**5.6**	mg/Kg
	Lead	**1.86**	mg/Kg
	Nickel	**5.7** J	mg/Kg
	Zinc	**12.4**	mg/Kg
NWTPH-Dx			
	Diesel	19 U J	mg/Kg
	Heavy Oil	37 U J	mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010307052
Sample ID: HB-TP09 S-1
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	**94.2**	per cent
CV		
Mercury	**0.751**	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	94 U	ug/Kg
2-Methylnaphthalene	94 U	ug/Kg
Acenaphthene	94 U	ug/Kg
Acenaphthylene	94 U	ug/Kg
Anthracene	94 U	ug/Kg
Benzo(a)anthracene	**150**	ug/Kg
Benzo(a)pyrene	**160**	ug/Kg
Benzo(g,h,i)perylene	**160**	ug/Kg
Benzofluoranthenes	**230**	ug/Kg
Chrysene	**150**	ug/Kg
Dibenz(a,h)anthracene	94 U	ug/Kg
Fluoranthene	**270**	ug/Kg
Fluorene	94 U	ug/Kg
Indeno(1,2,3-cd)pyrene	**120**	ug/Kg
Naphthalene	94 U	ug/Kg

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Lab#: 010307052
Sample ID: HB-TP09 S-1
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result		Units
	Phenanthrene	**160**		ug/Kg
	Pyrene	**390**		ug/Kg
ICP				
	Arsenic	**4.4**		mg/Kg
	Cadmium	0.51 B J DL 2/5/02		mg/Kg
	Chromium	**23.0**		mg/Kg
	Copper	**61.6**		mg/Kg
	Lead	**39.4**		mg/Kg
	Nickel	**27.0**	J	mg/Kg
	Zinc	**51.6**		mg/Kg
NWTPH-Dx				
	Diesel	19 U J		mg/Kg
	Heavy Oil	37 U J		mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010307053
Sample ID: HB-TP09 S-2
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	**92.6**	per cent
CV		
Mercury	**0.592**	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	96 U	ug/Kg
2-Methylnaphthalene	**1200**	ug/Kg
Acenaphthene	**4000**	ug/Kg
Acenaphthylene	96 U	ug/Kg
Anthracene	**4800**	ug/Kg
Benzo(a)anthracene	**6500**	ug/Kg
Benzo(a)pyrene	**4900**	ug/Kg
Benzo(g,h,i)perylene	**2900**	ug/Kg
Benzofluoranthenes	**11000**	ug/Kg
Chrysene	**7600**	ug/Kg
Dibenz(a,h)anthracene	**690**	ug/Kg
Fluoranthene	**15000**	ug/Kg
Fluorene	**2600**	ug/Kg
Indeno(1,2,3-cd)pyrene	**2400**	ug/Kg
Naphthalene	**640**	ug/Kg

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Lab#: 010307053
Sample ID: HB-TP09 S-2
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result		Units
	Phenanthrene	**21000**		ug/Kg
	Pyrene	**19000**		ug/Kg
ICP				
	Arsenic	**7.5**		mg/Kg
	Cadmium	0.95 ~~B~~ J		mg/Kg
	Chromium	**24.9** DUC 2/5/02		mg/Kg
	Copper	**75.9**		mg/Kg
	Lead	**166**		mg/Kg
	Nickel	**26.4**	J	mg/Kg
	Zinc	**91.7**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	**59**	J	mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010307054
Sample ID: HB-TP09 S-3
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	89.7	per cent
CV		
Mercury	1.33	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	91 U	ug/Kg
2-Methylnaphthalene	96	ug/Kg
Acenaphthene	1000	ug/Kg
Acenaphthylene	91 U	ug/Kg
Anthracene	1600	ug/Kg
Benzo(a)anthracene	3400	ug/Kg
Benzo(a)pyrene	4600	ug/Kg
Benzo(g,h,i)perylene	2300	ug/Kg
Benzofluoranthenes	6100	ug/Kg
Chrysene	4100	ug/Kg
Dibenz(a,h)anthracene	470	ug/Kg
Fluoranthene	6800	ug/Kg
Fluorene	580	ug/Kg
Indeno(1,2,3-cd)pyrene	1800	ug/Kg
Naphthalene	91 U	ug/Kg

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010307054
Sample ID: HB-TP09 S-3
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result		Units
	Phenanthrene	**6100**		ug/Kg
	Pyrene	**9600**		ug/Kg
ICP				
	Arsenic	**3.7**		mg/Kg
	Cadmium	0.46	U	mg/Kg
	Chromium	**20.7**		mg/Kg
	Copper	**41.6**		mg/Kg
	Lead	**62.6**		mg/Kg
	Nickel	**24.4**	J	mg/Kg
	Zinc	**77.7**		mg/Kg
NWTPH-Dx				
	Diesel	18	U	mg/Kg
	Heavy Oil	**63**	J	mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010312100
Sample ID: HB-MW02 S-1
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	93.8	per cent
CV		
Mercury	0.0071 U	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	96 U	ug/Kg
2-Methylnaphthalene	96 U	ug/Kg
Acenaphthene	96 U	ug/Kg
Acenaphthylene	96 U	ug/Kg
Anthracene	96 U	ug/Kg
Benzo(a)anthracene	96 U	ug/Kg
Benzo(a)pyrene	96 U	ug/Kg
Benzo(g,h,i)perylene	96 U	ug/Kg
Benzofluoranthenes	96 U	ug/Kg
Chrysene	96 U	ug/Kg
Dibenz(a,h)anthracene	96 U	ug/Kg
Fluoranthene	96 U	ug/Kg
Fluorene	96 U	ug/Kg
Indeno(1,2,3-cd)pyrene	96 U	ug/Kg
Naphthalene	96 U	ug/Kg

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B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010312100
Sample ID: HB-MW02 S-1
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	96 U		ug/Kg
	Pyrene	96 U		ug/Kg
ICP				
	Arsenic	**2.33**		mg/Kg
	Cadmium	0.24 U		mg/Kg
	Chromium	**6.99**		mg/Kg
	Copper	**7.1**	UJ	mg/Kg
	Lead	**2.7**	U	mg/Kg
	Nickel	**6.17**		mg/Kg
	Zinc	**14.4**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	38 U		mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010312101
Sample ID: HB-MW02 S-3
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	83.3	per cent
CV		
Mercury	0.0069 B J DLL 4/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	98 U	ug/Kg
2-Methylnaphthalene	98 U	ug/Kg
Acenaphthene	98 U	ug/Kg
Acenaphthylene	98 U	ug/Kg
Anthracene	98 U	ug/Kg
Benzo(a)anthracene	98 U	ug/Kg
Benzo(a)pyrene	98 U	ug/Kg
Benzo(g,h,i)perylene	98 U	ug/Kg
Benzofluoranthenes	98 U	ug/Kg
Chrysene	98 U	ug/Kg
Dibenz(a,h)anthracene	98 U	ug/Kg
Fluoranthene	98 U	ug/Kg
Fluorene	98 U	ug/Kg
Indeno(1,2,3-cd)pyrene	98 U	ug/Kg
Naphthalene	98 U	ug/Kg

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B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010312101
Sample ID: HB-MW02 S-3
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result	Units
	Phenanthrene	98 U	ug/Kg
	Pyrene	98 U	ug/Kg
ICP			
	Arsenic	**2.04**	mg/Kg
	Cadmium	0.25 U	mg/Kg
	Chromium	**5.87**	mg/Kg
	Copper	**6.5** UJ	mg/Kg
	Lead	**2.1** U	mg/Kg
	Nickel	**7.86**	mg/Kg
	Zinc	**31.0**	mg/Kg
NWTPH-Dx			
	Diesel	20 U	mg/Kg
	Heavy Oil	39 U	mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010312102
Sample ID: HB-MW03 S-1
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	**92.7**	per cent
CV		
Mercury	**0.110**	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	97 U	ug/Kg
2-Methylnaphthalene	97 U	ug/Kg
Acenaphthene	97 U	ug/Kg
Acenaphthylene	97 U	ug/Kg
Anthracene	97 U	ug/Kg
Benzo(a)anthracene	**210**	ug/Kg
Benzo(a)pyrene	**220**	ug/Kg
Benzo(g,h,i)perylene	97 U	ug/Kg
Benzofluoranthenes	**340**	ug/Kg
Chrysene	**230**	ug/Kg
Dibenz(a,h)anthracene	97 U	ug/Kg
Fluoranthene	**420**	ug/Kg
Fluorene	97 U	ug/Kg
Indeno(1,2,3-cd)pyrene	97 U	ug/Kg
Naphthalene	97 U	ug/Kg

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Lab#: 010312102
Sample ID: HB-MW03 S-1
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	**320**		ug/Kg
	Pyrene	**530**		ug/Kg
ICP				
	Arsenic	**4.02**		mg/Kg
	Cadmium	0.55 B J DLL 2/5/02		mg/Kg
	Chromium	**14.4**		mg/Kg
	Copper	**22.0**	J	mg/Kg
	Lead	**33.3**		mg/Kg
	Nickel	**15.4**		mg/Kg
	Zinc	**156**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	**300**		mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010312103
Sample ID: HB-MW03 S-4
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	78.7	per cent
CV		
Mercury	0.0078 B J	mg/Kg
GC/MS-BNA	DLC 2/5/02	
2-Chloronaphthalene	96 U	ug/Kg
2-Methylnaphthalene	96 U	ug/Kg
Acenaphthene	96 U	ug/Kg
Acenaphthylene	96 U	ug/Kg
Anthracene	96 U	ug/Kg
Benzo(a)anthracene	96 U	ug/Kg
Benzo(a)pyrene	96 U	ug/Kg
Benzo(g,h,i)perylene	96 U	ug/Kg
Benzofluoranthenes	96 U	ug/Kg
Chrysene	96 U	ug/Kg
Dibenz(a,h)anthracene	96 U	ug/Kg
Fluoranthene	96 U	ug/Kg
Fluorene	96 U	ug/Kg
Indeno(1,2,3-cd)pyrene	96 U	ug/Kg
Naphthalene	96 U	ug/Kg

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Lab#: 010312103
Sample ID: HB-MW03 S-4
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	96 U		ug/Kg
	Pyrene	96 U		ug/Kg
ICP				
	Arsenic	**3.23**		mg/Kg
	Cadmium	0.26 U		mg/Kg
	Chromium	**6.62**		mg/Kg
	Copper	**7.98**	J	mg/Kg
	Lead	**5.2**	U	mg/Kg
	Nickel	**6.54**		mg/Kg
	Zinc	**26.0**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	38 U		mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010312106
Sample ID: HB-B02 S-1
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	**92.5**	per cent
CV		
Mercury	0.0201 BJ DLL 2/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	96 U	ug/Kg
2-Methylnaphthalene	96 U	ug/Kg
Acenaphthene	96 U	ug/Kg
Acenaphthylene	96 U	ug/Kg
Anthracene	**130**	ug/Kg
Benzo(a)anthracene	**200**	ug/Kg
Benzo(a)pyrene	**180**	ug/Kg
Benzo(g,h,i)perylene	**120**	ug/Kg
Benzofluoranthenes	**240**	ug/Kg
Chrysene	**220**	ug/Kg
Dibenz(a,h)anthracene	96 U	ug/Kg
Fluoranthene	**410**	ug/Kg
Fluorene	96 U	ug/Kg
Indeno(1,2,3-cd)pyrene	96 U	ug/Kg
Naphthalene	96 U	ug/Kg

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Lab#: 010312106
Sample ID: HB-B02 S-1
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	**420**		ug/Kg
	Pyrene	**510**		ug/Kg
ICP				
	Arsenic	**2.29**		mg/Kg
	Cadmium	0.37 B J DLC 2/6/02		mg/Kg
	Chromium	**16.3**		mg/Kg
	Copper	**18.9**	J	mg/Kg
	Lead	**8.9**	U	mg/Kg
	Nickel	**24.7**		mg/Kg
	Zinc	**30.6**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	**93**		mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010312107
Sample ID: HB-B02 S-4
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	**80.2**	per cent
CV		
Mercury	0.0516 BJ DVC 2/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	97 U	ug/Kg
2-Methylnaphthalene	97 U	ug/Kg
Acenaphthene	97 U	ug/Kg
Acenaphthylene	97 U	ug/Kg
Anthracene	**110**	ug/Kg
Benzo(a)anthracene	**270**	ug/Kg
Benzo(a)pyrene	**290**	ug/Kg
Benzo(g,h,i)perylene	**180**	ug/Kg
Benzofluoranthenes	**360**	ug/Kg
Chrysene	**290**	ug/Kg
Dibenz(a,h)anthracene	97 U	ug/Kg
Fluoranthene	**490**	ug/Kg
Fluorene	97 U	ug/Kg
Indeno(1,2,3-cd)pyrene	**120**	ug/Kg
Naphthalene	97 U	ug/Kg

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Lab#: 010312107
Sample ID: HB-B02 S-4
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	**400**		ug/Kg
	Pyrene	**640**		ug/Kg
ICP				
	Arsenic	**1.76**		mg/Kg
	Cadmium	0.25 U		mg/Kg
	Chromium	**6.67**		mg/Kg
	Copper	**14.5**	J	mg/Kg
	Lead	**29.6**		mg/Kg
	Nickel	**7.54**		mg/Kg
	Zinc	**42.2**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	**100**		mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010307048
Sample ID: HB-TP07 S-1
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	**92.3**	per cent
CV		
Mercury	0.0903 ~~B~~ J DLL 2/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	95 U	ug/Kg
2-Methylnaphthalene	95 U	ug/Kg
Acenaphthene	95 U	ug/Kg
Acenaphthylene	95 U	ug/Kg
Anthracene	**110**	ug/Kg
Benzo(a)anthracene	**250**	ug/Kg
Benzo(a)pyrene	**220**	ug/Kg
Benzo(g,h,i)perylene	**120**	ug/Kg
Benzofluoranthenes	**270**	ug/Kg
Chrysene	**270**	ug/Kg
Dibenz(a,h)anthracene	95 U	ug/Kg
Fluoranthene	**370**	ug/Kg
Fluorene	95 U	ug/Kg
Indeno(1,2,3-cd)pyrene	95 U	ug/Kg
Naphthalene	95 U	ug/Kg

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Lab#: 010307048
Sample ID: HB-TP07 S-1
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result		Units
	Phenanthrene	470		ug/Kg
	Pyrene	600		ug/Kg
ICP				
	Arsenic	4.8		mg/Kg
	Cadmium	6.94		mg/Kg
	Chromium	49.0		mg/Kg
	Copper	179		mg/Kg
	Lead	130		mg/Kg
	Nickel	168	J	mg/Kg
	Zinc	133		mg/Kg
NWTPH-Dx				
	Diesel	19 U	J	mg/Kg
	Heavy Oil	85	J	mg/Kg

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 04, 2001

Lab#: 010320168
Sample ID: UMW2A
Sample Type: Groundwater
Sample Date: 3/20/01

Test	Result	Units
CONVENTIONAL		
TSS	**16.8**	mg/L
CV-DISS		
Mercury, dissolved	0.050 U	ug/L
GC/MS-PNA		
2-Chloronaphthalene	1.0 U	ug/L
2-Methylnaphthalene	1.0 U	ug/L
Acenaphthene	1.0 U	ug/L
Acenaphthylene	1.0 U	ug/L
Anthracene	1.0 U	ug/L
Benzo(a)anthracene	1.0 U	ug/L
Benzo(a)pyrene	1.0 U	ug/L
Benzo(g,h,i)perylene	1.0 U	ug/L
Benzofluoranthenes	1.0 U	ug/L
Chrysene	1.0 U	ug/L
Dibenz(a,h)anthracene	1.0 U	ug/L
Fluoranthene	1.0 U	ug/L
Fluorene	1.0 U	ug/L
Indeno(1,2,3-cd)pyrene	1.0 U	ug/L
Naphthalene	1.0 U	ug/L

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Lab#: 010320168
Sample ID: UMW2A
Sample Type: Groundwater
Sample Date: 3/20/01

	Test	Result	Units
	Phenanthrene	1.0 U	ug/L
	Pyrene	1.0 U	ug/L
ICP-DISS			
	Antimony, dissolved	0.24 B J	ug/L
	Arsenic, dissolved	**26**	ug/L
	Cadmium, dissolved	0.083 U	ug/L
	Chromium, dissolved	**6.5**	ug/L
	Copper, dissolved	**5.1**	ug/L
	Lead, dissolved	0.039 B J	ug/L
	Nickel, dissolved	**11**	ug/L
	Zinc, dissolved	4.9 B J	ug/L
NWTPH-Dx		DUC 2/5/02	
	Diesel	0.25 U J	mg/L
	Heavy Oil	0.50 U J	mg/L

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010320170
Sample ID: HB-MW02
Sample Type: Groundwater
Sample Date: 3/20/01

Test	Result	Units
CONVENTIONAL		
TSS	7.8	mg/L
CV-DISS		
Mercury, dissolved	0.050 U	ug/L
GC/MS-PNA		
2-Chloronaphthalene	1.0 U	ug/L
2-Methylnaphthalene	1.0 U	ug/L
Acenaphthene	1.0 U	ug/L
Acenaphthylene	1.0 U	ug/L
Anthracene	1.0 U	ug/L
Benzo(a)anthracene	1.0 U	ug/L
Benzo(a)pyrene	1.0 U	ug/L
Benzo(g,h,i)perylene	1.0 U	ug/L
Benzofluoranthenes	1.0 U	ug/L
Chrysene	1.0 U	ug/L
Dibenz(a,h)anthracene	1.0 U	ug/L
Fluoranthene	1.0 U	ug/L
Fluorene	1.0 U	ug/L
Indeno(1,2,3-cd)pyrene	1.0 U	ug/L
Naphthalene	1.0 U	ug/L

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Lab#: 010320170
Sample ID: HB-MW02
Sample Type: Groundwater
Sample Date: 3/20/01

	Test	Result	Units
	Phenanthrene	1.0 U	ug/L
	Pyrene	1.0 U	ug/L
ICP-DISS			
	Antimony, dissolved	1.9 ~~B~~ J DLL 7/5/02	ug/L
	Arsenic, dissolved	**26**	ug/L
	Cadmium, dissolved	0.083 U	ug/L
	Chromium, dissolved	**5.5**	ug/L
	Copper, dissolved	**9.1**	ug/L
	Lead, dissolved	0.023 U	ug/L
	Nickel, dissolved	**47**	ug/L
	Zinc, dissolved	**7.7**	ug/L
NWTPH-Dx			
	Diesel	0.25 U J	mg/L
	Heavy Oil	0.50 U J	mg/L

Reviewed By: Lori A Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 04, 2001

Lab#: 010320171
Sample ID: HB-MW03
Sample Type: Groundwater
Sample Date: 3/20/01

Test	Result	Units
CONVENTIONAL		
TSS	2.6	mg/L
CV-DISS		
Mercury, dissolved	0.050 U	ug/L
GC/MS-PNA		
2-Chloronaphthalene	1.0 U	ug/L
2-Methylnaphthalene	1.0 U	ug/L
Acenaphthene	1.0 U	ug/L
Acenaphthylene	1.0 U	ug/L
Anthracene	1.0 U	ug/L
Benzo(a)anthracene	1.0 U	ug/L
Benzo(a)pyrene	1.0 U	ug/L
Benzo(g,h,i)perylene	1.0 U	ug/L
Benzofluoranthenes	1.0 U	ug/L
Chrysene	1.0 U	ug/L
Dibenz(a,h)anthracene	1.0 U	ug/L
Fluoranthene	1.0 U	ug/L
Fluorene	1.0 U	ug/L
Indeno(1,2,3-cd)pyrene	1.0 U	ug/L
Naphthalene	1.0 U	ug/L

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Sample Custody Record

Samples Shipped to: COT Lab

HART CROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB 4676-72 LAB NUMBER

PROJECT NAME Thea Foss - Hiram Bull

HART CROWSER CONTACT Joe Morrice

SAMPLED BY: JNM

REQUESTED ANALYSIS

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	Diss Metals	TPH-Dx	PAHs	TSS	TPH-G/BTEX	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	UMW2A	High	3/2		water	X	X	X	X		3	WO# AJ212M
	HBMW02	High				X	X	X	X		3	
	HBMW03	High				X	X	X	X	X	6	
	HBMW01	High				X	X	X	X	X	6	WO# AJ212N
	HBMWA					X	X	X	X	X	6	
												High Salinity Samples
												3/2/01

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	3/2/01	Rick Fuller SIGNATURE	3-2-01
PRINT NAME Joe Morrice	TIME	Rick Fuller PRINT NAME	TIME
COMPANY Hart Crowser	1625	GT of Tacoma COMPANY	1625
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

Field filtered.

Ss, As, Cd, Cu, Pb, Hg, Ni, Zn

29 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION

CUSTODY SEALS: ☐YES ☐NO ☐N/A

GOOD CONDITION ☐YES ☐NO

TEMPERATURE

SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. _____ for Other Contract Requirements

TURNAROUND TIME:

☐ 24 HOURS ☐ 1 WEEK

☐ 48 HOURS ☐ STANDARD

☐ 72 HOURS OTHER _____

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

Sample Custody Record

Samples Shipped to: COT Lab

HARTCROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB 4676-72 LAB NUMBER

PROJECT NAME Thea Foss Uplands - Hess Boll

HART CROWSER CONTACT Joe Morrice

SAMPLED BY: JNM

REQUESTED ANALYSIS

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	D.T.S. Metals	PAHs	TPH-Dx	TSS	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	←	HB-501	3/27/01	1300	Water	X	X	X	X	3	Metals Sample is Saline (.23 ppt) WO# AJ212M

3/27/01

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	3/27/01	Cherish Ward	3/27/01
PRINT NAME Joe Morrice	TIME	Cherish Ward	TIME
COMPANY Hart Crowser	1425	City of Tacoma	14:25

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINT NAME	TIME	PRINT NAME	TIME
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

Metals: Sb, As, Cd, Cr, Cu, Pb, Hg, Ni, Zn

3 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER

W I Yello s to L Pin ject M Retur Copy Hart Crow Gold to Sample Custodian

Sample Custody Record

Samples Shipped to: Kramer City Lab

HART CROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB Ikea Foss #4674 LAB NUMBER

PROJECT NAME

HART CROWSER CONTACT TDC - Tyson Carlson

SAMPLED BY: TDC

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	TPH-D (Silica Gel)	PAH	METALS	TPH 8270	TPH-G	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	HB-MW01	S-4	03/07/01		Soil					X	2	AJ212N, Dev Site 9
	HB-MW01	S-6									2	
	HB-MW02	S-1	03/08/01								2	AJ212M, Dev Site 8
	HB-MW02	S-3									2	
	HB MW03	S-1									1	
	HB MW03	S-4									2	
	HBB01	S-1									2	AJ212N, Dev. Site 9
	HBB01	S-4									2	
	HBB02	S-1									2	AJ212M, Dev. Site 8
	HBB02	S-4									2	
	P1-TP01	S-1	03/07/01								2	AJ212R Dev Site 12
	P1-TP01	S-3									2	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	03/09/01	SIGNATURE Stephanie Seivert	03/09/01
PRINT NAME JK	TIME 1700	PRINT NAME Stephanie Seivert	TIME 17:00
COMPANY		COMPANY	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

Sample Custody Record

Samples Shipped to: COT Lab

HARTCROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB 4676-71 LAB NUMBER

PROJECT NAME Thea Foss - Hiram Bull

HART CROWSER CONTACT Joe Morrice

SAMPLED BY: SNM

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	REQUESTED ANALYSIS: D-35 Metals	TPH-D	PAHs	TPH-G/VOA	TSS	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	UMW2A		3/20	755	W	X	X	X		X	6	
	HD-MW04			850					X	X	6	
	HD-MW03			940					X	X	6	
	HD-MW02			1030						X	6	

added 3.21.01 @

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	3/24/01	Bill Essmeier SIGNATURE	3/20/2001
Joe Morrice PRINT NAME	TIME		TIME
Hart Crowser COMPANY	225	COT COMPANY	2:30PM
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

24 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION: ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

City of Tacoma
Environmental Services
Science and Engineering
Division

Memorandum

TO: Mark D'Andrea, P. E., Project Coordinator, Public Works Engineering

FROM: Christopher L. Getchell, Source Control Supervisor

SUBJECT: Foss Uplands – Hick's Bull WO# AJ212N TEC

DATE: April 24, 2001

Attached are the sample analysis results for the soil and water samples collected by Hart Crowser, March 7, 8, 9, 20, and 21, 2001. The samples were collected in association with the Foss Uplands Investigation.

The Science and Engineering Division analyzed the samples for TSS, NWTPH-G, NWPTH-Dx, Volatile Organics, and Semi-Volatile Organics. Sound Analytical Services performed the ICP-MS analysis for Dissolved Metals. A detailed Quality Control Data Review report was prepared for these samples and is included with the sample reports.

The Heavy Oil values samples HB-TP03 S-1, HB-TP03 S-2, HB-TP04 S-1, and HB-TP04 S-2 are qualified as estimated based on high %D of the continuing calibration standards.

The Cadmium value in sample HB-MW01 S-4 is qualified as not detected based on the high concentration in the Method Blank.

Samples HB-TP03 S-2, HB-TP04 S-2, and HB-MW01 High are qualified as estimated for Diesel and Heavy Oil based on the surrogate compound recoveries outside of acceptance limits.

The Copper values samples HB-TP01 S-3, HB-TP02 S-1, HB-TP02 S-2, HB-MW01 S-4, HB-MW01 S-6, HB-B01 S-1, and HB-B01 S-4 qualified as estimated for Copper based on the high spike recovery.

The values for Benzo(b,k)fluoranthenes, Benzo(a)Pyrene, Indeno(1,2,3-c,d)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene associated with the low recovery of Perylene-d12 are qualified as estimated in samples HB-TP04 S-1 and HB-TP01 S-1. The Benzo(a)Anthracene and Chrysene values for sample HB-TP01 S-1 are qualified as estimated based on the low recovery of Chrysene-d12. The Pyrene value in HB-TP01 S-1 was quantitated from the Internal Standard Phenanthrene-d10 and is qualified with P.

If you have any questions concerning these results, call me at (253) 502-2130. Please note, the samples associated with this report will be discarded six months from the date of this report unless requested otherwise.

Christopher L. Getchell
Source Control Supervisor,
Science and Engineering Division.

CLG:LAZ

D:\Sharedwd\2001\HBull9.doc

Thea Foss Uplands
Hick's Bull
Development Site 9 (AJ212N TEC)

Sample ID	Laboratory ID	Matrix
HB-TP03 S-1	010307044	Soil
HB-TP03 S-2	010307045	Soil
HB-TP04 S-1	010307046	Soil
HB-TP04 S-2	010307047	Soil
HB-TP01 S-1	010308072	Soil
HB-TP01 S-2	010308073	Soil
HB-TP01 S-3	010308074	Soil
HB-TP02 S-1	010308075	Soil
HB-TP02 S-2	010308076	Soil
HB-MW01 S-4	010312098	Soil
HB-MW01 S-6	010312099	Soil
HB-B01 S-1	010312104	Soil
HB-B01 S-4	010312105	Soil
HB-MW01	010320169	Groundwater
HB-MWA	010321199	Groundwater
HB-MW01 High	010321200	Groundwater

Quality Control Data Review

TO: Christopher L. Getchell, Source Control Supervisor

FROM: Lori A. Zboralski, Senior Laboratory Analyst

DATE: May 11, 2001

SAMPLES

This report concerns the following samples associated with the **Foss Uplands WO# AJ212M:**

Sample Description	Lab #	Sample Matrix	Date Sampled
HB-TP03 S-1	010307044	Soil	03/07/01
HB-TP03 S-2	010307045	Soil	03/07/01
HB-TP04 S-1	010307046	Soil	03/07/01
HB-TP04 S-2	010307047	Soil	03/07/01
HB-TP01 S-1	010308072	Soil	03/08/01
HB-TP01 S-2	010308073	Soil	03/08/01
HB-TP01 S-3	010308074	Soil	03/08/01
HB-TP02 S-1	010308075	Soil	03/08/01
HB-TP02 S-2	010308076	Soil	03/08/01
HB-MW01 S-4	010312098	Soil	03/09/01
HB-MW01 S-6	010312099	Soil	03/09/01
HB-B01 S-1	010312104	Soil	03/08/01
HB-B01 S-4	010312105	Soil	03/08/01
HB-MW01	010320169	Groundwater	03/20/01
HB-MWA	010321199	Groundwater	03/21/01
HB-MW01 High	010321200	Groundwater	03/21/01

HOLDING TIMES

The water samples were extracted within the 7-day holding time for Semi-Volatile Organics and NWTPH-Dx and analyzed within 7 days for TSS, 14 days for Volatile Organics, 28 days for Dissolved Mercury, 40 days for Semi-Volatile Organics and NWTPH-Dx, and 180 days for Dissolved Metals.

The soil samples were extracted within the 14-day holding time for Semi-Volatile Organics and NWTPH-Dx and analyzed within 7 days for Solids, 14 days for Volatile Organics, 28 days for Mercury, 40 days for Semi-Volatile Organics and NWTPH-Dx, and 180 days for Total Metals.

METHODS

The samples were analyzed according to NWTPH-G, NWTPH-Dx, CLP ILM04.0 for Metals, CLP OLM01.8 for Volatile and Semi-Volatile Organics and Science and Engineering Division Standard Operating Procedures.

DAILY INSTRUMENT PERFORMANCE STANDARDS

The criteria for the spectra of Decafluoro-triphenylphosphine (DFTPP) and Bromofluorobenzene (BFB) were met for the twelve-hour sequences when these samples were analyzed. The spectra generated by the mass spectrometers can be considered in control for the analysis of these samples.

CALIBRATION AND VERIFICATION

All reported compounds for Volatile and Semi-Volatile Organics had updated relative response factors (RRF) greater than or equal to 0.050 with relative standard deviations (%RSD) of less than 30% for the Initial Calibration and percent differences (%D) of less than 25% for the Continuing Calibration when compared to the average RRF.

The Initial Calibration for the NWTPH-G and NWPTH-Dx analyses were within the method limits with correlation coefficients of greater than 0.990. The continuing calibrations ranged from 1.5% to 30.0%. **The continuing calibration standards for Heavy Oil that exceeded the limits are listed in the table below:**

Analysis	Date	%Difference	Associated Samples
Heavy Oil	03/19/01 9:42 am	15.6	HB-TP03 S-1, HB-TP03 S-2, HB-TP04 S-1, HB-TP04 S-2
Heavy Oil	03/20/01 4:08 am	30.0	HB-TP03 S-1, HB-TP03 S-2, HB-TP04 S-1, HB-TP04 S-2

The Heavy Oil values samples HB-TP03 S-1, HB-TP03 S-2, HB-TP04 S-1, and HB-TP04 S-2 are qualified as estimated based on the high %D of the continuing calibration standards.

The ICP and FIMS calibrations met method requirements for linearity and accuracy. ICP and FIMS sensitivities were verified by analysis of standards near the detection limits of the instruments. The recoveries ranged from 78 to 121% and all were within laboratory established 50-200% limits.

Independent mid-range standards were analyzed to monitor calibration accuracy for the ICP and FIMS (ICV and CCV). Acceptable recoveries for ICP must be within 90 to 110%. Recoveries for FIMS must be within 80 to 120%. All ICVs and CCVs had recoveries within acceptable limits.

Standards are required to be run to measure the accuracy of ICP interelement correction factors. These samples ICSA and ICSAB must be run at the beginning and end of each analytical run. The ICSAB recoveries for each element must be within 80 to 120% recovery. The recoveries of the ICSAB for the analysis of these samples ranged from 90 to 104%.

METHOD AND CALIBRATION BLANKS

Method and calibration blanks were analyzed at the required frequencies for the methods. The concentrations of these blanks were less than 1/5th the amount found in the sample or the detection limit, **except for the following:**

Parameter	Blank	Concentration	MDL	Associated Samples.
Cadmium	010308080PBS	0.6 ug/L	0.52 ug/L	HB-MW01 S-4

The Cadmium value in sample HB-MW01 S-4 is qualified as not detected based on the high concentration in the Method Blank.

SURROGATE COMPOUNDS

Two Surrogate compounds were added to the NWTPH-Dx analysis, 2 Surrogate compounds were added to the NWTPH-G/BTEX, and 2 Surrogate compounds were added to the Semi-Volatile Organics analysis. The Surrogate compound recoveries ranged from 49 to 161%. All the recoveries were within the control limits of the methods, **except for the following:**

Analysis	Sample	Surrogate Compound	Recovery	Limits
Semi-VOA	**HB-TP01 S-1**	**Terphenyl-d14**	**161**	**18-137**
NWTPH-Dx	**HB-TP03 S-2**	**2-Fluorobiphenyl**	**34**	**50-150**
NWTPH-Dx	**HB-TP04 S-2**	**2-Fluorobiphenyl**	**42**	**50-150**
NWTPH-Dx	**HB-MW01 High**	**2-Fluorobiphenyl**	**48**	**50-150**

The Semi-VOA compounds in sample HB-TP01 S-1 are not qualified based on one surrogate compound outside of limits.

Samples HB-TP03 S-2, HB-TP04 S-2, and HB-MW01 High are qualified as estimated for Diesel and Heavy Oil based on the surrogate compound recoveries outside of acceptance limits.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples (LCS) monitor the analytical system by carrying a standard through every step of the analytical method including extraction or digestion. All LCS recoveries were within laboratory established control limits.

DUPLICATE SAMPLE ANALYSIS

All associated duplicate samples had differences of less than the reporting limits for analytes with concentrations less than 5 times the reporting limits and Relative Percent Differences (RPD) of less than 35% for metals analytes with concentrations greater than 5 times the reporting limits.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Matrix spike analysis was performed for the metals analysis. All recoveries were within the required CLP limits. Matrix spike and matrix spike duplicate analysis was performed for NWTPH-G, NWTPH-Dx, and Volatile and Semi-Volatile Organics with these samples. The spike recoveries were within the method recovery limits, **except for the following:**

Spiked Sample	Analyte	% Recovery	Limits	Associated Samples
HB-TP02 S-2	**Copper**	**930**	**75-125**	**HB-TP01 S-3, HB-TP02 S-1, HB-TP02 S-2, HB-MW01 S-4, HB-MW01 S-6, HB-B01 S-1, HB-B01 S-4**
HB-TP02 S-1	**Pyrene**	**151**	**35-142**	**HB-TP02 S-1, HB-TP02 S-2, HB-MW01 S-4, HB-MW01 S-6, HB-B01 S-1**

The Copper values samples HB-TP01 S-3, HB-TP02 S-1, HB-TP02 S-2, HB-MW01 S-4, HB-MW01 S-6, HB-B01 S-1, and HB-B01 S-4 qualified as estimated for Copper based on the high spike recovery.

Matrix Spike recovery for Pyrene is an indicator of matrix interferences in that sample and do not necessarily reflect the matrices of other samples in the batch. No data is qualified based on the high Pyrene recovery in sample HB-TP02 S-1.

The RPDs for all of the MS/MSD pairs were within the method limits. No data is qualified based on Matrix Spike Duplicate analysis.

ICP SERIAL DILUTIONS

Serial dilution of samples analyzed by ICP provides information about physical or chemical interferences that may exist due to sample matrix.

Associated sample HB-TP02 S-2 was analyzed at a five-fold dilution. All analytes had %D of the diluted sample compared to the undiluted sample of less than 10% for analytes greater than 50 times the IDL.

INTERNAL STANDARDS

Performance of the Internal Standards (IS) monitors GC/MS sensitivity and stability during each analysis. Internal Standards must not vary more than -50% to +100% from the continuing calibration response and be within +/- 30 seconds from the continuing calibration retention time. **Samples with Internal Standards that did not meet these criteria are listed in the following table with the associated compounds:**

Sample ID	Internal Standard	IS Recovery	Associated Compounds
HB-TP04 S-1	**Perylene-d12**	**47**	**Benzo(b,k)fluoranthenes**
			Benzo(a)Pyrene
			Indeno(1,2,3-c,d)pyrene
			Dibenz(a,h)anthracene
			Benzo(g,h,i)perylene
HB-TP01 S-1	**Chrysene-d12**	**41**	**Pyrene**
			Benzo(a)Anthracene
			Chrysene
HB-TP01 S-1	**Perylene-d12**	**46**	**Benzo(b,k)fluoranthenes**
			Benzo(a)Pyrene
			Indeno(1,2,3-c,d)pyrene
			Dibenz(a,h)anthracene
			Benzo(g,h,i)perylene

The values for Benzo(b,k)fluoranthenes, Benzo(a)Pyrene, Indeno(1,2,3-c,d)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene associated with the low recovery of Perylene-d12 are qualified as estimated in samples HB-TP04 S-1 and HB-TP01 S-1. The Pyrene value in HB-TP01 S-1 was quantitated from the Internal Standard Phenanthrene-d10 and is qualified with P. The Benzo(a)Anthracene and Chrysene values for sample HB-TP01 S-1 are qualified as estimated based on the low recovery of Chrysene-d12.

The qualifiers assigned to these samples include the following:

P indicates that the value was calculated using the alternate internal standard Phenanthrene-d10

U indicates that the analysis of the parameter did not detect a positive hit above the Reporting Limit.

UJ indicates that the analysis of the parameter did not detect a positive hit above the Reporting Limit, however the value should be considered estimated.

J the value should be considered estimated.

All data including qualified values are acceptable for use.

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC
Date: May 11, 2001

Lab#: 010307044
Sample ID: HB-TP03 S-1
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	**92.0**	per cent
CV		
Mercury	**0.179**	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	83 U	ug/Kg
2-Methylnaphthalene	83 U	ug/Kg
Acenaphthene	83 U	ug/Kg
Acenaphthylene	83 U	ug/Kg
Anthracene	83 U	ug/Kg
Benzo(a)anthracene	**120**	ug/Kg
Benzo(a)pyrene	**100**	ug/Kg
Benzo(g,h,i)perylene	83 U	ug/Kg
Benzofluoranthenes	**210**	ug/Kg
Chrysene	**110**	ug/Kg
Dibenz(a,h)anthracene	83 U	ug/Kg
Fluoranthene	**140**	ug/Kg
Fluorene	83 U	ug/Kg
Indeno(1,2,3-cd)pyrene	83 U	ug/Kg
Naphthalene	83 U	ug/Kg

U indicates not detected at the associated value

B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010307044
Sample ID: HB-TP03 S-1
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result		Units
	Phenanthrene	83 U		ug/Kg
	Pyrene	**160**		ug/Kg
ICP				
	Arsenic	**9.1**		mg/Kg
	Cadmium	**1.16**		mg/Kg
	Chromium	**11.4**		mg/Kg
	Copper	**498**		mg/Kg
	Lead	**694**		mg/Kg
	Nickel	**14.7**	J	mg/Kg
	Zinc	**398**		mg/Kg
NWTPH-Dx				
	Diesel	17 U		mg/Kg
	Heavy Oil	**82**	J	mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC
Date: May 11, 2001

Lab#: 010307045
Sample ID: HB-TP03 S-2
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	94.2	per cent
CV		
Mercury	0.0076 U	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	97 U	ug/Kg
2-Methylnaphthalene	97 U	ug/Kg
Acenaphthene	97 U	ug/Kg
Acenaphthylene	97 U	ug/Kg
Anthracene	97 U	ug/Kg
Benzo(a)anthracene	97 U	ug/Kg
Benzo(a)pyrene	97 U	ug/Kg
Benzo(g,h,i)perylene	97 U	ug/Kg
Benzofluoranthenes	97 U	ug/Kg
Chrysene	97 U	ug/Kg
Dibenz(a,h)anthracene	97 U	ug/Kg
Fluoranthene	97 U	ug/Kg
Fluorene	97 U	ug/Kg
Indeno(1,2,3-cd)pyrene	97 U	ug/Kg
Naphthalene	97 U	ug/Kg

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B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010307045
Sample ID: HB-TP03 S-2
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result	Units
	Phenanthrene	97 U	ug/Kg
	Pyrene	97 U	ug/Kg
ICP			
	Arsenic	**2.6**	mg/Kg
	Cadmium	0.23 U	mg/Kg
	Chromium	**14.4**	mg/Kg
	Copper	**5.9**	mg/Kg
	Lead	**2.54**	mg/Kg
	Nickel	**7.6** J	mg/Kg
	Zinc	**15.7**	mg/Kg
NWTPH-Dx			
	Diesel	19 U J	mg/Kg
	Heavy Oil	39 U J	mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

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UJ indicates not detected at the associated value, however the value should be considered estimated

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010307046
Sample ID: HB-TP04 S-1
Sample Type: Soil
Sample Date: 3/7/01

Test	Result		Units
CONVENTIONAL			
Solids	83.3		per cent
CV			
Mercury	0.231		mg/Kg
GC/MS-BNA			
2-Chloronaphthalene	96	U	ug/Kg
2-Methylnaphthalene	96	U	ug/Kg
Acenaphthene	96	U	ug/Kg
Acenaphthylene	310		ug/Kg
Anthracene	140		ug/Kg
Benzo(a)anthracene	1700		ug/Kg
Benzo(a)pyrene	2300	J	ug/Kg
Benzo(g,h,i)perylene	1800	J	ug/Kg
Benzofluoranthenes	4800	J	ug/Kg
Chrysene	2700		ug/Kg
Dibenz(a,h)anthracene	330	J	ug/Kg
Fluoranthene	3500		ug/Kg
Fluorene	96	U	ug/Kg
Indeno(1,2,3-cd)pyrene	1100	J	ug/Kg
Naphthalene	96	U	ug/Kg

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010307046
Sample ID: HB-TP04 S-1
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result		Units
	Phenanthrene	**1600**		ug/Kg
	Pyrene	**6400**		ug/Kg
ICP				
	Arsenic	**13.0**		mg/Kg
	Cadmium	**4.42**		mg/Kg
	Chromium	**17.9**		mg/Kg
	Copper	**232**		mg/Kg
	Lead	**696**		mg/Kg
	Nickel	**32.3**	J	mg/Kg
	Zinc	**542**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	**1000**	J	mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010307047
Sample ID: HB-TP04 S-2
Sample Type: Soil
Sample Date: 3/7/01

Test	Result	Units
CONVENTIONAL		
Solids	93.1	per cent
CV		
Mercury	0.0095 B J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	76 U	ug/Kg
2-Methylnaphthalene	76 U	ug/Kg
Acenaphthene	76 U	ug/Kg
Acenaphthylene	76 U	ug/Kg
Anthracene	76 U	ug/Kg
Benzo(a)anthracene	76 U	ug/Kg
Benzo(a)pyrene	76 U	ug/Kg
Benzo(g,h,i)perylene	76 U	ug/Kg
Benzofluoranthenes	76 U	ug/Kg
Chrysene	76 U	ug/Kg
Dibenz(a,h)anthracene	76 U	ug/Kg
Fluoranthene	76 U	ug/Kg
Fluorene	76 U	ug/Kg
Indeno(1,2,3-cd)pyrene	76 U	ug/Kg
Naphthalene	76 U	ug/Kg

DLC 2/5/02

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010307047
Sample ID: HB-TP04 S-2
Sample Type: Soil
Sample Date: 3/7/01

	Test	Result	Units
	Phenanthrene	76 U	ug/Kg
	Pyrene	76 U	ug/Kg
ICP			
	Arsenic	**2.2**	mg/Kg
	Cadmium	0.26 U	mg/Kg
	Chromium	**8.56**	mg/Kg
	Copper	**4.6**	mg/Kg
	Lead	**1.95**	mg/Kg
	Nickel	**8.1** J	mg/Kg
	Zinc	**12.1**	mg/Kg
NWTPH-Dx			
	Diesel	15 U J	mg/Kg
	Heavy Oil	31 U J	mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

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UJ indicates not detected at the associated value, however the value should be considered estimated

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010308072
Sample ID: HB-TP01 S-1
Sample Type: Solids
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	90.8	per cent
CV		
Mercury	0.0175 B J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	88 U	ug/Kg
2-Methylnaphthalene	88 U	ug/Kg
Acenaphthene	88 U	ug/Kg
Acenaphthylene	88 U	ug/Kg
Anthracene	88 U	ug/Kg
Benzo(a)anthracene	94 J	ug/Kg
Benzo(a)pyrene	310 J	ug/Kg
Benzo(g,h,i)perylene	88 U J	ug/Kg
Benzofluoranthenes	700 J	ug/Kg
Chrysene	200 J	ug/Kg
Dibenz(a,h)anthracene	88 U J	ug/Kg
Fluoranthene	160	ug/Kg
Fluorene	88 U	ug/Kg
Indeno(1,2,3-cd)pyrene	88 U J	ug/Kg
Naphthalene	88 U	ug/Kg

DLC 2/5/02

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010308072
Sample ID: HB-TP01 S-1
Sample Type: Solids
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	**200**		ug/Kg
	Pyrene	**210**	P J	ug/Kg
ICP			DU 2/5/02	
	Arsenic	**4.3**		mg/Kg
	Cadmium	0.51 U		mg/Kg
	Chromium	**14.9**		mg/Kg
	Copper	**18.5**		mg/Kg
	Lead	**15.3**		mg/Kg
	Nickel	**35.3**	J	mg/Kg
	Zinc	**46.3**		mg/Kg
NWTPH-Dx				
	Diesel	350 U		mg/Kg
	Heavy Oil	**4000**		mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

U indicates not detected at the associated value
B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits
J indicates the associated value is estimated
UJ indicates not detected at the associated value, however the value should be considered estimated
P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC
Date: May 11, 2001

Lab#: 010308073
Sample ID: HB-TP01 S-2
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	**86.1**	per cent
CV		
Mercury	0.0219 B J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	99 U	ug/Kg
2-Methylnaphthalene	99 U	ug/Kg
Acenaphthene	99 U	ug/Kg
Acenaphthylene	99 U	ug/Kg
Anthracene	99 U	ug/Kg
Benzo(a)anthracene	99 U	ug/Kg
Benzo(a)pyrene	99 U	ug/Kg
Benzo(g,h,i)perylene	99 U	ug/Kg
Benzofluoranthenes	99 U	ug/Kg
Chrysene	99 U	ug/Kg
Dibenz(a,h)anthracene	99 U	ug/Kg
Fluoranthene	99 U	ug/Kg
Fluorene	99 U	ug/Kg
Indeno(1,2,3-cd)pyrene	99 U	ug/Kg
Naphthalene	99 U	ug/Kg

DLC
2/5/02

U indicates not detected at the associated value

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010308073
Sample ID: HB-TP01 S-2
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result	Units
	Phenanthrene	99 U	ug/Kg
	Pyrene	99 U	ug/Kg
ICP			
	Arsenic	**3.0**	mg/Kg
	Cadmium	0.35 B J	mg/Kg
	Chromium	**27.5**	mg/Kg
	Copper	**10.9**	mg/Kg
	Lead	**5.11**	mg/Kg
	Nickel	**39.9** J	mg/Kg
	Zinc	**31.4**	mg/Kg
NWTPH-Dx			
	Diesel	20 U	mg/Kg
	Heavy Oil	40 U	mg/Kg

DLC 2/5/02

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC
Date: May 11, 2001

Lab#: 010308074
Sample ID: HB-TP01 S-3
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	86.5	per cent
CV		
Mercury	0.159	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	96 U	ug/Kg
2-Methylnaphthalene	96 U	ug/Kg
Acenaphthene	96 U	ug/Kg
Acenaphthylene	96 U	ug/Kg
Anthracene	190	ug/Kg
Benzo(a)anthracene	430	ug/Kg
Benzo(a)pyrene	370	ug/Kg
Benzo(g,h,i)perylene	220	ug/Kg
Benzofluoranthenes	490	ug/Kg
Chrysene	420	ug/Kg
Dibenz(a,h)anthracene	96 U	ug/Kg
Fluoranthene	710	ug/Kg
Fluorene	96 U	ug/Kg
Indeno(1,2,3-cd)pyrene	180	ug/Kg
Naphthalene	96 U	ug/Kg

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010308074
Sample ID: HB-TP01 S-3
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	**550**		ug/Kg
	Pyrene	**1000**		ug/Kg
ICP				
	Arsenic	**3.59**		mg/Kg
	Cadmium	0.49 B J		mg/Kg
	Chromium	**25.8**		mg/Kg
	Copper	**23.0**	J	mg/Kg
	Lead	**36.5**		mg/Kg
	Nickel	**34.1**		mg/Kg
	Zinc	**55.9**		mg/Kg
NWTPH-Dx				
	Diesel	19 U		mg/Kg
	Heavy Oil	**44**		mg/Kg

DLC 2/5/02

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010308075
Sample ID: HB-TP02 S-1
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	87.0	per cent
CV		
Mercury	0.140	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	99 U	ug/Kg
2-Methylnaphthalene	99 U	ug/Kg
Acenaphthene	99 U	ug/Kg
Acenaphthylene	110	ug/Kg
Anthracene	150	ug/Kg
Benzo(a)anthracene	290	ug/Kg
Benzo(a)pyrene	480	ug/Kg
Benzo(g,h,i)perylene	1200	ug/Kg
Benzofluoranthenes	850	ug/Kg
Chrysene	780	ug/Kg
Dibenz(a,h)anthracene	190	ug/Kg
Fluoranthene	320	ug/Kg
Fluorene	99 U	ug/Kg
Indeno(1,2,3-cd)pyrene	500	ug/Kg
Naphthalene	99 U	ug/Kg

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010308075
Sample ID: HB-TP02 S-1
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result	Units
	Phenanthrene	**320**	ug/Kg
	Pyrene	**520**	ug/Kg
ICP			
	Arsenic	**8.81**	mg/Kg
	Cadmium	0.90 ~~B~~ J	mg/Kg
	Chromium	**23.0**	mg/Kg
	Copper	**115** J	mg/Kg
	Lead	**207**	mg/Kg
	Nickel	**23.6**	mg/Kg
	Zinc	**171**	mg/Kg
NWTPH-Dx			
	Diesel	19 U	mg/Kg
	Heavy Oil	**510**	mg/Kg

DLC 2/5/02

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010308076
Sample ID: HB-TP02 S-2
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	**89.0**	per cent
CV		
Mercury	0.0720 B J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	97 U	ug/Kg
2-Methylnaphthalene	97 U	ug/Kg
Acenaphthene	97 U	ug/Kg
Acenaphthylene	97 U	ug/Kg
Anthracene	97 U	ug/Kg
Benzo(a)anthracene	**300**	ug/Kg
Benzo(a)pyrene	**350**	ug/Kg
Benzo(g,h,i)perylene	**320**	ug/Kg
Benzofluoranthenes	**540**	ug/Kg
Chrysene	**400**	ug/Kg
Dibenz(a,h)anthracene	97 U	ug/Kg
Fluoranthene	**370**	ug/Kg
Fluorene	97 U	ug/Kg
Indeno(1,2,3-cd)pyrene	**210**	ug/Kg
Naphthalene	97 U	ug/Kg

DLC 2/5/02

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Lab#: 010308076
Sample ID: HB-TP02 S-2
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result	Units
	Phenanthrene	**280**	ug/Kg
	Pyrene	**490**	ug/Kg
ICP			
	Arsenic	**3.11**	mg/Kg
	Cadmium	0.43 B J	mg/Kg
	Chromium	**24.2**	mg/Kg
	Copper	**112** J	mg/Kg
	Lead	**60.0**	mg/Kg
	Nickel	**34.9**	mg/Kg
	Zinc	**70.2**	mg/Kg
NWTPH-Dx			
	Diesel	19 U	mg/Kg
	Heavy Oil	**100**	mg/Kg

DLC 2/5/02

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010312098
Sample ID: HB-MW01 S-4
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	84.4	per cent
CV		
Mercury	0.0254 B J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	97 U	ug/Kg
2-Methylnaphthalene	1900	ug/Kg
Acenaphthene	3500	ug/Kg
Acenaphthylene	97 U	ug/Kg
Anthracene	2500	ug/Kg
Benzo(a)anthracene	1300	ug/Kg
Benzo(a)pyrene	330	ug/Kg
Benzo(g,h,i)perylene	110	ug/Kg
Benzofluoranthenes	680	ug/Kg
Chrysene	1300	ug/Kg
Dibenz(a,h)anthracene	97 U	ug/Kg
Fluoranthene	6700	ug/Kg
Fluorene	3700	ug/Kg
Indeno(1,2,3-cd)pyrene	110	ug/Kg
Naphthalene	4700	ug/Kg

DLL 2/5/02

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J indicates the associated value is estimated

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Lab#: 010312098
Sample ID: HB-MW01 S-4
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	**12000**		ug/Kg
	Pyrene	**6300**		ug/Kg
GC/MS-VOA				
	Benzene	220	U	ug/Kg
	Ethylbenzene	220	U	ug/Kg
	Gasoline	4.5	U J	mg/Kg
	Toluene	220	U	ug/Kg
	Xylenes (Total)	220	U	ug/Kg
ICP				
	Arsenic	**4.72**		mg/Kg
	Cadmium	**0.48**	U	mg/Kg
	Chromium	**14.7**		mg/Kg
	Copper	**28.2**	J	mg/Kg
	Lead	**21.6**		mg/Kg
	Nickel	**18.4**		mg/Kg
	Zinc	**46.5**		mg/Kg
NWTPH-Dx				
	Diesel	19	U	mg/Kg
	Heavy Oil	39	U	mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010312099
Sample ID: HB-MW01 S-6
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	80.3	per cent
CV		
Mercury	0.0077 ~~B~~ J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	89 U	ug/Kg
2-Methylnaphthalene	89 U	ug/Kg
Acenaphthene	89 U	ug/Kg
Acenaphthylene	89 U	ug/Kg
Anthracene	89 U	ug/Kg
Benzo(a)anthracene	89 U	ug/Kg
Benzo(a)pyrene	89 U	ug/Kg
Benzo(g,h,i)perylene	89 U	ug/Kg
Benzofluoranthenes	89 U	ug/Kg
Chrysene	89 U	ug/Kg
Dibenz(a,h)anthracene	89 U	ug/Kg
Fluoranthene	380	ug/Kg
Fluorene	120	ug/Kg
Indeno(1,2,3-cd)pyrene	89 U	ug/Kg
Naphthalene	99	ug/Kg

DLC 2/5/02

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Lab#: 010312099
Sample ID: HB-MW01 S-6
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	**700**		ug/Kg
	Pyrene	**300**		ug/Kg
ICP				
	Arsenic	**2.07**		mg/Kg
	Cadmium	0.26 U		mg/Kg
	Chromium	**5.34**		mg/Kg
	Copper	**11.8**	J	mg/Kg
	Lead	**2.86**		mg/Kg
	Nickel	**6.32**		mg/Kg
	Zinc	**196**		mg/Kg
NWTPH-Dx				
	Diesel	18 U		mg/Kg
	Heavy Oil	36 U		mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010312104
Sample ID: HB-B01 S-1
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	**86.2**	per cent
CV		
Mercury	0.0897 ~~B~~ J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	94 U	ug/Kg
2-Methylnaphthalene	94 U	ug/Kg
Acenaphthene	94 U	ug/Kg
Acenaphthylene	94 U	ug/Kg
Anthracene	94 U	ug/Kg
Benzo(a)anthracene	94 U	ug/Kg
Benzo(a)pyrene	94 U	ug/Kg
Benzo(g,h,i)perylene	94 U	ug/Kg
Benzofluoranthenes	**110**	ug/Kg
Chrysene	94 U	ug/Kg
Dibenz(a,h)anthracene	94 U	ug/Kg
Fluoranthene	94 U	ug/Kg
Fluorene	94 U	ug/Kg
Indeno(1,2,3-cd)pyrene	94 U	ug/Kg
Naphthalene	94 U	ug/Kg

DLC 2/5/02

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010312104
Sample ID: HB-B01 S-1
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result	Units
	Phenanthrene	94 U	ug/Kg
	Pyrene	**120**	ug/Kg
ICP			
	Arsenic	**4.15**	mg/Kg
	Cadmium	0.48 ~~B~~ J	mg/Kg
	Chromium	**34.6**	mg/Kg
	Copper	**52.2** J	mg/Kg
	Lead	**72.2**	mg/Kg
	Nickel	**34.0**	mg/Kg
	Zinc	**67.4**	mg/Kg
NWTPH-Dx			
	Diesel	19 U	mg/Kg
	Heavy Oil	**130**	mg/Kg

DLL 2/5/02

Reviewed By: Lori A. Zboralski 5/4/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010312105
Sample ID: HB-B01 S-4
Sample Type: Soil
Sample Date: 3/9/01

Test	Result	Units
CONVENTIONAL		
Solids	79.2	per cent
CV		
Mercury	0.0117 B J	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	89 U	ug/Kg
2-Methylnaphthalene	89 U	ug/Kg
Acenaphthene	89 U	ug/Kg
Acenaphthylene	89 U	ug/Kg
Anthracene	89 U	ug/Kg
Benzo(a)anthracene	89 U	ug/Kg
Benzo(a)pyrene	89 U	ug/Kg
Benzo(g,h,i)perylene	89 U	ug/Kg
Benzofluoranthenes	89 U	ug/Kg
Chrysene	89 U	ug/Kg
Dibenz(a,h)anthracene	89 U	ug/Kg
Fluoranthene	89 U	ug/Kg
Fluorene	89 U	ug/Kg
Indeno(1,2,3-cd)pyrene	89 U	ug/Kg
Naphthalene	89 U	ug/Kg

DLC 2/5/02

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J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010312105
Sample ID: HB-B01 S-4
Sample Type: Soil
Sample Date: 3/9/01

	Test	Result		Units
	Phenanthrene	89 U		ug/Kg
	Pyrene	89 U		ug/Kg
ICP				
	Arsenic	**2.79**		mg/Kg
	Cadmium	0.25 U		mg/Kg
	Chromium	**5.73**		mg/Kg
	Copper	**8.82**	J	mg/Kg
	Lead	**5.64**		mg/Kg
	Nickel	**6.73**		mg/Kg
	Zinc	**15.9**		mg/Kg
NWTPH-Dx				
	Diesel	18 U		mg/Kg
	Heavy Oil	35 U		mg/Kg

Reviewed By: Lori A. Zboralski 5/11/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC

Date: May 11, 2001

Lab#: 010320169
Sample ID: HB-MW01
Sample Type: Groundwater
Sample Date: 3/20/01

Test	Result	Units
CONVENTIONAL		
TSS	**2.9**	mg/L
CV-DISS		
Mercury, dissolved	0.050 U	ug/L
GC/MS-PNA		
2-Chloronaphthalene	1.0 U	ug/L
2-Methylnaphthalene	1.0 U	ug/L
Acenaphthene	**12**	ug/L
Acenaphthylene	1.0 U	ug/L
Anthracene	**1.7**	ug/L
Benzo(a)anthracene	1.0 U	ug/L
Benzo(a)pyrene	1.0 U	ug/L
Benzo(g,h,i)perylene	1.0 U	ug/L
Benzofluoranthenes	1.0 U	ug/L
Chrysene	1.0 U	ug/L
Dibenz(a,h)anthracene	1.0 U	ug/L
Fluoranthene	**9.1**	ug/L
Fluorene	**3.5**	ug/L
Indeno(1,2,3-cd)pyrene	1.0 U	ug/L
Naphthalene	1.0 U	ug/L

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B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010320169
Sample ID: HB-MW01
Sample Type: Groundwater
Sample Date: 3/20/01

	Test	Result	Units
	Phenanthrene	1.0 U	ug/L
	Pyrene	1.0 U	ug/L
GC/MS-VOA			
	Benzene	0.5 U	ug/L
	Ethylbenzene	0.5 U	ug/L
	Gasoline	0.5 U	mg/L
	Toluene	0.5 U	ug/L
	Xylenes (Total)	0.5 U	ug/L
ICP-DISS			
	Antimony, dissolved	2.6 B J	ug/L
	Arsenic, dissolved	**26**	ug/L
	Cadmium, dissolved	0.083 U	ug/L
	Chromium, dissolved	**6.1**	ug/L
	Copper, dissolved	**7.2**	ug/L
	Lead, dissolved	0.14 B J	ug/L
	Nickel, dissolved	**13**	ug/L
	Zinc, dissolved	**43**	ug/L
NWTPH-Dx			
	Diesel	0.25 U	mg/L
	Heavy Oil	0.50 U	mg/L

Reviewed By: Lori A. Zboralski 5/11/01

DLC 2/5/02

U indicates not detected at the associated value

B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC
Date: May 11, 2001

Lab#: 010321199
Sample ID: HB-MWA
Sample Type: Groundwater
Sample Date: 3/21/01

Test	Result	Units
CONVENTIONAL		
TSS	**0.7**	mg/L
CV-DISS		
Mercury, dissolved	0.050 U	ug/L
GC/MS-PNA		
2-Chloronaphthalene	1.0 U	ug/L
2-Methylnaphthalene	1.0 U	ug/L
Acenaphthene	**7.7**	ug/L
Acenaphthylene	1.0 U	ug/L
Anthracene	1.0 U	ug/L
Benzo(a)anthracene	1.0 U	ug/L
Benzo(a)pyrene	1.0 U	ug/L
Benzo(g,h,i)perylene	1.0 U	ug/L
Benzofluoranthenes	1.0 U	ug/L
Chrysene	1.0 U	ug/L
Dibenz(a,h)anthracene	1.0 U	ug/L
Fluoranthene	**12**	ug/L
Fluorene	**2.8**	ug/L
Indeno(1,2,3-cd)pyrene	1.0 U	ug/L
Naphthalene	1.0 U	ug/L

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B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010321199
Sample ID: HB-MWA
Sample Type: Groundwater
Sample Date: 3/21/01

	Test	Result	Units
	Phenanthrene	**1.5**	ug/L
	Pyrene	1.0 U	ug/L
GC/MS-VOA			
	Benzene	0.5 U	ug/L
	Ethylbenzene	0.5 U	ug/L
	Gasoline	0.5 U	mg/L
	Toluene	0.5 U	ug/L
	Xylenes (Total)	0.5 U	ug/L
ICP-DISS			
	Antimony, dissolved	2.2 ~~B~~ J	ug/L
	Arsenic, dissolved	**19**	ug/L
	Cadmium, dissolved	0.083 U	ug/L
	Chromium, dissolved	**5.2**	ug/L
	Copper, dissolved	**5.9**	ug/L
	Lead, dissolved	0.029 ~~B~~ J	ug/L
	Nickel, dissolved	**9.3**	ug/L
	Zinc, dissolved	**53**	ug/L
NWTPH-Dx			
	Diesel	0.25 U	mg/L
	Heavy Oil	0.50 U	mg/L

DLC 3/5/02

Reviewed By: Lori A. Zboralski 5/11/01

U indicates not detected at the associated value

B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212NTEC
Date: May 11, 2001

Lab#: 010321200
Sample ID: HB-MW01 High
Sample Type: Groundwater
Sample Date: 3/20/01

Test	Result	Units
CONVENTIONAL		
TSS	**0.5**	mg/L
CV-DISS		
Mercury, dissolved	0.050 U	ug/L
GC/MS-PNA		
2-Chloronaphthalene	1.0 U	ug/L
2-Methylnaphthalene	1.0 U	ug/L
Acenaphthene	**7.1**	ug/L
Acenaphthylene	1.0 U	ug/L
Anthracene	1.0 U	ug/L
Benzo(a)anthracene	1.0 U	ug/L
Benzo(a)pyrene	1.0 U	ug/L
Benzo(g,h,i)perylene	1.0 U	ug/L
Benzofluoranthenes	1.0 U	ug/L
Chrysene	1.0 U	ug/L
Dibenz(a,h)anthracene	1.0 U	ug/L
Fluoranthene	**11**	ug/L
Fluorene	**2.1**	ug/L
Indeno(1,2,3-cd)pyrene	1.0 U	ug/L
Naphthalene	1.0 U	ug/L

U indicates not detected at the associated value

B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

Lab#: 010321200
Sample ID: HB-MW01 High
Sample Type: Groundwater
Sample Date: 3/20/01

	Test	Result	Units
	Phenanthrene	**1.3**	ug/L
	Pyrene	1.0 U	ug/L
GC/MS-VOA			
	Benzene	0.5 U	ug/L
	Ethylbenzene	0.5 U	ug/L
	Gasoline	0.5 U	mg/L
	Toluene	0.5 U	ug/L
	Xylenes (Total)	0.5 U	ug/L
ICP-DISS			
	Antimony, dissolved	2.2 ~~B~~ J	ug/L
	Arsenic, dissolved	**16**	ug/L
	Cadmium, dissolved	0.083 U	ug/L
	Chromium, dissolved	**5.4**	ug/L
	Copper, dissolved	**6.4**	ug/L
	Lead, dissolved	0.047 ~~B~~ J	ug/L
	Nickel, dissolved	**8.8**	ug/L
	Zinc, dissolved	**54**	ug/L
NWTPH-Dx			
	Diesel	0.25 U J	mg/L
	Heavy Oil	0.50 U J	mg/L

DLC
2/5/02

Reviewed By: Lori A. Zboralski 5/11/01

U indicates not detected at the associated value
B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits
J indicates the associated value is estimated
UJ indicates not detected at the associated value, however the value should be considered estimated

Sample Custody Record

Samples Shipped to: City of Tacoma

HARTCROWSER

1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB Thea Foss Upland LAB NUMBER _____
PROJECT NAME ↳ Hicks Bld
HART CROWSER CONTACT Joe Morrice
SAMPLED BY: JAZ

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	Metals	TPH-D	PAHs	TPH-G/BTEX	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	HBTP09	S-1	03/7	900	Sed	X	X	X		1	Dw. Site 8 AJ212M
	HBTP09	S-2		905		X	X	X		1	Dw. Site 8
	HBTP09	S-3		910		X	X	X		1	Dw Site 8
	HBTP08	S-1		10:30		X	X	X		1	Dw Site 8
	HBTP08	S-2		10:35		X	X	X		1	Dw Site 8
	HBTP07	S-1		11:30		X	X	X		1	Dw Site 8
	HBTP07	S-2		11:35		X	X	X		1	Dw Site 8
	HBTP04	S-1		14:45		X	X	X		1	Dw Site 9 AJ212N
	HBTP04	S-2		14:50		X	X	X		1	Dw Site 9
	HBTP03	S-1		14:05		X	X	X		1	Dw Site 9
	HBTP03	S-2		14:10		X	X	X		1	Dw Site 9

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: AJ Zwiebel	3/7/01	SIGNATURE: Rick Fuller	3-7-01
PRINT NAME: Jennifer Zwiebel	TIME	PRINT NAME: Rick Fuller	TIME
COMPANY: Hart Crowser	16:00	COMPANY: City of Tacoma	1600hrs
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE _____
SHIPMENT METHOD ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. _____
for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER _____

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

Sample Custody Record

Samples Shipped to: City of Tacoma

HARTCROWSER
19 [illegible] Avenue [illegible]st
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB Hicks Bull LAB NUMBER

PROJECT NAME Thea Foss Upland

HART CROWSER CONTACT Joe Morrice

SAMPLED BY: JAZ

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	Metals	TPH-D	PAHs	TPH-G/VOAs	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	HB-TP01	S-1	3/8/01	11:20	Soil	X	X	X		1	Dev. Site 9 AJZ 2 N
	HB-TP01	S-2		11:25		X	X	X		1	
	HB-TP01	S-3		11:30		X	X	X		1	
	HB-TP02	S-1		10:05		X	X	X		1	
	HB-TP02	S-2		10:00		X	X	X		1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Jennifer Zwiebel	3/8/01	SIGNATURE: Rick Fuller	3-8-01
PRINT NAME: Jennifer Zwiebel	TIME	PRINT NAME: Rick Fuller	TIME
COMPANY: Hart Crowser	15:55	COMPANY: City of Tacoma	1555
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

5 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. _____ for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER _____

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

Sample Custody Record

1 of 2

Samples Shipped to: Kramer City Lab

HART CROWSER

Hart Crowser, In
1910 Fairview Avenue Ea
Seattle, Washington 98102-36
Phone: 206-324-9530 FAX: 206-328-55

JOB Ikea Foss #4676 LAB NUMBER

PROJECT NAME

HART CROWSER CONTACT TDC - Tyson Carlson

SAMPLED BY: TDC

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	REQUESTED ANALYSIS: TPH-D	PAH	METALS	TPH (SW8270)	TPH-G	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	HB-MW01	S-4	03/09/01		Soil					X	2	AJ212N, Dev Std 9
	HB-MW01	S-6									2	
	HB-MW02	S-1	03/08/01								2	AJ212M, Dev Std 8
	HB-MW02	S-3									2	
	HB MW03	S-1									2	
	HB MW03	S-4									2	
	HBD01	S-1									2	AJ212N, Dev Std 9
	HBBD1	S-4									2	
	HBBD2	S-1									2	AJ212M, Dev Std 8
	HBBD2	S-4									2	
	P1-TP01	S-1	03/09/01			1	1				2	
	P1-TP01	S-3									2	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	03/09/01	SIGNATURE Stephanie Seivert	03/09/01
PRINT NAME	TIME 17:00	PRINT NAME Stephanie Seivert	TIME 17:00
COMPANY HC		COMPANY	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER

White and Yellow Copies to Lab Pink to Project Manager Lab to ... White ... to Hart ... to Sa... ustod...

Sample Custody Record

Samples Shipped to: COT Lab

HARTCROWSER
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB 4676-71 LAB NUMBER

PROJECT NAME Thea Foss - Hicks Bull

HART CROWSER CONTACT Joe Morrice

SAMPLED BY: JMM

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	REQUESTED ANALYSIS: D.O. Methods	TPH-D	PAHs	TPH-G/VOA	TSS	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	UNW2A		3/20	755	W	X	X	X		X	6	Added 3.21.01 @
	HD-MW4			850					X	X	6	
	HD-MW03			940					X	X	6	
	HD-MW02			1050						X	6	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE Joe Morrice	3/24-01	SIGNATURE Bill Essmeier	3/20/2001
PRINT NAME Hart Crowser	TIME 225	PRINT NAME COT	TIME 2:30Pm
COMPANY		COMPANY	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

24 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION: ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

Sample Custody Record

Samples Shipped to: COT Lab

HARTCROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB 4676-72 LAB NUMBER

PROJECT NAME Thea Foss - Hikes Bell

HART CROWSER CONTACT Joe Morrice

SAMPLED BY: JWM

REQUESTED ANALYSIS

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	Diss Metals*	TPH-Dx	PAHs	TSS	TPH-G/BTEX	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	UMW2A-High		3/21		water	X	X	X	X		3	WO# AJ212M
	HBMW02-High					X	X	X	X		3	
	HBMW03-High					X	X	X	X	X	6	
	HBMW01-High					X	X	X	X	X	6	WO# AJ212N
	HBMWA					X	X	X	X	X	6	

High Salinity Samples

3/21/01

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Joe Morrice	3/21/01	SIGNATURE: Rick Fuller	3-21-01
PRINT NAME: Joe Morrice	TIME	PRINT NAME: Rick Fuller	TIME
COMPANY: Hart Crowser	1625	COMPANY: City of TACOMA	1625
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

* Field filtered.

Sb, As, Cd, Cu, Pb, Hg, Ni, Zn

24 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

City of Tacoma
Environmental Services
Science and Engineering
Division

Memorandum

TO: Mark D'Andrea, P. E., Project Coordinator, Public Works Engineering

FROM: Christopher L. Getchell, Source Control Supervisor

SUBJECT: Foss Uplands – Hick's Bull WO# AJ212M TEC

DATE: May 14, 2001

Attached are the sample analysis results for the soil and water samples collected by Hart Crowser, March 8, 2001. The samples were collected in association with the Foss Uplands Investigation.

The Science and Engineering Division analyzed the samples for TSS, NWPTH-Dx, and Semi-Volatile Organics. A detailed Quality Control Data Review report was prepared for these samples and is included with the sample reports.

Samples HB-TP06 S-2 and HB-TP10 S-2 are qualified as not detected for Cadmium based on high cadmium concentration in the Method Blank.

The Semi-Volatile compounds in samples HB-TP05 S-1 and HB-TP10 S-2 are qualified as estimated based on the surrogate compound recoveries outside of acceptance limits. Sample HB-TP10 S-2 is qualified as estimated for Diesel and Heavy Oil based on the surrogate compound recoveries outside of acceptance limits.

The Copper values samples HB-TP05 S-1, HB-TP05 S-2, HB-TP05 S-3, HB-TP06 S-1, HB-TP06 S-2, HB-TP10 S-1, and HB-TP10 S-2 are qualified as estimated for Copper based on the high spike recovery.

The values for Benzo(b,k)fluoranthenes, Benzo(a)Pyrene, Indeno(1,2,3-c,d)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene associated with the low recovery of Perylene-d12 are qualified as estimated in sample HB-TP05 S-1.

If you have any questions concerning these results, call me at (253) 502-2130. Please note, the samples associated with this report will be discarded six months from the date of this report unless requested otherwise.

Christopher L. Getchell
Source Control Supervisor,
Science and Engineering Division.

CLG:LAZ

D:\Sharedwd\2001\HBull8a.doc

Thea Foss Uplands
Hick's Bull
Development Site 8 (AJ212M TEC)

Sample ID	Laboratory ID	Matrix
HB-TP05 S-1	010308077	Soil
HB-TP05 S-2	010308078	Soil
HB-TP05 S-3	010308079	Soil
HB-TP06 S-1	010308080	Soil
HB-TP06 S-2	010308081	Soil
HB-TP10 S-1	010308082	Soil
HB-TP10 S-2	010308083	Soil

Quality Control Data Review

TO: Christopher L. Getchell, Source Control Supervisor

FROM: Lori A. Zboralski, Senior Laboratory Analyst

DATE: May 14, 2001

SAMPLES

This report concerns the following samples associated with the **Foss Uplands WO# AJ212M:**

Sample Description	Lab #	Sample Matrix	Date Sampled
HB-TP05 S-1	010308077	Soil	03/08/01
HB-TP05 S-2	010308078	Soil	03/08/01
HB-TP05 S-3	010308079	Soil	03/08/01
HB-TP06 S-1	010308080	Soil	03/08/01
HB-TP06 S-2	010308081	Soil	03/08/01
HB-TP10 S-1	010308082	Soil	03/08/01
HB-TP10 S-2	010308083	Soil	03/08/01

HOLDING TIMES

The samples were extracted within the 14-day holding time for Semi-Volatile Organics and NWTPH-Dx and analyzed within 7 days for Solids, 28 days for Mercury, 40 days for Semi-Volatile Organics and NWTPH-Dx, and 180 days for Total Metals.

METHODS

The samples were analyzed according to NWTPH-Dx, CLP ILM04.0 for Metals, CLP OLM01.8 for Semi-Volatile Organics and Science and Engineering Division Standard Operating Procedures.

DAILY INSTRUMENT PERFORMANCE STANDARDS

The criteria for the spectra of Decafluoro-triphenylphosphine (DFTPP) were met for the twelve-hour sequences when these samples were analyzed. The spectra generated by the mass spectrometers can be considered in control for the analysis of these samples.

CALIBRATION AND VERIFICATION

All reported compounds for Semi-Volatile Organics had updated relative response factors (RRF) greater than or equal to 0.050 with relative standard deviations (%RSD) of less than 30% for the Initial Calibration and percent differences (%D) of less than 25% for the Continuing Calibration when compared to the average RRF.

The Initial Calibration for the NWPTH-Dx analyses were within the method limits with correlation coefficients of greater than 0.990. The continuing calibrations ranged from 1.5% to 13.2%.

The ICP and FIMS calibrations met method requirements for linearity and accuracy. ICP and FIMS sensitivities were verified by analysis of standards near the detection limits of the instruments. The recoveries ranged from 78 to 121% and all were within laboratory established 50-200% limits.

Independent mid-range standards were analyzed to monitor calibration accuracy for the ICP and FIMS (ICV and CCV). Acceptable recoveries for ICP must be within 90 to 110%. Recoveries for FIMS must be within 80 to 120%. All ICVs and CCVs had recoveries within acceptable limits.

Standards are required to be run to measure the accuracy of ICP interelement correction factors. These samples ICSA and ICSAB must be run at the beginning and end of each analytical run. The ICSAB recoveries for each element must be within 80 to 120% recovery. The recoveries of the ICSAB for the analysis of these samples ranged from 94 to 104%.

METHOD AND CALIBRATION BLANKS

Method and calibration blanks were analyzed at the required frequencies for the methods. The concentrations of these blanks were less than 1/5th the amount found in the sample or the detection limit, **except for the following:**

Parameter	Blank	Concentration	MDL	Associated Samples.
Cadmium	010308080PBS	0.6 ug/L	0.52 ug/L	HB-TP06 S-2, HB-TP10 S-2

Samples HB-TP06 S-2 and HB-TP10 S-2 are qualified as not detected for Cadmium based on the high concentration in the Method Blank.

SURROGATE COMPOUNDS

Two Surrogate compounds were added to the NWTPH-Dx analysis and 2 Surrogate compounds were added to the Semi-Volatile Organics analysis. The Surrogate compound recoveries ranged from 35 to 152%. All the recoveries were within the control limits of the methods, **except for the following:**

Analysis	Sample	Surrogate Compound	Recovery	Limits
NWTPH-Dx	HB-TP10 S-2	2-Fluorobiphenyl	35	50-150
NWTPH-Dx	HB-TP10 S-2	Terphenyl-d14	38	50-150
Semi-VOA	HB-TP05 S-1	Terphenyl-d14	152	18-137
Semi-VOA	HB-TP10 S-2	Terphenyl-d14	147	18-137

The Semi-Volatile compounds in samples HB-TP05 S-1 and HB-TP10 S-2 are qualified as estimated based on the surrogate compound recoveries outside of acceptance limits. Sample HB-TP10 S-2 is qualified as estimated for Diesel and Heavy Oil based on the surrogate compound recoveries outside of acceptance limits.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples (LCS) monitor the analytical system by carrying a standard through every step of the analytical method including extraction or digestion. All LCS recoveries were within laboratory established control limits.

DUPLICATE SAMPLE ANALYSIS

All associated duplicate samples had differences of less than the reporting limits for analytes with concentrations less than 5 times the reporting limits and Relative Percent Differences (RPD) of less than 35% for metals analytes with concentrations greater than 5 times the reporting limits.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Matrix spike analysis was performed for the metals analysis. All recoveries were within the required CLP limits. Matrix spike and matrix spike duplicate analysis was performed for NWTPH-G, NWTPH-Dx, and Volatile and Semi-Volatile Organics with these samples. The spike recoveries were within the method recovery limits, **except for the following:**

Spiked Sample	Analyte	% Recovery	Limits	Associated Samples
HB-TP02 S-2	Copper	930	75-125	HB-TP05 S-1, HB-TP05 S-2, HB-TP05 S-3, HB-TP06 S-1, HB-TP06 S-2, HB-TP10 S-1, HB-TP10 S-2

The Copper values samples HB-TP05 S-1, HB-TP05 S-2, HB-TP05 S-3, HB-TP06 S-1, HB-TP06 S-2, HB-TP10 S-1, and HB-TP10 S-2 are qualified as estimated for Copper based on the high spike recovery. The RPDs for all of the MS/MSD pairs were within the method limits. No data is qualified based on Matrix Spike and Matrix Spike Duplicate analysis.

ICP SERIAL DILUTIONS

Serial dilution of samples analyzed by ICP provides information about physical or chemical interferences that may exist due to sample matrix.

Associated sample HB-TP02 S-2 was analyzed at a five-fold dilution. All analytes had %D of the diluted sample compared to the undiluted sample of less than 10% for analytes greater than 50 times the IDL.

INTERNAL STANDARDS

Performance of the Internal Standards (IS) monitors GC/MS sensitivity and stability during each analysis. Internal Standards must not vary more than -50% to +100% from the continuing calibration response and be within +/- 30 seconds from the continuing calibration retention time. **Samples with Internal Standards that did not meet these criteria are listed in the following table with the associated compounds:**

Sample ID	Internal Standard	IS Recovery	Associated Compounds
HB-TP05 S-1	Perylene-d12	42	Benzo(b,k)fluoranthenes Benzo(a)Pyrene Indeno(1,2,3-c,d)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene

The values for Benzo(b,k)fluoranthenes, Benzo(a)Pyrene, Indeno(1,2,3-c,d)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene associated with the low recovery of Perylene-d12 are qualified as estimated in sample HB-TP05 S-1.

DATA ASSESSMENT

The qualifiers assigned to these samples include the following:

U indicates that the analysis of the parameter did not detect a positive hit above the Reporting Limit.

UJ indicates that the analysis of the parameter did not detect a positive hit above the Reporting Limit, however the value should be considered estimated.

J the value should be considered estimated.

All data including qualified values are acceptable for use.

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 14, 2001

Lab#: 010308077
Sample ID: HB-TP05 S-1
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	**89.9**	per cent
CV		
Mercury	0.0771 ~~B~~ J DLC 2/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	96 U J	ug/Kg
2-Methylnaphthalene	96 U J	ug/Kg
Acenaphthene	**410** J	ug/Kg
Acenaphthylene	96 U J	ug/Kg
Anthracene	**620** J	ug/Kg
Benzo(a)anthracene	**2600** J	ug/Kg
Benzo(a)pyrene	**3300** J	ug/Kg
Benzo(g,h,i)perylene	**1800** J	ug/Kg
Benzofluoranthenes	**4400** J	ug/Kg
Chrysene	**3200**	ug/Kg
Dibenz(a,h)anthracene	**340** J	ug/Kg
Fluoranthene	**5000** J	ug/Kg
Fluorene	**200** J	ug/Kg
Indeno(1,2,3-cd)pyrene	**1300** J	ug/Kg
Naphthalene	96 U J	ug/Kg

U indicates not detected at the associated value

B indicates the value is greater than the detection limits of the method, however it is lower than the Contract Required Detection Limits

J indicates the associated value is estimated

UJ indicates not detected at the associated value, however the value should be considered estimated

P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

Lab#: 010308077
Sample ID: HB-TP05 S-1
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	**3800**	J	ug/Kg
	Pyrene	**6700**	J	ug/Kg
ICP				
	Arsenic	**3.92**		mg/Kg
	Cadmium	0.57 ~~B~~	J	mg/Kg
	Chromium	**25.9**	DUC 2/5/02	mg/Kg
	Copper	**53.8**	J	mg/Kg
	Lead	**53.9**		mg/Kg
	Nickel	**36.3**		mg/Kg
	Zinc	**80.8**		mg/Kg
NWTPH-Dx				
	Diesel	380 U		mg/Kg
	Heavy Oil	**1300**		mg/Kg

Reviewed By: Lori A. Zboralski 5/14/01

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UJ indicates not detected at the associated value, however the value should be considered estimated
P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 14, 2001

Lab#: 010308078
Sample ID: HB-TP05 S-2
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	68.3	per cent
CV		
Mercury	0.520	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	99 U	ug/Kg
2-Methylnaphthalene	380	ug/Kg
Acenaphthene	110	ug/Kg
Acenaphthylene	130	ug/Kg
Anthracene	160	ug/Kg
Benzo(a)anthracene	810	ug/Kg
Benzo(a)pyrene	920	ug/Kg
Benzo(g,h,i)perylene	460	ug/Kg
Benzofluoranthenes	1400	ug/Kg
Chrysene	1100	ug/Kg
Dibenz(a,h)anthracene	110	ug/Kg
Fluoranthene	1100	ug/Kg
Fluorene	99 U	ug/Kg
Indeno(1,2,3-cd)pyrene	370	ug/Kg
Naphthalene	170	ug/Kg

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P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

Lab#: 010308078
Sample ID: HB-TP05 S-2
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	1200		ug/Kg
	Pyrene	1400		ug/Kg
ICP				
	Arsenic	77.2		mg/Kg
	Cadmium	5.29		mg/Kg
	Chromium	51.1		mg/Kg
	Copper	869	J	mg/Kg
	Lead	2630		mg/Kg
	Nickel	72.1		mg/Kg
	Zinc	1290		mg/Kg
NWTPH-Dx				
	Diesel	43		mg/Kg
	Heavy Oil	250		mg/Kg

Reviewed By: Lori A. Zboralski 5/14/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 14, 2001

Lab#: 010308079
Sample ID: HB-TP05 S-3
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	94.5	per cent
CV		
Mercury	0.0162 B J DLC 2/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	72 U	ug/Kg
2-Methylnaphthalene	72 U	ug/Kg
Acenaphthene	72 U	ug/Kg
Acenaphthylene	72 U	ug/Kg
Anthracene	72 U	ug/Kg
Benzo(a)anthracene	72 U	ug/Kg
Benzo(a)pyrene	72 U	ug/Kg
Benzo(g,h,i)perylene	72 U	ug/Kg
Benzofluoranthenes	72 U	ug/Kg
Chrysene	72 U	ug/Kg
Dibenz(a,h)anthracene	72 U	ug/Kg
Fluoranthene	72 U	ug/Kg
Fluorene	72 U	ug/Kg
Indeno(1,2,3-cd)pyrene	72 U	ug/Kg
Naphthalene	72 U	ug/Kg

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Lab#: 010308079
Sample ID: HB-TP05 S-3
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	72 U		ug/Kg
	Pyrene	72 U		ug/Kg
ICP				
	Arsenic	**18.2**		mg/Kg
	Cadmium	0.27 ~~B~~ J DLC 2/5/02		mg/Kg
	Chromium	**6.74**		mg/Kg
	Copper	**11.0**	J	mg/Kg
	Lead	**4.67**		mg/Kg
	Nickel	**6.70**		mg/Kg
	Zinc	**13.9**		mg/Kg
NWTPH-Dx				
	Diesel	14 U		mg/Kg
	Heavy Oil	29 U		mg/Kg

Reviewed By: Lori A. Zboralski 5/14/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 14, 2001

Lab#: 010308080
Sample ID: HB-TP06 S-1
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	**91.5**	per cent
CV		
Mercury	**0.168**	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	86 U	ug/Kg
2-Methylnaphthalene	86 U	ug/Kg
Acenaphthene	86 U	ug/Kg
Acenaphthylene	86 U	ug/Kg
Anthracene	86 U	ug/Kg
Benzo(a)anthracene	**120**	ug/Kg
Benzo(a)pyrene	**170**	ug/Kg
Benzo(g,h,i)perylene	**100**	ug/Kg
Benzofluoranthenes	**260**	ug/Kg
Chrysene	**220**	ug/Kg
Dibenz(a,h)anthracene	86 U	ug/Kg
Fluoranthene	**150**	ug/Kg
Fluorene	86 U	ug/Kg
Indeno(1,2,3-cd)pyrene	**88**	ug/Kg
Naphthalene	86 U	ug/Kg

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UJ indicates not detected at the associated value, however the value should be considered estimated

P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

Lab#: 010308080
Sample ID: HB-TP06 S-1
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	140		ug/Kg
	Pyrene	200		ug/Kg
ICP				
	Arsenic	7.82		mg/Kg
	Cadmium	11.2		mg/Kg
	Chromium	43.3		mg/Kg
	Copper	326	J	mg/Kg
	Lead	297		mg/Kg
	Nickel	103		mg/Kg
	Zinc	306		mg/Kg
NWTPH-Dx				
	Diesel	17 U		mg/Kg
	Heavy Oil	250		mg/Kg

Reviewed By: Lori A. Zboralski 5/14/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 14, 2001

Lab#: 010308081
Sample ID: HB-TP06 S-2
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	91.5	per cent
CV		
Mercury	0.0066 U	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	97 U	ug/Kg
2-Methylnaphthalene	97 U	ug/Kg
Acenaphthene	97 U	ug/Kg
Acenaphthylene	97 U	ug/Kg
Anthracene	97 U	ug/Kg
Benzo(a)anthracene	97 U	ug/Kg
Benzo(a)pyrene	97 U	ug/Kg
Benzo(g,h,i)perylene	97 U	ug/Kg
Benzofluoranthenes	97 U	ug/Kg
Chrysene	97 U	ug/Kg
Dibenz(a,h)anthracene	97 U	ug/Kg
Fluoranthene	97 U	ug/Kg
Fluorene	97 U	ug/Kg
Indeno(1,2,3-cd)pyrene	97 U	ug/Kg
Naphthalene	97 U	ug/Kg

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P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

Lab#: 010308081
Sample ID: HB-TP06 S-2
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	97	U	ug/Kg
	Pyrene	97	U	ug/Kg
ICP				
	Arsenic	**2.08**		mg/Kg
	Cadmium	**0.29**	U	mg/Kg
	Chromium	**15.7**		mg/Kg
	Copper	**8.50**	J	mg/Kg
	Lead	**2.56**		mg/Kg
	Nickel	**10.1**		mg/Kg
	Zinc	**13.1**		mg/Kg
NWTPH-Dx				
	Diesel	19	U	mg/Kg
	Heavy Oil	39	U	mg/Kg

Reviewed By: Lori A. Zboralski 5/14/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC
Date: May 14, 2001

Lab#: 010308082
Sample ID: HB-TP10 S-1
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	**84.9**	per cent
CV		
Mercury	**7.83**	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	98 U	ug/Kg
2-Methylnaphthalene	**270**	ug/Kg
Acenaphthene	**710**	ug/Kg
Acenaphthylene	98 U	ug/Kg
Anthracene	**950**	ug/Kg
Benzo(a)anthracene	**2100**	ug/Kg
Benzo(a)pyrene	**1900**	ug/Kg
Benzo(g,h,i)perylene	**740**	ug/Kg
Benzofluoranthenes	**2500**	ug/Kg
Chrysene	**2600**	ug/Kg
Dibenz(a,h)anthracene	**230**	ug/Kg
Fluoranthene	**4400**	ug/Kg
Fluorene	**520**	ug/Kg
Indeno(1,2,3-cd)pyrene	**660**	ug/Kg
Naphthalene	**470**	ug/Kg

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UJ indicates not detected at the associated value, however the value should be considered estimated

P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

Lab#: 010308082
Sample ID: HB-TP10 S-1
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result		Units
	Phenanthrene	7300		ug/Kg
	Pyrene	6600		ug/Kg
ICP				
	Arsenic	9.05		mg/Kg
	Cadmium	2.70		mg/Kg
	Chromium	30.0		mg/Kg
	Copper	55.1	J	mg/Kg
	Lead	252		mg/Kg
	Nickel	28.1		mg/Kg
	Zinc	905		mg/Kg
NWTPH-Dx				
	Diesel	20 U		mg/Kg
	Heavy Oil	55		mg/Kg

Reviewed By: Lori A. Zboralski 5/14/01

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- City of Tacoma -

Science and Engineering Division

To: Christopher L. Getchell, Source Control Supervisor

Foss Uplands
AJ212MTEC

Date: May 16, 2001

Lab#: 010308083
Sample ID: HB-TP10 S-2
Sample Type: Soil
Sample Date: 3/8/01

Test	Result	Units
CONVENTIONAL		
Solids	93.9	per cent
CV		
Mercury	0.0356 ~~B~~ J DLL 2/5/02	mg/Kg
GC/MS-BNA		
2-Chloronaphthalene	99 U J	ug/Kg
2-Methylnaphthalene	99 U J	ug/Kg
Acenaphthene	99 U J	ug/Kg
Acenaphthylene	99 U J	ug/Kg
Anthracene	99 U J	ug/Kg
Benzo(a)anthracene	99 U J	ug/Kg
Benzo(a)pyrene	99 U J	ug/Kg
Benzo(g,h,i)perylene	99 U J	ug/Kg
Benzofluoranthenes	99 U J	ug/Kg
Chrysene	99 U J	ug/Kg
Dibenz(a,h)anthracene	99 U J	ug/Kg
Fluoranthene	99 U J	ug/Kg
Fluorene	99 U J	ug/Kg
Indeno(1,2,3-cd)pyrene	99 U J	ug/Kg
Naphthalene	99 U J	ug/Kg

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P indicates the value is quantitated on the alternate Internal Standard Phenanthrene-d10

Lab#: 010308083
Sample ID: HB-TP10 S-2
Sample Type: Soil
Sample Date: 3/8/01

	Test	Result	Units
	Phenanthrene	99 U J	ug/Kg
	Pyrene	99 U J	ug/Kg
ICP			
	Arsenic	**2.62**	mg/Kg
	Cadmium	**0.25** U	mg/Kg
	Chromium	**6.43**	mg/Kg
	Copper	**9.61** J	mg/Kg
	Lead	**7.18**	mg/Kg
	Nickel	**7.24**	mg/Kg
	Zinc	**26.5**	mg/Kg
NWTPH-Dx			
	Diesel	20 U J	mg/Kg
	Heavy Oil	40 U J	mg/Kg

Reviewed By: Lori A. Zboralski 5/16/01

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Sample Custody Record

Samples Shipped to: City of Tacoma

HARTCROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

JOB Hicks Bull LAB NUMBER

PROJECT NAME Thea Foss Uplands

HART CROWSER CONTACT Joe Morrice

SAMPLED BY: JA2

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	REQUESTED ANALYSIS: Metals	TPH-D	PAHs	TPH-G/BTEX	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	HB-TP05	S-1	3/8/01	14:25	Soil	X	X	X		1	Dup. Side 8 AJ212M
	HB-TP05	S-2		14:30		X	X	X		1	
	HB-TP05	S-3		14:35		X	X	X		1	
	HB-TP06	S-1		13:15		X	X	X		1	
	HB-TP06	S-2		13:20		X	X	X		1	
	HB-TP10	S-1		8:45		X	X	X		1	
	HB-TP10	S-2		8:50		X	X	X		1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: [signature]	3/8/01	[signature]	3-8-01
PRINT NAME: J Zwiebel	TIME	PRINT NAME: Rick Fuller	TIME
COMPANY: Hart Crowser	15:55	COMPANY: City of Tacoma	1555
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINT NAME		PRINT NAME	
COMPANY		COMPANY	

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:

7 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☐ STANDARD
☐ 72 HOURS OTHER

White and Yellow Copies to Lab Pink to Project Manager Lab to Return White Copy to Hart Crowser Gold to Sample Custodian

file copy
cc: Lori Herman

City of Tacoma
Environmental Services
Science and Engineering
Division

Memorandum

BILL HALL

TO: Mark D'Andrea, P. E., Project Coordinator, Public Works Engineering

FROM: Christopher L. Getchell, Source Control Supervisor

SUBJECT: Foss Uplands – Hick's Bull WO# AJ212M

DATE: January 3, 2002

Attached are the sample analysis results for the water samples collected by Hart Crowser on December 10, 2001. The samples were collected in association with the Foss Uplands Investigation.

The samples were analyzed at Severn-Trent Laboratories-Seattle (STL-Seattle, formerly known as Sound Analytical Services) by ICP-MS for Dissolved Metals. A detailed Quality Control Data Review report was prepared for these samples and is included with the sample reports.

The copper values for samples HB MW-02, HB MW-03, and UMW-02A are qualified as estimated because of high percent difference for the Serial Dilution matrix check.

If you have any questions concerning these results, call me at (253) 502-2130. Please note the samples associated with this report will be discarded six months from the date of this report unless requested otherwise.

Christopher L. Getchell
Source Control Supervisor,
Science and Engineering Division.

CLG:LAZ

C:\QCWork\Sharedwd\2001\11213064.doc

Thea Foss Uplands
Hick's Bull
AJ212M

Sample ID	Laboratory ID	Matrix
HB MW02	20011213064	Groundwater
HB MW03	20011213065	Groundwater
UMW-02A	20011213066	Groundwater

Quality Control Data Review

TO: Christopher L. Getchell, Source Control Supervisor

FROM: Lori A. Zboralski, Senior Laboratory Analyst LAZ

DATE: January 3, 2002

SAMPLES

This report concerns the following samples associated with the **Foss Uplands WO# AJ212M:**

Sample Description	Lab #	Sample Matrix	Date Sampled
HB MW02	20011213064	Groundwater	12/10/01
HB MW03	20011213065	Groundwater	12/10/01
UMW-02A	20011213066	Groundwater	12/10/01

HOLDING TIMES

The samples were analyzed within 180 days for Dissolved Metals.

METHODS

The samples were analyzed according to EPA Method 6020.

CALIBRATION AND VERIFICATION

The ICP calibration met method requirements for linearity and accuracy. ICP sensitivities were verified by analysis of standards near the detection limits of the instrument. The recoveries ranged from 98.7 to 111% and all were within laboratory established 50-200% limits.

Independent mid-range standards were analyzed to monitor calibration accuracy for the ICP (ICV and CCV). Acceptable recoveries for ICP must be within 90 to 110%. All ICVs and CCVs had recoveries within acceptable limits.

Standards are required to be run to measure the accuracy of ICP interelement correction factors. These samples ICSA and ICSAB must be run at the beginning and end of each analytical run. The ICSAB recoveries for each element must be within 80 to 120% recovery. The recoveries of the ICSAB for the analysis of these samples ranged from 93.2 to 99.4%.

METHOD AND CALIBRATION BLANKS

Method and calibration blanks were analyzed at the required frequencies for the methods. The concentrations of these blanks were less than $1/5^{th}$ the amount found in the sample or less than the detection limit.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples (LCS) monitor the analytical system by carrying a standard through every step of the analytical method including extraction or digestion. All LCS recoveries were within laboratory established control limits.

DUPLICATE SAMPLE ANALYSIS

All associated duplicate samples had differences of less than the reporting limits for analytes with concentrations less than 5 times the reporting limits and Relative Percent Differences (RPD) of less than 20% for metals analytes with concentrations greater than 5 times the reporting limits.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Matrix spike analysis was performed for the metals analysis. All recoveries were within the required CLP limits. The spike recoveries were within the method recovery limits.

ICP SERIAL DILUTIONS

Serial dilution of samples analyzed by ICP provides information about physical or chemical interferences that may exist due to sample matrix.

Associated sample HB OB-1 was analyzed at a five-fold dilution. All analytes had %D of the diluted sample compared to the undiluted sample of less than 10% for analytes greater than 50 times the IDL, **except for Copper. The %D for copper was 13%. The copper values for samples HB MW-02, HB MW-03, and UMW-02A are qualified as estimated.**

DATA ASSESSMENT

The following qualifier is assigned to the copper values for samples HB MW-02, HB MW-03, and UMW-02A:

J the value should be considered estimated.

All data including qualified values are acceptable for use.

City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421
Phone: 253.591.5588 Fax: 253.502.2170

Lab#: 20011213064 **Report Date:** January 03, 2002
Sample ID: **HB MW-02**
Sample Type: Water
Sample Collect Date: 12/10/2001
Sample Receipt Date: 12/12/2001

Test	Prep Method:	Analytical Method:	Result		Units	MDL	Lab
ICP-DISS							
Arsenic, Dissolved		6020	**20.6**		ug/L	0.154	STL
Copper, Dissolved		6020	**4.33**	J	ug/L	0.0812	STL
Nickel, Dissolved		6020	**25.8**		ug/L	0.0735	STL

Contracted Laboratory

STL Severn Trent - Seattle 5755 8th St E Tacoma, WA 98424

Flags: U: The value is less than detection limit
UJ: The value is less than detection limit and considered estimated
J: The value is considered estimated
B: The value is less than the reporting limit but greater than detection limit

Lori A. Zboralski January 3, 2002

Reviewed By: **Date**

City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421
Phone: 253.591.5588 Fax: 253.502.2170

Lab#: 20011213065
Sample ID: **HB MW-03**
Sample Type: Water
Sample Collect Date: 12/10/2001
Sample Receipt Date: 12/12/2001

Report Date: January 03, 2002

Test	Prep Method:	Analytical Method:	Result		Units	MDL	Lab
ICP-DISS							
Arsenic, Dissolved		6020	**35.6**		ug/L	0.154	STL
Copper, Dissolved		6020	**6.24**	J	ug/L	0.0812	STL
Nickel, Dissolved		6020	**11.2**		ug/L	0.0735	STL

Contracted Laboratory

STL	Severn Trent - Seattle	5755 8th St E	Tacoma, WA 98424

Flags:
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- UJ: The value is less than detection limit and considered estimated
- J: The value is considered estimated
- B: The value is less than the reporting limit but greater than detection limit

Lori A. Zboralski — **Reviewed By:**

January 3, 2002 — **Date**

City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421
Phone: 253.591.5588 Fax: 253.502.2170

Lab#: 20011213066 **Report Date:** January 03, 2002
Sample ID: **UMW-02A**
Sample Type: Water
Sample Collect Date: 12/10/2001
Sample Receipt Date: 12/13/2001

Test	Prep Method:	Analytical Method:	Result		Units	MDL	Lab
ICP-DISS							
Arsenic, Dissolved		6020	**15.6**		ug/L	0.154	STL
Copper, Dissolved		6020	**3.79**	J	ug/L	0.0812	STL
Nickel, Dissolved		6020	**6.24**		ug/L	0.0735	STL

Contracted Laboratory

STL Severn Trent - Seattle 5755 8th St E Tacoma, WA 98424

Flags: U: The value is less than detection limit
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Lori A. Zboralski January 3, 2002
Reviewed By: **Date**

Sample Custody Record

Samples Shipped to: C&T Lab

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Phone: 206-324-9530 FAX: 206-328-5581

HARTCROWSER

JOB [illegible] LAB NUMBER

PROJECT NAME [illegible]

HART CROWSER CONTACT [illegible]

SAMPLED BY: [illegible]

REQUESTED ANALYSIS: Dis. Metals

OBSERVATIONS/COMMENTS/COMPOSITING INSTRUCTIONS: Sent to Severn-Trent Lab (Sound Analytical) 12/13/2001 Bill E

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	Dis. Metals	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS
1213062	OD-1		12/10/01	1720	H_2O	X	1	WO AJ212N
1213063	HD-1			1135			1	
1213064	HB MW-02			2015			1	WO AJ212M
1213065	HB MW-03			1945			1	
1213066	UMW-2A		↓	1950	↓	↓	1	

Handwritten across analysis columns: [illegible] Field Filtered

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE [illegible]	[illegible]	SIGNATURE [illegible]	12/12/01
PRINT NAME [illegible]	TIME	PRINT NAME [illegible]	TIME
COMPANY [illegible]		COMPANY City of Tacoma	1645

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE Bill Emmer	12/13/2001	SIGNATURE [illegible]	12/13/01
PRINT NAME Bill Emmer	TIME	PRINT NAME [illegible]	TIME
COMPANY [illegible]	12:25	COMPANY STL	1225

SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS: Metals: As, Cu, Ni

5 TOTAL NUMBER OF CONTAINERS

SAMPLE RECEIPT INFORMATION
CUSTODY SEALS: ☐YES ☐NO ☐N/A
GOOD CONDITION ☐YES ☐NO
TEMPERATURE
SHIPMENT METHOD: ☐HAND ☐COURIER ☐OVERNIGHT

COOLER NO.: STORAGE LOCATION:

See Lab Work Order No. ______ for Other Contract Requirements

TURNAROUND TIME:
☐ 24 HOURS ☐ 1 WEEK
☐ 48 HOURS ☑ STANDARD
☐ 72 HOURS OTHER ______

file copy

CC: Lori Herman

City of Tacoma
Environmental Services
Science and Engineering
Division

Memorandum

BILL HYATT

TO: Mark D'Andrea, P. E., Project Coordinator, Public Works Engineering

FROM: Christopher L. Getchell, Source Control Supervisor

SUBJECT: Foss Uplands – Hick's Bull WO# AJ212N

DATE: January 3, 2002

Attached are the sample analysis results for the water samples collected by Hart Crowser on December 10, 2001. The samples were collected in association with the Foss Uplands Investigation.

The samples were analyzed at Severn-Trent Laboratories-Seattle (STL-Seattle, formerly known as Sound Analytical Services) by ICP-MS for Dissolved Metals. A detailed Quality Control Data Review report was prepared for these samples and is included with the sample reports.

The copper values for samples OB-1 and HB S-1 are qualified as estimated because of high percent difference for the Serial Dilution matrix check.

If you have any questions concerning these results, call me at (253) 502-2130. Please note the samples associated with this report will be discarded six months from the date of this report unless requested otherwise.

Christopher L. Getchell
Source Control Supervisor,
Science and Engineering Division.

CLG:LAZ

C:\QCWork\Sharedwd\2001\11213062.doc

Thea Foss Uplands
Hick's Bull
AJ212N

Sample ID	Laboratory ID	Matrix
OB-1	20011213062	Groundwater
HB S-1	20011213063	Groundwater

Quality Control Data Review

TO: Christopher L. Getchell, Source Control Supervisor

FROM: Lori A. Zboralski, Senior Laboratory Analyst

DATE: January 3, 2002

SAMPLES

This report concerns the following samples associated with the **Foss Uplands WO# AJ212N:**

Sample Description	Lab #	Sample Matrix	Date Sampled
OB-1	20011213062	Groundwater	12/10/01
HB S-1	20011213063	Groundwater	12/10/01

HOLDING TIMES

The samples were analyzed within 180 days for Dissolved Metals.

METHODS

The samples were analyzed according to EPA Method 6020.

CALIBRATION AND VERIFICATION

The ICP calibration met method requirements for linearity and accuracy. ICP sensitivities were verified by analysis of standards near the detection limits of the instrument. The recoveries ranged from 98.7 to 111% and all were within laboratory established 50-200% limits.

Independent mid-range standards were analyzed to monitor calibration accuracy for the ICP (ICV and CCV). Acceptable recoveries for ICP must be within 90 to 110%. All ICVs and CCVs had recoveries within acceptable limits.

Standards are required to be run to measure the accuracy of ICP interelement correction factors. These samples ICSA and ICSAB must be run at the beginning and end of each analytical run. The ICSAB recoveries for each element must be within 80 to 120% recovery. The recoveries of the ICSAB for the analysis of these samples ranged from 93.2 to 99.4%.

METHOD AND CALIBRATION BLANKS

Method and calibration blanks were analyzed at the required frequencies for the methods. The concentrations of these blanks were less than $1/5^{th}$ the amount found in the sample or less than the detection limit.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples (LCS) monitor the analytical system by carrying a standard through every step of the analytical method including extraction or digestion. All LCS recoveries were within laboratory established control limits.

DUPLICATE SAMPLE ANALYSIS

All associated duplicate samples had differences of less than the reporting limits for analytes with concentrations less than 5 times the reporting limits and Relative Percent Differences (RPD) of less than 20% for metals analytes with concentrations greater than 5 times the reporting limits.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Matrix spike analysis was performed for the metals analysis. All recoveries were within the required CLP limits. The spike recoveries were within the method recovery limits.

ICP SERIAL DILUTIONS

Serial dilution of samples analyzed by ICP provides information about physical or chemical interferences that may exist due to sample matrix.

Sample HB OB-1 was analyzed at a five-fold dilution. All analytes had %D of the diluted sample compared to the undiluted sample of less than 10% for analytes greater than 50 times the IDL, **except for Copper. The %D for copper was 13%. The copper values for samples OB-1 and HB S-1 are qualified as estimated**.

DATA ASSESSMENT

The following qualifier is assigned to the copper values for samples OB-1 and HB-S-1:

J the value should be considered estimated.

All data including qualified values are acceptable for use.

City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421
Phone: 253.591.5588 Fax: 253.502.2170

Lab#: 20011213062 **Report Date:** January 03, 2002
Sample ID: OB-1
Sample Type: Water
Sample Collect Date: 12/10/2001
Sample Receipt Date: 12/12/2001

Test	Prep Method:	Analytical Method:	Result		Units	MDL	Lab
ICP-DISS							
Arsenic, Dissolved		6020	**42.7**		ug/L	0.154	STL
Copper, Dissolved		6020	**9.05**	J	ug/L	0.0812	STL
Nickel, Dissolved		6020	**10.8**		ug/L	0.0735	STL

Contracted Laboratory

STL Severn Trent - Seattle 5755 8th St E Tacoma, WA 98424

Flags:
- U: The value is less than detection limit
- UJ: The value is less than detection limit and considered estimated
- J: The value is considered estimated
- B: The value is less than the reporting limit but greater than detection limit

Lori A. Zboralski — **Reviewed By:**
January 3, 2002 — **Date**

City of Tacoma

Science and Engineering Division

2201 Portland Avenue Tacoma WA 98421
Phone: 253.591.5588 Fax: 253.502.2170

Lab#: 20011213063 **Report Date:** January 03, 2002
Sample ID: HB S-1
Sample Type: Water
Sample Collect Date: 12/10/2001
Sample Receipt Date: 12/12/2001

Test	Prep Method:	Analytical Method:	Result		Units	MDL	Lab
ICP-DISS							
Arsenic, Dissolved		6020	**38.8**		ug/L	0.154	STL
Copper, Dissolved		6020	**7.16**	J	ug/L	0.0812	STL
Nickel, Dissolved		6020	**10.7**		ug/L	0.0735	STL

Contracted Laboratory

STL Severn Trent - Seattle 5755 8th St E Tacoma, WA 98424

Flags:
- U: The value is less than detection limit
- UJ: The value is less than detection limit and considered estimated
- J: The value is considered estimated
- B: The value is less than the reporting limit but greater than detection limit

Lori A. Zboralski January 3, 2002

Reviewed By: **Date**

City of Tacoma
Department of Public Works
Special Projects Section
747 Market Street, Room 644
Tacoma, WA 98402-3769

RECEIVED
JAN 21 2002
HART CROWSER, INC.

LETTER OF TRANSMITTAL

TO:	DATE: January 18, 2002	JOB NO.AJ212M/N/SA 1336
Hart Crowser, Inc. 1910 Fairview Avenue East Seattle, WA 98102-3699	ATTENTION: Joseph Morrice	
	RE: **Foss Uplands**	
	Dock Street North	
	Sample Analysis	

WE ARE SENDING YOU [X] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications

[ ] Copy of letter [ ] Change order [ ] _____

COPIES	DATE	NO.	DESCRIPTION
1	November 26, 2001		Industrial Monitoring October 26, 2002 samples - lab analysis
1	January 3,2002		Hicks-Bull December 10, 20001 samples – lab analysis
1	January 3,2002		Hicks-Bull December 10, 20001 samples – lab analysis

THESE ARE TRANSMITTED as checked below:

[ ] For approval [ ] Approved as submitted [ ] Resubmit _____ copies for approval

[X] For your use [ ] Approved as noted [ ] Submit _____ copies for distribution

[X] As requested [ ] Returned for corrections [ ] Return _____ corrected prints

[ ] For review and comments [ ] _____

[ ] FOR BIDS DUE : [ ] PRINTS RETURNED AFTER LOAN TO US

REMARKS :

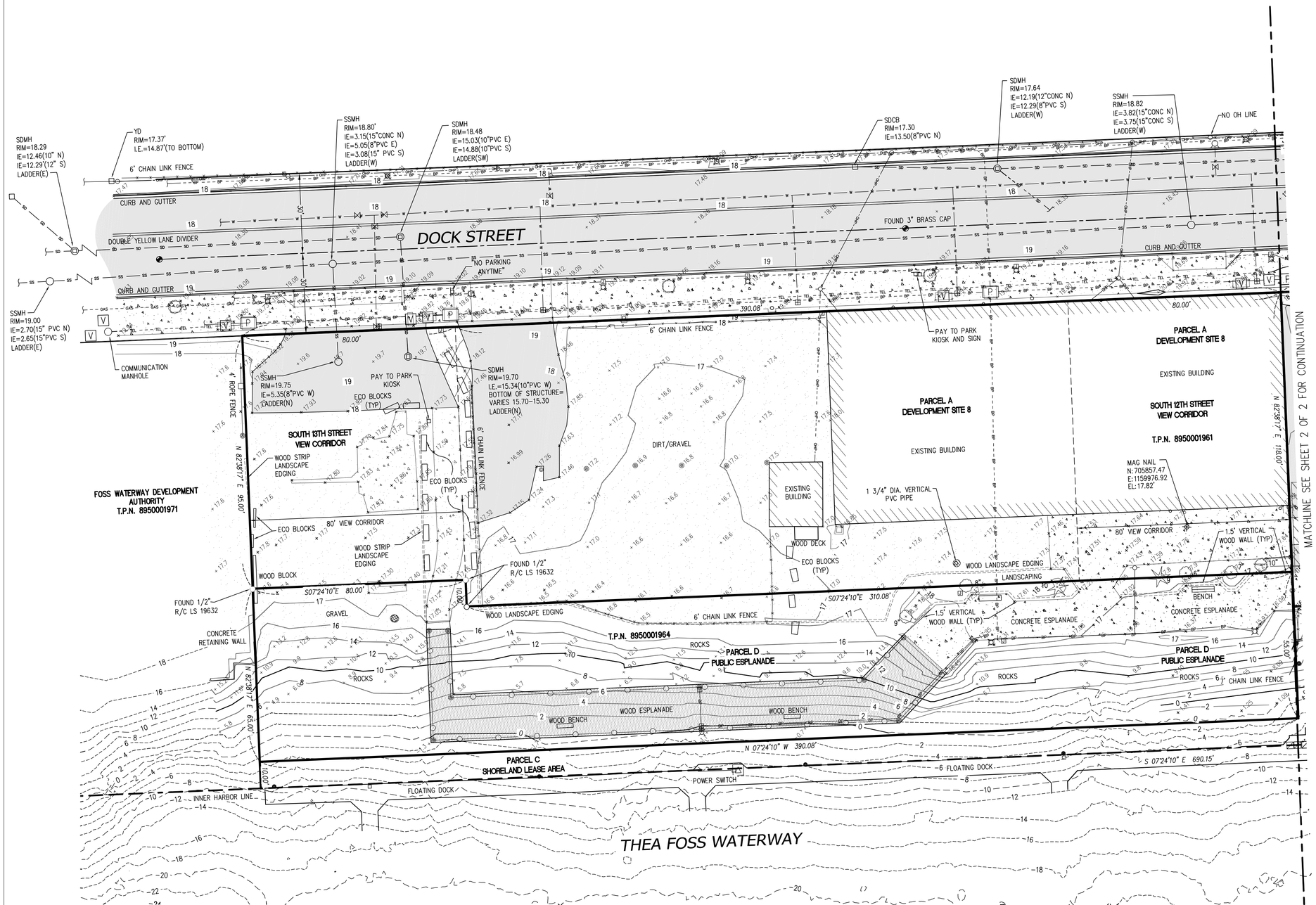
Please contact me should you have any questions or comments at 591-5864.

CC: File:

SIGNED: _____
For Bill Iyall

I:\PUBLIC\Special_Projects\Store\THEA FOSS\Transmittal- HC_JM2.doc

APPENDIX C
Sitts & Hill Survey Drawing



NORTH

HORIZONTAL SCALE: 1"=20'

20 0 20 40

LEGEND

- FOUND MONUMENT
- FOUND REBAR/CAP AS NOTED
- SURVEY CONTROL POINT
- TELEPHONE/TV RISER
- COMMUNICATION MANHOLE
- UNKNOWN VAULT
- POWER METER
- JUNCTION BOX
- LIGHT
- UTILITY POLE
- GUY ANCHOR
- POWER TRANSFORMER
- POWER VAULT
- GAS METER
- CATCH BASIN
- STORM DRAIN MANHOLE
- CLEAN OUT
- SANITARY SEWER MANHOLE EXCEPT AS NOTED
- WATER METER
- WATER MANHOLE
- FIRE HYDRANT
- WATER VAULT
- GATE VALVE
- FIRE DEPARTMENT CONNECTION
- BOLLARD
- FENCE/GATE POST
- MONITOR WELL
- SIGN
- COLUMN
- HANDICAP PARKING
- DECIDUOUS TREE
- EVERGREEN TREE
- SPOT ELEVATION

- BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- RIGHT OF WAY LINE
- HARBOR LINE
- BURIED STORM DRAIN LINE (FIELD LOCATED)
- BURIED STORM DRAIN LINE (RECORD)
- BURIED SANITARY SEWER LINE
- BURIED POWER LINE (FIELD LOCATED)
- BURIED POWER LINE (RECORD)
- OVERHEAD POWER LINE (FIELD LOCATED)
- OVERHEAD POWER LINE (RECORD)
- BURIED WATER LINE
- BURIED COMMUNICATION LINE (FIELD LOCATED)
- BURIED COMMUNICATION LINE (RECORD)
- BURIED GAS LINE (RECORD)
- UNKNOWN UTILITY CONDUIT
- CHAIN LINK FENCE AS NOTED
- RAILING LINE
- ROPE FENCE AS NOTED
- MINOR CONTOUR
- MAJOR CONTOUR
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE

HORIZONTAL DATUM

WASHINGTON STATE PLANE COORDINATE SYSTEM NAD 83/91 SOUTH ZONE PER CITY OF TACOMA

VERTICAL DATUM

PROJECT BM:
CITY OF TACOMA MON NO. 2063
DESCRIPTION: BRASS SURFACE MONUMENT ON THE EAST SIDE OF DOCK STREET, IN FRONT OF 535 DOCK STREET.
CITY OF TACOMA PUBLISHED ELEVATION:
NGVD 29 = 10.21'
CONVERSION TO MLLW = 16.19'

PROJECT TBM:
BRASS CAP MONUMENT INTERSECTION OF SOUTH 11TH STREET AND DOCK STREET
ELEVATION = 18.20 MLLW

NOTES

1. BOUNDARY AS SHOWN HEREON PER BOUNDARY LINE ADJUSTMENT FOR THE CITY OF TACOMA RECORDED UNDER PIERCE COUNTY RECORDING NUMBER 200112145005 WHICH IS A RE-RECORDING OF RECORDING NUMBER 200111025001. SITTS & HILL ENGINEERS PERFORMED NO ADDITIONAL BOUNDARY ANALYSIS AS PART OF THIS PROJECT. THIS SURVEY DOES NOT PURPORT TO SHOW ANY OR ALL EASEMENTS OF RECORD.

2. INITIAL FIELD WORK PERFORMED FOR THIS SURVEY IN MARCH 2011 AND COMPLETED IN APRIL 2013.

3. THIS SURVEY WAS PERFORMED BY FIELD TRAVERSE WITH THE FINAL RESULTS MEETING OR EXCEEDING THE CURRENT TRAVERSE STANDARDS CONTAINED IN W.A.C. 332-130-090. MEASUREMENTS WERE MADE WITH A TOPCON QS TOTAL STATION IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S SPECIFICATIONS.

4. THE PURPOSE OF THIS SURVEY IS TO PROVIDE A BASEMAP OF CURRENT CONDITIONS AS THEY APPEAR ON THE GROUND AS OF APRIL 2013.

5. UTILITY INFORMATION SHOWN HEREON IS BASED ON SURFACE EVIDENCE OBSERVED DURING FIELD SURVEY. DATA WAS SUPPLEMENTED WITH RECORD DATA FROM THE CITY OF TACOMA PUBLIC UTILITIES, PUGET SOUND ENERGY, CENTURY LINK AND CLICK NETWORK AND IS REPRESENTED BY DASHED UTILITY LINES.

INITIAL UTILITY LOCATES ON PARCEL B, ADJACENT PARCEL C, ADJACENT DOCK ST. AND SO. 11TH ST. WERE PERFORMED BY LOCATING INC. IN MARCH 2011. UNDERGROUND DRY UTILITIES NOT ON OR UNDER THE EXISITNG WOOD DECK MARKED BY LOCATING INC. LOCATING INC. COULD NOT LOCATE WATER LINE DUE TO BEING PLASTIC. UTILITIES UNDER WOOD DECK AND DOWN RAMPS CONSIST OF POWER, WATER & COMMUNICATION LINES UNLESS OTHERWISE SHOWN HEREON.

ADDITIONAL UTILITY LOCATES WERE COORDINATED BY GEOENGINEERS IN APRIL 2013. PARTIAL UTILITY LOCATES WERE PERFORMED IN APRIL 2013 ON PARCELS A, D, ADJACENT PARCEL C AND ADJACENT DOCK ST. ADDITIONAL UTILITIES MAY EXIST AND NEED TO BE FIELD VERIFIED WHICH MAY INCLUDE: GAS, COMMUNICATIONS AND BURIED POWER.

6. NO SPOT ELEVATIONS ARE SHOWN ON THE EXISTING WOOD DECK UNLESS NOTED.

7. STORM MANHOLE AND DRAIN LOCATION APPROXIMATE UNDER PAVEMENT IN LOCATION SPECIFIED ON SHEET 2 OF 2.

8. TIDELAND CONTOURS (DASHED) FROM THE THEA FOSS POST CONSTRUCTION SURVEY.

SITTS & HILL ENGINEERS, INC.
CIVIL ■ STRUCTURAL ■ SURVEYING
4815 CENTER STREET ● TACOMA, WA 98409 ● (253) 474-9449

Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE	SCALE
2013-04-24	1"= 20'
DESIGNED	CHECKED
	MAM
DRAWN	PROJECT NAME
SLS	15603
DRAWING NAME	
TOPOGRAPHIC SURVEY	

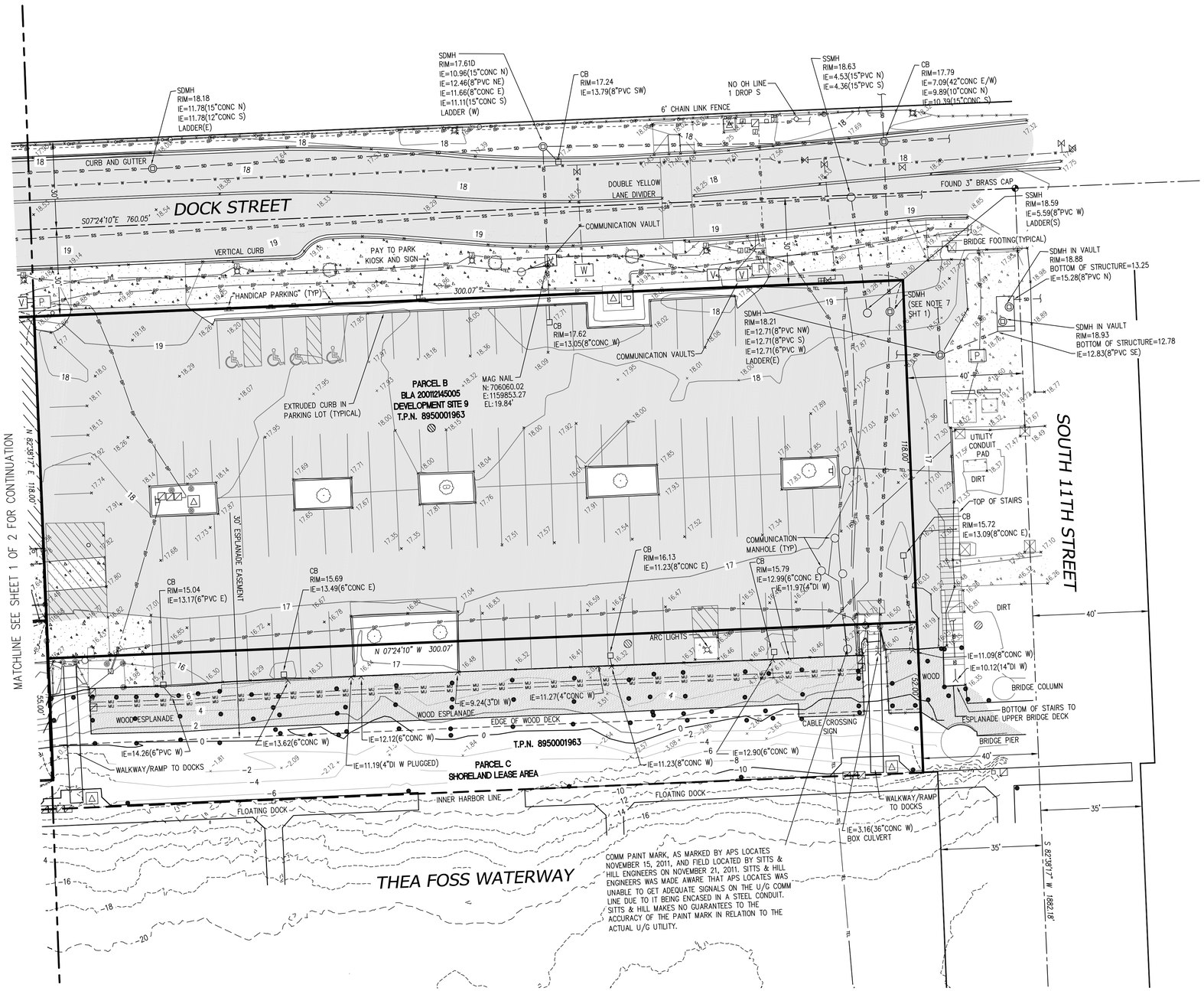
MICHAEL A. McEVILLY — STATE OF WASHINGTON — 24855 — REGISTERED PROFESSIONAL LAND SURVEYOR
PRELIMINARY

ENGINEERING DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

FOSS WATERWAY DEVELOPMENT AUTHORITY TOPOGRAPHIC SURVEY SITE 8 & 9 ESPLANADE

SHEET NO.
SHEET 1 OF 2



NORTH

HORIZONTAL SCALE: 1"=20'

20 0 20 40

LEGEND

- FOUND MONUMENT
- FOUND REBAR/CAP AS NOTED
- SURVEY CONTROL POINT
- TELEPHONE/TV RISER
- COMMUNICATION MANHOLE
- UNKNOWN VAULT
- POWER METER
- JUNCTION BOX
- LIGHT
- UTILITY POLE
- GUY ANCHOR
- POWER TRANSFORMER
- POWER VAULT
- GAS METER
- CATCH BASIN
- STORM DRAIN MANHOLE
- CLEAN OUT
- SANITARY SEWER MANHOLE EXCEPT AS NOTED
- WATER METER
- WATER MANHOLE
- FIRE HYDRANT
- WATER VAULT
- GATE VALVE
- FIRE DEPARTMENT CONNECTION
- BOLLARD
- FENCE/GATE POST
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- HANDICAP PARKING
- DECIDUOUS TREE
- EVERGREEN TREE
- SPOT ELEVATION

- BOUNDARY LINE
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- BURIED POWER LINE (RECORD)
- OVERHEAD POWER LINE (FIELD LOCATED)
- OVERHEAD POWER LINE (RECORD)
- BURIED WATER LINE
- BURIED COMMUNICATION LINE (FIELD LOCATED)
- BURIED COMMUNICATION LINE (RECORD)
- BURIED GAS LINE (RECORD)
- UNKNOWN UTILITY CONDUIT
- CHAIN LINK FENCE AS NOTED
- RAILING LINE
- ROPE FENCE AS NOTED
- MINOR CONTOUR
- MAJOR CONTOUR
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE

SITTS & HILL ENGINEERS, INC.
CIVIL ■ STRUCTURAL ■ SURVEYING
4815 CENTER STREET ● TACOMA, WA 98409 ● (253) 474-9449

Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE	SCALE
2013-04-26	1"= 20'
DESIGNED	CHECKED
	MAM
DRAWN	PROJECT NAME
SLS	15603
DRAWING NAME	
TOPOGRAPHIC SURVEY	

MICHAEL A. MCNEILL — STATE OF WASHINGTON — 24602 — REGISTERED PROFESSIONAL LAND SURVEYOR

PRELIMINARY

ENGINEERING DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

FOSS WATERWAY DEVELOPMENT AUTHORITY
TOPOGRAPHIC SURVEY
SITE 8 & 9 ESPLANADE

SHEET NO.
SHEET 2 OF 2

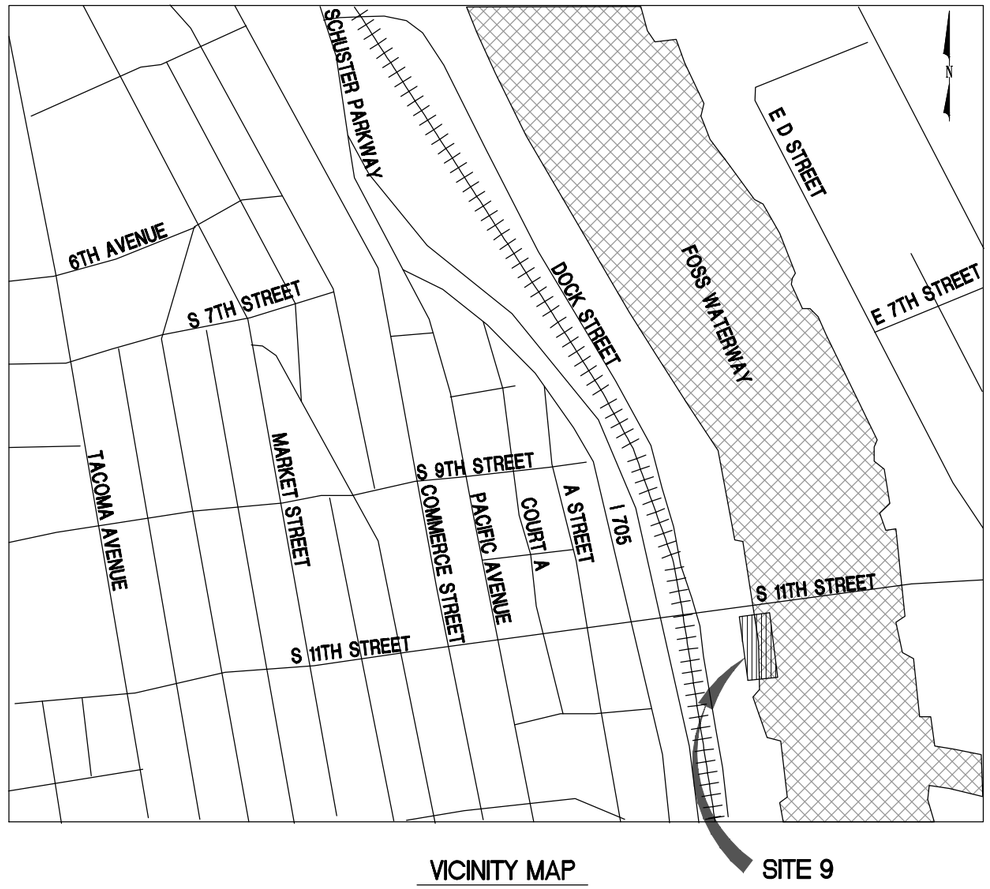
APPENDIX D
Emergency Interim Action Documentation

Engineering Design Plans

SITE 9 BULKHEAD WALL REMOVAL

CITY OF TACOMA PROJECT NUMBER:

SHEET INDEX		
SHT #	DWG #	TITLE
GENERAL		
1	CV1	COVER SHEET
2	SV1	TOPOGRAPHIC SURVEY
3	G1	CONSTRUCTION ACCESS, STAGING AND SEQUENCING PLAN
CIVIL		
4	C1	DEMOLITION AND TESC PLAN
5	C2	DEMOLITION SECTIONS
6	C3	DEMOLITION AND TESC DETAILS AND NOTES
7	C3.1	CITY OF TACOMA TREE PROTECTION DETAILS
8	C4	SITE, PAVING AND HORIZONTAL CONTROL PLAN
9	C5	GRADING AND DRAINAGE PLAN
10	C6	SLOPE PROTECTION SECTION
11	C7	SLOPE PROTECTION DETAILS
12	C8	MISCELLANEOUS CIVIL SECTIONS
13	C9	MISCELLANEOUS CIVIL SECTION AND DETAILS
14	C10	MISCELLANEOUS CIVIL DETAILS
STRUCTURAL		
15	S1	EXISTING GANGWAY
16	S2	SOUTH GANGWAY FOUNDATION
17	S3	BRIDGE ARC LIGHT FOUNDATION
18	S4	NORTH GANGWAY FOUNDATION
19	S5	NORTH GANGWAY GUARDRAIL



VICINITY MAP

ABBREVIATIONS

AD	–	AREA DRAIN
ALUM	–	ALUMINUM
∠	–	ANGLE
APPROX	–	APPROXIMATELY
BM	–	BENCH MARK
BP	–	BURIED POWER
BYD	–	BEYOND
CB	–	CATCH BASIN
CL	–	CENTERLINE
CLR	–	CLEARANCE
CONC	–	CONCRETE
CSBC	–	CRUSHED SURFACING BASE COURSE
CSTC	–	CRUSHED SURFACING TOP COURSE
DTL	–	DETAIL
ø	–	DIAMETER
E	–	EASTING
EA	–	EACH
EL	–	ELEVATION
EX	–	EXISTING
FB	–	FLAT BAR
FF	–	FINISHED FLOOR
FHM	–	FOSS HARBOR MARINA
FL	–	FIRE LINE
FOW	–	FACE OF WALL
FTG	–	FOOTING
GALV	–	GALVANIZED
GA	–	GAUGE
GB	–	GRADE BREAK
HMA	–	HOT MIX ASPHALT
HS	–	HIGH STRENGTH
ID	–	INSIDE DIAMETER
IE	–	INVERT ELEVATION
LF	–	LINEAR FEET
LG	–	LONG
LWD	–	LARGE WOODY DEBRIS
MAX	–	MAXIMUM
MFG	–	MANUFACTURER'S
MIN	–	MINIMUM
MISC	–	MISCELLANEOUS
MHHW	–	MEAN HIGHER HIGH WATER
MLLW	–	MEAN LOWER LOW WATER
MOD	–	MODEL
N	–	NORTHING
NIC	–	NOT IN CONTRACT
OC	–	ON CENTER
OD	–	OUTSIDE DIAMETER
OHWM	–	ORDINARY HIGH WATER MARK
PCC	–	PORTLAND CEMENT CONCRETE
PNTS	–	POINTS
REQ'D	–	REQUIRED
ROW	–	RIGHT–OF–WAY
SDCB	–	STORM DRAIN CATCH BASIN
SEC	–	SECTION
SF	–	SQUARE FEET
SHT	–	SHEET
SOG	–	SLAB ON GRADE
SPEC'S	–	PROJECT SPECIFICATIONS
SSMH	–	SANITARY SEWER MANHOLE
STA	–	STATION
T/	–	TOP OF
TP	–	TOP OF PAVEMENT
TS	–	TOP OF SLAB
TW	–	TOP OF WALL
TYP	–	TYPICAL
UNO	–	UNLESS NOTED OTHERWISE
W	–	WATER
WS	–	WATER SURFACE
WSDOT	–	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

DETAIL (1 / CV1)
SCALE: 1" = 1'–0"

SECTION (A / CV1)
SCALE: 1" = 1'–0"

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE 11/20/13 | SCALE NONE
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STATE OF WASHINGTON STEVEN WADE KNOWLES 32791 REGISTERED PROFESSIONAL ENGINEER 11/20/13

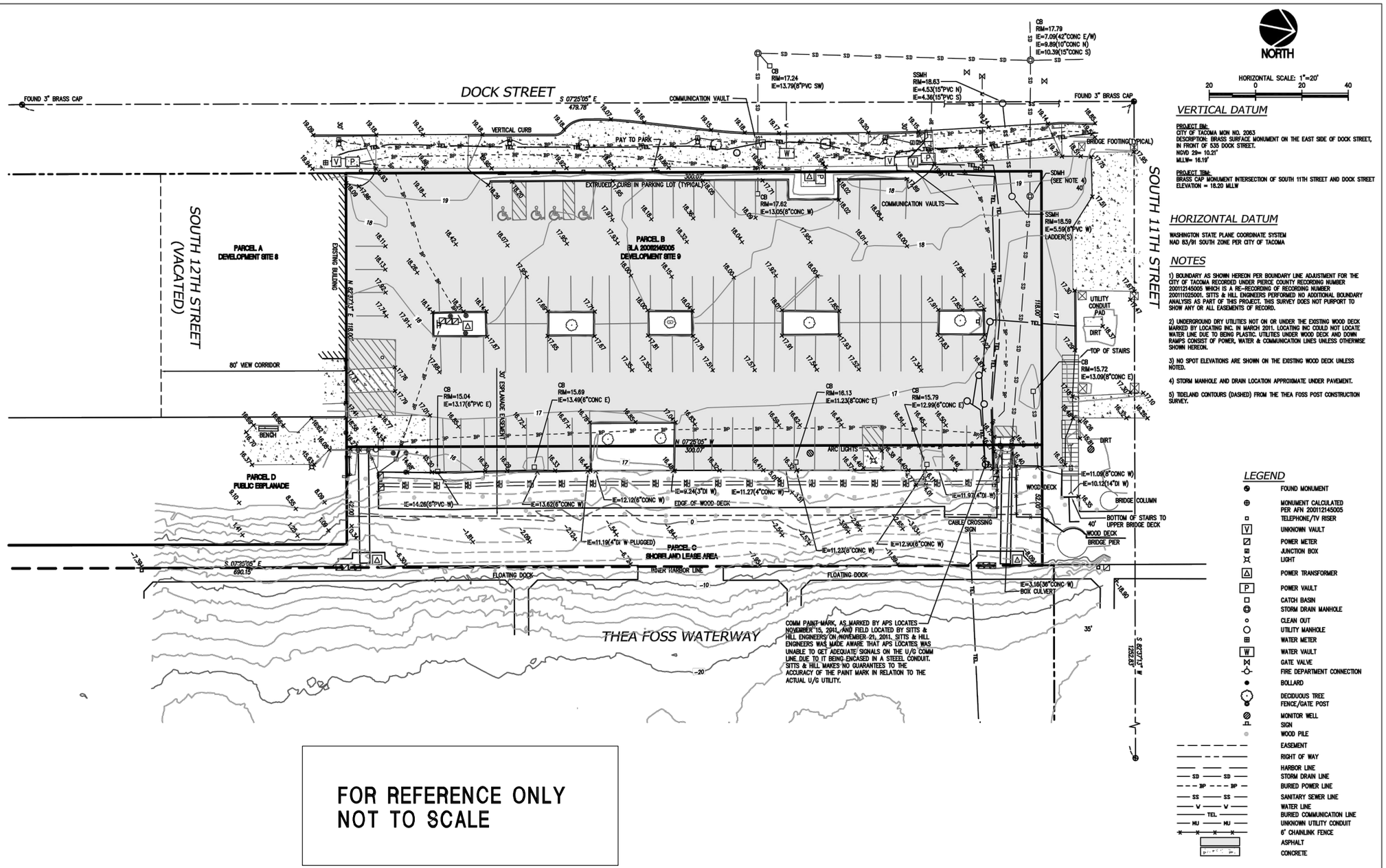
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
COVER SHEET

SHEET NO. CV1
SHEET 1 OF 19

PLOTTED BY: bosterhou DATE & TIME: Nov. 20, 2013 – 11:30am FILE: C:\Users\rebekaho\appdata\local\temp\AcePublish_628A\CV1 Cover Sheet.dwg



VERTICAL DATUM

PROJECT BM:
CITY OF TACOMA MON NO. 2063
DESCRIPTION: BRASS SURFACE MONUMENT ON THE EAST SIDE OF DOCK STREET, IN FRONT OF 535 DOCK STREET.
NGVD 29= 10.21'
MLLW= 16.19'

PROJECT TBM:
BRASS CAP MONUMENT INTERSECTION OF SOUTH 11TH STREET AND DOCK STREET
ELEVATION = 18.20 MLLW

HORIZONTAL DATUM

WASHINGTON STATE PLANE COORDINATE SYSTEM
NAD 83/91 SOUTH ZONE PER CITY OF TACOMA

NOTES

1) BOUNDARY AS SHOWN HEREON PER BOUNDARY LINE ADJUSTMENT FOR THE CITY OF TACOMA RECORDED UNDER PIERCE COUNTY RECORDING NUMBER 200112145005 WHICH IS A RE-RECORDING OF RECORDING NUMBER 200111025001. SITTS & HILL ENGINEERS PERFORMED NO ADDITIONAL BOUNDARY ANALYSIS AS PART OF THIS PROJECT. THIS SURVEY DOES NOT PURPORT TO SHOW ANY OR ALL EASEMENTS OF RECORD.

2) UNDERGROUND DRY UTILITIES NOT ON OR UNDER THE EXISTING WOOD DECK MARKED BY LOCATING INC. IN MARCH 2011. LOCATING INC COULD NOT LOCATE WATER LINE DUE TO BEING PLASTIC. UTILITIES UNDER WOOD DECK AND DOWN RAMPS CONSIST OF POWER, WATER & COMMUNICATION LINES UNLESS OTHERWISE SHOWN HEREON.

3) NO SPOT ELEVATIONS ARE SHOWN ON THE EXISTING WOOD DECK UNLESS NOTED.

4) STORM MANHOLE AND DRAIN LOCATION APPROXIMATE UNDER PAVEMENT.

5) TIDELAND CONTOURS (DASHED) FROM THE THEA FOSS POST CONSTRUCTION SURVEY.

LEGEND

- FOUND MONUMENT
- MONUMENT CALCULATED PER AFN 200112145005
- TELEPHONE/TV RISER
- UNKNOWN VAULT
- POWER METER
- JUNCTION BOX
- LIGHT
- POWER TRANSFORMER
- POWER VAULT
- CATCH BASIN
- STORM DRAIN MANHOLE
- CLEAN OUT
- UTILITY MANHOLE
- WATER METER
- WATER VAULT
- GATE VALVE
- FIRE DEPARTMENT CONNECTION
- BOLLARD
- DECIDUOUS TREE
- FENCE/GATE POST
- MONITOR WELL
- SIGN
- WOOD PILE
- EASEMENT
- RIGHT OF WAY
- HARBOR LINE
- STORM DRAIN LINE
- BURIED POWER LINE
- SANITARY SEWER LINE
- WATER LINE
- BURIED COMMUNICATION LINE
- UNKNOWN UTILITY CONDUIT
- 6' CHAINLINK FENCE
- ASPHALT
- CONCRETE

FOR REFERENCE ONLY
NOT TO SCALE

100% DESIGN SUBMITTAL

SITTS & HILL ENGINEERS, INC.
CIVIL ■ STRUCTURAL ■ SURVEYING
4815 CENTER STREET ● TACOMA, WA 98409 ● (253) 474-9449

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED BY DATE FIELD BOOKS
DATE 2011-08-11 | SCALE 1"= 20'
DESIGNED | CHECKED MAM
DRAWN TJH | PROJECT NAME 14981
DRAWING NAME TOPOGRAPHIC SURVEY

ROBERT N. ECO — STATE OF WASHINGTON — 19006 — REGISTERED PROFESSIONAL LAND SURVEYOR — 11/26/2013

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION MANAGER

FOSS WATERWAY DEVELOPMENT AUTHORITY
TOPOGRAPHIC SURVEY
SITE 9 ESPLANADE

SHEET NO. SHEET 2 OF 41

CONSTRUCTION SET

PLOTTED BY: bcatterlin@DATE & TIME: Nov 20, 2013 - 11:32am FILE: N:\Struct\113-\113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\SV1 TOPO SURVEY.dwg

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

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NO	REVISION	DATE	APPD

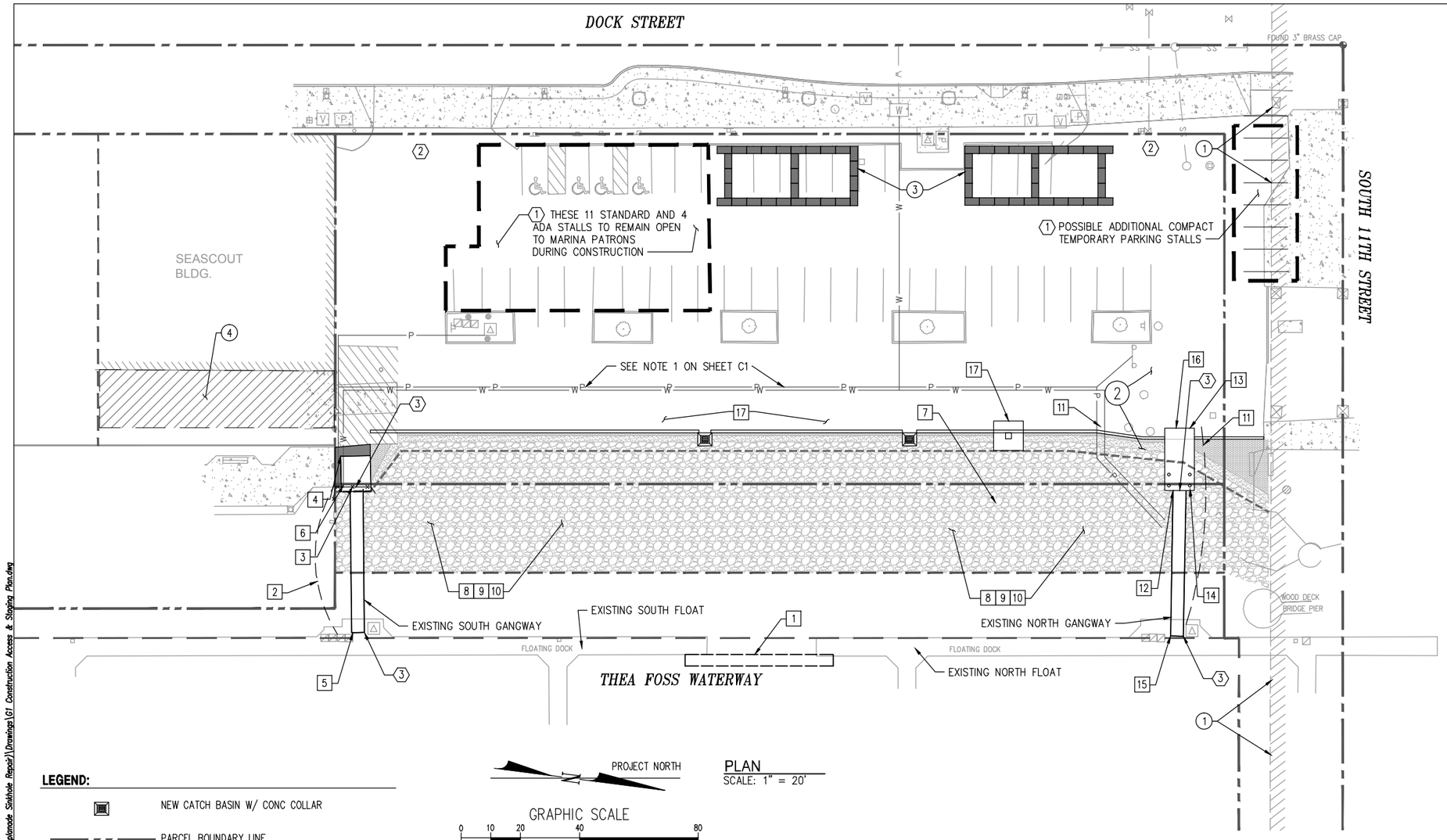
FINAL CONSTRUCTION CHECKED BY DATE FIELD BOOKS
DATE 11/20/13 | SCALE AS SHOWN
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KNOX — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/26/13

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS
ASST. CONSTRUCTION DIVISION MANAGER

SITE 9 BULKHEAD WALL REMOVAL
TOPOGRAPHIC SURVEY

SHEET NO. SV1
SHEET 2 OF 19



PROJECT NORTH

PLAN
SCALE: 1" = 20'

GRAPHIC SCALE
0 10 20 40 80
1 inch = 20 ft.

LEGEND:

- NEW CATCH BASIN W/ CONC COLLAR
- PARCEL BOUNDARY LINE
- NEW CAP RIPRAP
- NEW CAP FILTER MATERIAL
- NEW CRUSHED ROCK
- NEW CONC PAVEMENT
- NEW TYPE 6 EXTRUDED CURB (2 / C10)

STAGING NOTES FOR MARINA PARKING LOT:

THE EXISTING PARKING LOT CONTAINS 38 STANDARD PARKING STALLS AND 4 ADA PARKING STALLS DEDICATED FOR USE BY MARINA PATRONS. THIS SAME NUMBER OF PARKING STALLS IS TO REMAIN AVAILABLE TO MARINA PATRONS THROUGHOUT CONSTRUCTION.

(1) THE SUGGESTED CONSTRUCTION PHASING PLAN MAINTAINS 11 STANDARD AND 4 ADA PARKING STALLS AND MAY SUPPORT 7 ADDITIONAL COMPACT PARKING STALLS. THE CONTRACTOR SHALL COORDINATE WITH FOSS HARBOR MARINA (FHM) AND THE CITY TO OPEN THE ADJACENT MUNICIPAL DOCK LOT (OR AN APPROPRIATE ALTERNATIVE) FOR MARINA PARKING AND MAINTAIN 24 HOURS/7 DAYS A WEEK ACCESS BETWEEN THE LOT AND THE MARINA FLOATS.

(2) THE CONTRACTOR SHALL MAINTAIN LOT ENTRANCE ACCESSIBILITY AT A MINIMUM OF ONE LOCATION AT ALL TIMES THROUGHOUT CONSTRUCTION.

(3) THE CONTRACTOR SHALL MAINTAIN ACCESS TO AT LEAST ONE GANGWAY AT ALL TIMES THROUGHOUT CONSTRUCTION.

(4) CONTRACTOR SHALL SUBMIT A PROPOSED VEHICLE AND PATRON ACCESS PLAN TO THE CITY AND FHM FOR REVIEW AND OBTAIN APPROVAL PRIOR TO COMMENCING CONSTRUCTION.

KEY NOTES:

(1) S. 11TH BRIDGE DECK ABOVE. CONTRACTOR TO VERIFY OVERHEAD CLEARANCES.

(2) **EXACT LOCATION OF EXISTING FIBER OPTIC TELECOMMUNICATIONS CABLE IS UNKNOWN. CONTRACTOR TO LOCATE CABLE(S) (HORIZONTALLY AND VERTICALLY) PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL NOTIFY ENGINEER OF ANY CONFLICTS. DUE TO THE LOCATION AND CRITICAL NATURE OF THE TELECOMMUNICATIONS LINK HOUSED WITHIN THE CROSSING, THE CONTRACTOR SHALL COORDINATE WITH THE CENTURYLINK FIELD ENGINEER AND RISK MANAGEMENT STAFF TO CREATE A CONTINGENCY PLAN FOR POTENTIAL DISRUPTION PRIOR TO THE START OF CONSTRUCTION.**

(3) SOIL STOCKPILE/DEWATERING AREA. PROVIDED AREA NOT CAPABLE OF CONTAINING ALL EXCAVATION SPOILS OF PROJECT. SITE SOILS TO BE SAMPLED, TESTED, AND PRE-QUALIFIED FOR PROPER DISPOSAL PRIOR TO THE START OF EXCAVATION TO MINIMIZE SOIL STOCK PILING ON SITE.

(4) CONTRACTOR STAGING AREA.

SUGGESTED SEQUENCE OF WORK:

THE SUGGESTED SEQUENCE SHOWN BELOW IS INTENDED TO ILLUSTRATE THE PROBABLE PHASES OF WORK THAT WILL BE REQUIRED TO COMPLETE THIS PROJECT. THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING A FORMAL WORK PLAN FOR THE PROJECT THAT COMPLIES WITH ALL PROVISIONS OF THE CONTRACT DOCUMENTS, INCLUDING PERMIT RESTRICTIONS ON IN-WATER WORK ACTIVITIES. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE TO COORDINATE ALL WORK ACTIVITIES WITH THE CITY AND THE FHM.

PHASE SEQUENCING

1. CITY TO INSTALL A TEMPORARY MARINA FLOAT WHERE INDICATED. TEMPORARY MARINA FLOAT WILL STAY IN PLACE UNTIL SOUTH AND NORTH GANGWAYS ARE REPLACED AND FUNCTIONAL.
2. CONTRACTOR TO DISCONNECT EXISTING UTILITIES (SEE NOTE 1 ON SHEET C1) AT EXISTING SOUTH GANGWAY AND PROVIDE TEMPORARY UTILITY CONNECTIONS TO SOUTH MARINA FLOATS. A MINIMUM 24 HOUR NOTICE OF UTILITY SHUTDOWN SHALL BE GIVEN TO THE MARINA AND SHUTDOWN OF UTILITY SERVICE TO MARINA SHALL BE NO MORE THAN 8 HOURS.
3. CONTRACTOR TO REMOVE EXISTING SOUTH GANGWAY AND SECURITY FENCE AND DEMOLISH ABUTMENT.
4. CONTRACTOR TO CONSTRUCT GANGWAY PLATFORM FOR THE SOUTH GANGWAY, SEE STRUCTURAL DRAWINGS.
5. CONTRACTOR TO REINSTALL EXISTING SOUTH GANGWAY.
6. CONTRACTOR TO RESTORE UTILITIES ON SOUTH GANGWAY, REMOVE TEMPORARY UTILITY CONNECTION AND CONSTRUCT SECURITY ENCLOSURE.
7. CONTRACTOR TO DEMOLISH EXISTING ARC LIGHT FOUNDATION. (ARC LIGHT TO BE REUSED)
8. CONTRACTOR TO REMOVE EXISTING TIMBER ESPLANADE, WOOD DECKING AND ASSOCIATED PILES IN CONJUNCTION WITH BANK REPAIR AS DESCRIBED BELOW.
9. CONTRACTOR TO START BANK REPAIR AT SOUTH END OF SITE. BANK REPAIR WILL BE DONE IN 25 FOOT TO 50 FOOT SECTIONS AND WILL BE CONDUCTED DURING NIGHT TIME LOW TIDES. EXCAVATION WILL BEGIN AT LOWEST POINT AND PROGRESS TO EXISTING BULKHEAD.
10. CONTRACTOR TO REMOVE EXISTING SECTION OF BULKHEAD AND EXCAVATE CUT BACK AREA BEHIND BULKHEAD, SEE CIVIL SHEETS. CONTRACTOR WILL FINISH CUTBACK SECTION BY PLACING CAP MATERIAL IMMEDIATELY FOLLOWING EXCAVATION IN EACH SECTION OF WORK.
11. CONTRACTOR TO DISCONNECT EXISTING UTILITIES (SEE NOTE 1 ON SHEET C1) TO NORTH GANGWAY. CONTRACTOR TO PROVIDE TEMPORARY UTILITY CONNECTIONS TO NORTH MARINA FLOATS. A MINIMUM 24 HOUR NOTICE OF UTILITY SHUTDOWN SHALL BE GIVEN TO THE MARINA AND SHUTDOWN OF UTILITY SERVICE TO MARINA SHALL BE NO MORE THAN 8 HOURS.
12. CONTRACTOR TO REMOVE EXISTING NORTH GANGWAY AND DEMOLISH ABUTMENT. THE SOUTH GANGWAY SHALL BE OPERATIONAL BEFORE REMOVAL OF NORTH GANGWAY.
13. CONTRACTOR TO CONSTRUCT GANGWAY PLATFORM AND INSTALL PILES FOR THE NORTH GANGWAY, SEE STRUCTURAL DRAWINGS.
14. CONTRACTOR TO COMPLETE PILE DRIVING AND ALL IN-WATER WORK ACTIVITIES NO LATER THAN FEBRUARY 15, 2014 PER THE REQUIREMENTS OF THE PERMITS ACQUIRED FOR THIS PROJECT. SEE PERMIT DOCUMENTATION FOR ADDITIONAL REQUIREMENTS AND INFORMATION.
15. CONTRACTOR TO REINSTALL EXISTING NORTH GANGWAY.
16. CONTRACTOR TO RESTORE UTILITIES ON NORTH GANGWAY, REMOVE TEMPORARY UTILITY CONNECTION AND CONSTRUCT SECURITY ENCLOSURE.
17. CONTRACTOR TO RESTORE SITE ACCORDING TO PLANS, INCLUDING RELOCATION OF EXISTING ARC LIGHT ON NEW FOUNDATION.

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

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NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE 11/20/13 | SCALE AS SHOWN
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KINGSLEY — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

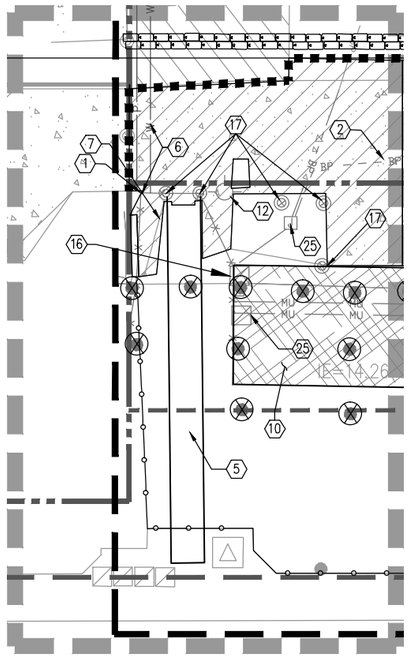
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

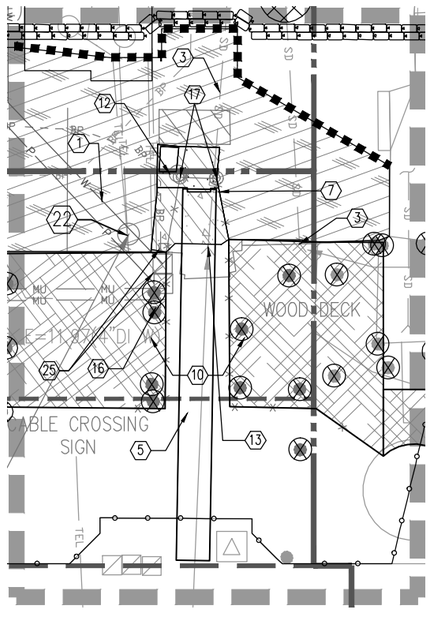
SITE 9 BULKHEAD WALL REMOVAL
CONSTRUCTION ACCESS, STAGING AND SEQUENCING PLAN

SHEET NO. G1
SHEET 3 OF 19

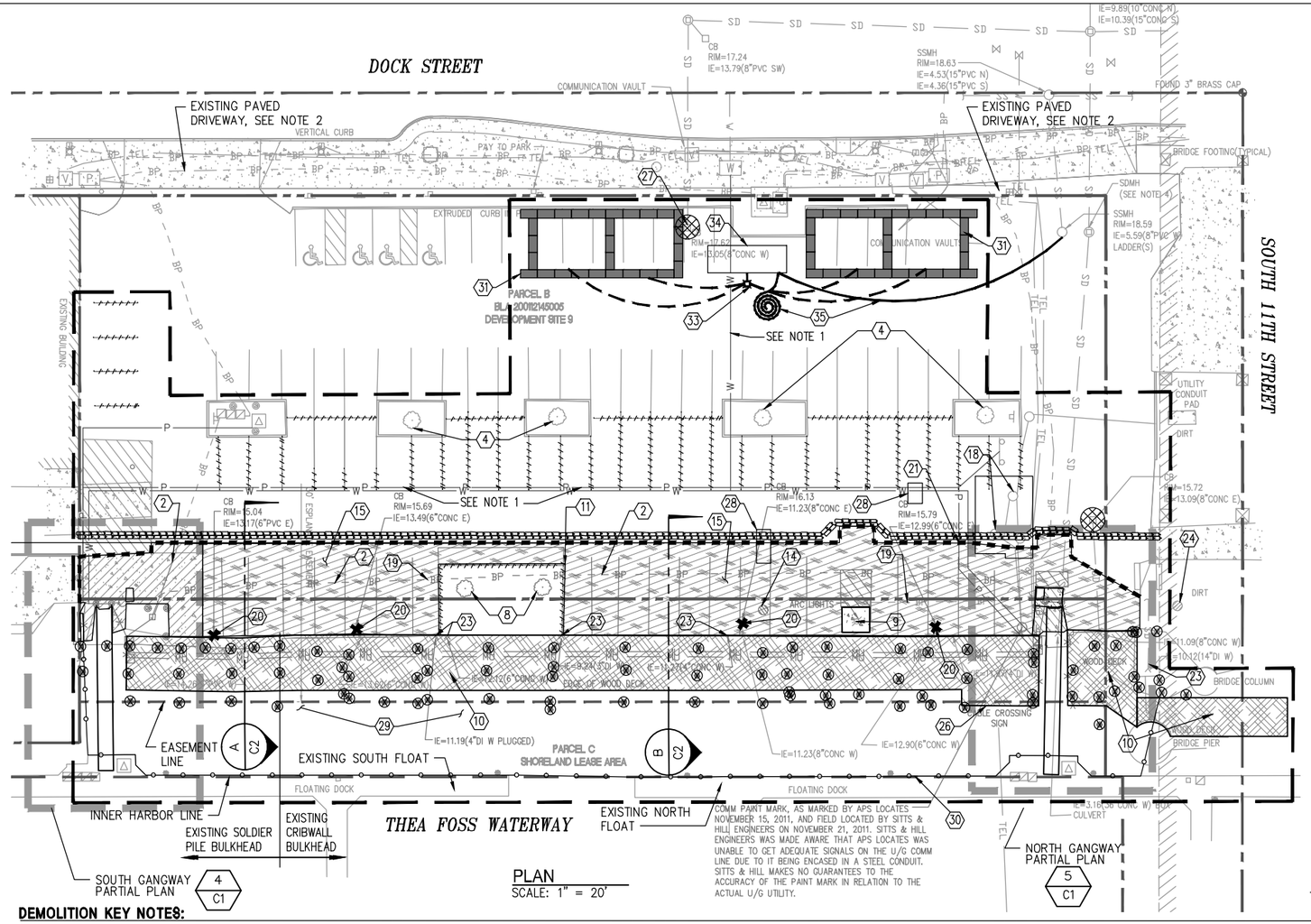
PLOTTED BY: bosterhaudDATE & TIME: Nov 20, 2013 - 11:32am FILE: N:\Struct\113-1\131141 (Site 9 Esplanade Sinkhole Repair)\Drawings\GI Construction Access & Staging Plan.dwg



SOUTH GANGWAY
PARTIAL PLAN
SCALE: 1" = 10'
4 / C1



NORTH GANGWAY
PARTIAL PLAN
SCALE: 1" = 10'
5 / C1



PLAN
SCALE: 1" = 20'

SOUTH GANGWAY
PARTIAL PLAN
4 / C1

NORTH GANGWAY
PARTIAL PLAN
5 / C1

LEGEND:

- REMOVE EXISTING TIMBER ESPLANADE, GANGWAY, WOOD DECKING, AND ASSOCIATED PILES (10)
- REMOVE ASPHALT PAVING
- REMOVE CONCRETE PAVING
- PAVEMENT SAWCUT
- EASEMENT LINE
- SILT CURTAIN
- REMOVE TIMBER PILE SEE DEMOLITION NOTE 8 ON SHEET C3
- CLEARING LIMITS
- REMOVE PAINT LINE/CURB
- PARCEL BOUNDARY LINE
- W — APPROX WATER UTILITY LINE, SEE NOTE 1
- P — APPROX POWER UTILITY LINE, SEE NOTE 1
- (20) REMOVE CATCH BASIN
- INLET PROTECTION (1 / C3)
- SANDBAG BERM (2 / C3)

NOTES:

1. WATER AND POWER LINES SHOWN ON THE PLANS ARE APPROXIMATE BASED ON LOCATION OF ASPHALT PATCHING FROM RECENT UTILITY RELOCATION WORK. RECENT WORK ALSO INCLUDED TELEPHONE AND CABLE UTILITIES NOT SHOWN ON PLAN. CONTRACTOR SHALL CONSULT AS-BUILT DOCUMENTATION AVAILABLE FROM THE CITY FOR MORE INFORMATION REGARDING RELOCATED UTILITIES IN THE PROJECT AREA. ALL OTHER UTILITIES (EXCLUDING STORMWATER AND THE CENTURYLINK OWNED FIBER OPTIC LINE, REFER TO SHEET C9) WITHIN THE PAVEMENT SAW CUT LINE ARE ASSUMED TO HAVE BEEN ABANDONED DURING THE RECENT SITE UTILITY WORK (TO BE VERIFIED BY THE CITY INSPECTOR PRIOR TO CONTRACTOR BEGINNING WORK). THE CONTRACTOR SHALL LOCATE ABANDONED UTILITIES IN THE FIELD AND REMOVE AS NECESSARY FOR SITE GRADING.
2. CONTRACTOR SHALL USE EXISTING PAVED DRIVEWAYS AND PARKING AREAS FOR SITE ACCESS AND VEHICLE CIRCULATION.
3. IN ADDITION TO ALL NOTES HEREIN, THE PROJECT IS SUBJECT TO AND MUST COMPLY WITH ALL APPLICABLE STATE AND FEDERAL PERMITS. SEE PERMIT DOCUMENTATION FOR ADDITIONAL REQUIREMENTS AND INFORMATION.

PROJECT NORTH

DEMOLITION KEY NOTES:

(1) CONTRACTOR TO DISCONNECT AND REROUTE UTILITIES AT TOP OF GANGWAY AND PROVIDE TEMPORARY SUPPORT METHOD BETWEEN MARINA FLOAT AND SHORELINE WHILE GANGWAY IS OUT OF SERVICE.

(2) REMOVE BURIED POWER WITHIN EXCAVATION LIMITS. CITY INSPECTOR TO VERIFY THAT UTILITY IS ABANDONED PRIOR TO CONTRACTOR BEGINNING WORK.

(3) EXISTING STORM PIPE TO REMAIN. PROTECT IN PLACE SEE DEMOLITION NOTE 5 ON SHEET C3.

(4) PROTECT EXISTING TREES. SEE CITY OF TACOMA TREE PROTECTION DETAILS. (6 / C3.1) (7 / C3.1) (8 / C3.1)

(5) GANGWAY TO BE REUSED. PROTECT AND STORE UNTIL RE-INSTALLATION.

(6) PROTECT IN PLACE UTILITIES. SEE NOTE 1.

(7) SECURITY FENCE TO BE REMOVED AND SALVAGED.

(8) REMOVE EXISTING TREES AND STUMPS.

(9) REMOVE AND SALVAGE EXISTING ARC LIGHT AND JUNCTION BOX, RELOCATE AS SHOWN ON SHEET C4. DEMOLISH FOUNDATION.

(10) REMOVE WOOD DECK AND STRINGERS.

(11) REMOVE EXISTING CURB.

(12) REMOVE WATER UTILITY. CITY INSPECTOR TO VERIFY THAT UTILITY IS ABANDONED PRIOR TO CONTRACTOR BEGINNING WORK.

(13) PROTECT IN PLACE EX STORM OUTFALL. REFER TO SECTION E ON SHEET C9.

(14) THE CITY SHALL DECOMMISSION MONITORING WELL. WELL SHALL BE DECOMMISSIONED IN ACCORDANCE WITH WAC 173-160-381 BY A WELL DRILLER LICENSED IN THE STATE OF WASHINGTON.

(15) REMOVE WATER LINE RUNNING NORTH-SOUTH THROUGH EXCAVATION LIMITS (EXACT LOCATION UNKNOWN). CITY INSPECTOR TO LOCATE AND VERIFY THAT UTILITY IS ABANDONED PRIOR TO CONTRACTOR BEGINNING WORK. SEE DEMOLITION NOTE 7 ON SHEET C3.

(16) REMOVE TELEPHONE UTILITY. CITY INSPECTOR TO VERIFY THAT UTILITY IS ABANDONED PRIOR TO CONTRACTOR BEGINNING WORK.

(17) REMOVE EXISTING BOLLARDS.

(18) PROTECT IN PLACE EXISTING CENTURYLINK OWNED COMMUNICATION MANHOLE LIDS AND UNDERGROUND VAULT. APPROXIMATE LOCATION OF UNDERGROUND VAULT SHOWN.

(19) REMOVE ACTIVE BURIED POWER LINE AND RELOCATE AS DESCRIBED ON SHEET C4.

(20) REMOVE STORM DRAIN STRUCTURE AND OUTFALL DRAIN PIPE.

(21) TEMPORARILY RELOCATE EX UTILITIES OUTSIDE OF EXCAVATION AREA AND PROVIDE TEMPORARY CONNECTION TO GANGWAY, SEE NOTE 1 AND SHEET G1.

(22) **PROTECT IN PLACE COMMUNICATION LINE. EXACT LOCATION OF EXISTING FIBER OPTIC TELECOMMUNICATIONS CABLE IS UNKNOWN. CONTRACTOR TO LOCATE CABLE(S) (HORIZONTALLY AND VERTICALLY) PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL NOTIFY ENGINEER OF ANY CONFLICTS. DUE TO THE LOCATION AND CRITICAL NATURE OF THE TELECOMMUNICATIONS LINK HOUSED WITHIN THE CROSSING, THE CONTRACTOR SHALL COORDINATE WITH THE CENTURYLINK FIELD ENGINEER AND RISK MANAGEMENT STAFF TO CREATE A CONTINGENCY PLAN FOR POTENTIAL DISRUPTION PRIOR TO THE START OF CONSTRUCTION.**

(23) OUTFALL SOURCE UNKNOWN. DETERMINE OUTFALL SOURCE. IF ABANDONED, REMOVE OUTFALL. IF ACTIVE SEE NOTE 1 ON SHEET C5.

(24) PROTECT IN PLACE EXISTING MONITORING WELL.

(25) REMOVE ELECTRICAL UTILITY. CITY INSPECTOR TO VERIFY THAT UTILITY IS ABANDONED PRIOR TO CONTRACTOR BEGINNING WORK.

(26) REMOVE AND REINSTALL CABLE CROSSING SIGN. COORDINATE INSTALLATION LOCATION AND MOUNTING WITH THE CITY AND CENTURYLINK.

(27) DO NOT COVER OR BLOCK EXISTING CATCH BASIN

(28) APPROXIMATE LOCATION OF UNDERGROUND TANK. CONTRACTOR SHALL POTHOLE AND DETERMINE EXACT LOCATION AND TYPE IN THE FIELD AND COORDINATE REMOVAL REQUIREMENTS WITH THE CITY.

(29) ABSORBENT BOOM SHALL BE USED DURING ALL PILE EXTRACTION AND SHALL REMAIN IN PLACE UNTIL HOLES CREATED BY PILE EXTRACTION ARE FILLED.

(30) SILT CURTAIN TO BE FASTENED TO MARINA FLOAT

(31) LINED DEWATERING BAY, SEE DEWATERING SEQUENCING NOTES ON SHEET C3. (3 / C3)

(32) NOT USED

(33) DISCHARGE PUMP

(34) BAKER TANK

(35) OPTIONAL DISCHARGE BAKER TANK TO SANITARY SEWER PENDING NECESSARY PERMIT APPROVAL

GRAPHIC SCALE
0 10 20 40 80
1 inch = 20 ft.

GRAPHIC SCALE
0 5 10 20 40
1 inch = 10 ft.

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
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FINAL CONSTRUCTION CHECKED BY DATE
FIELD BOOKS

DATE 11/20/13 | SCALE AS NOTED
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KINCAID — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

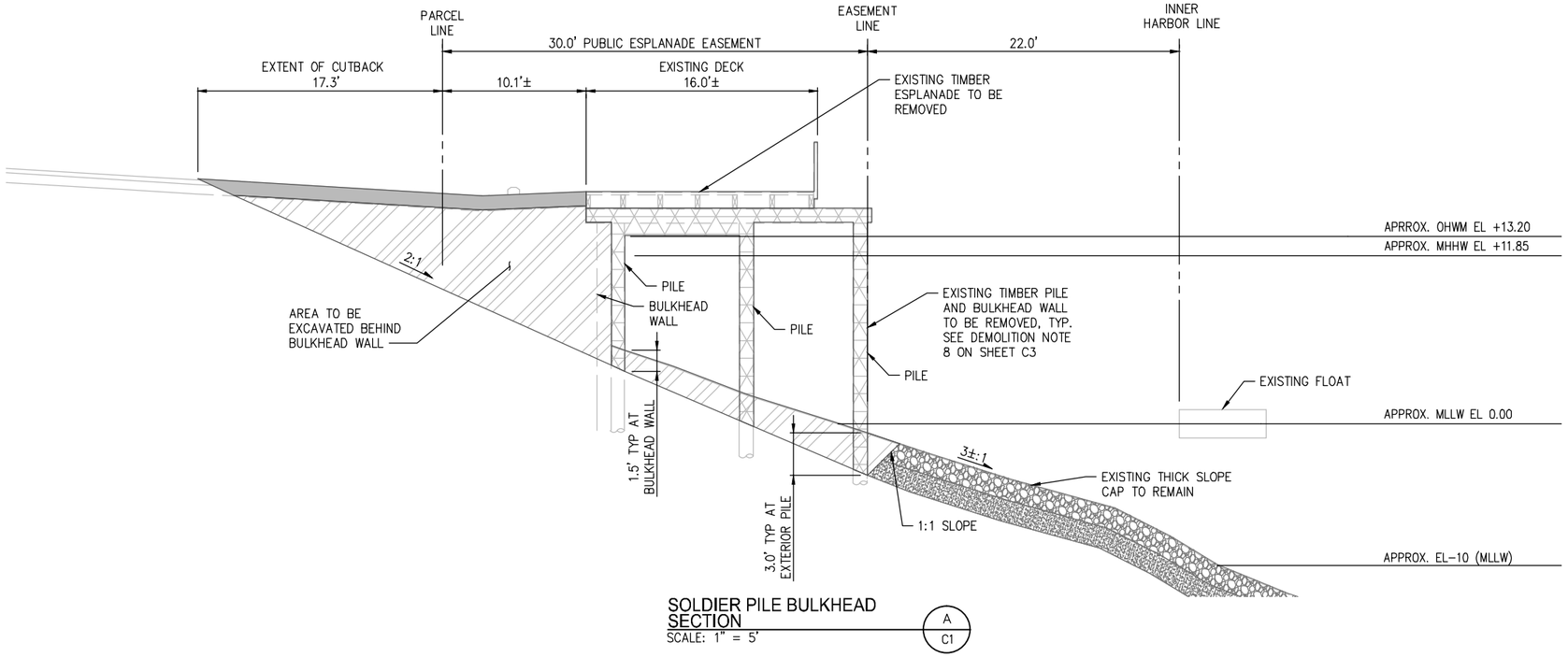
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
DEMOLITION AND TESC PLAN

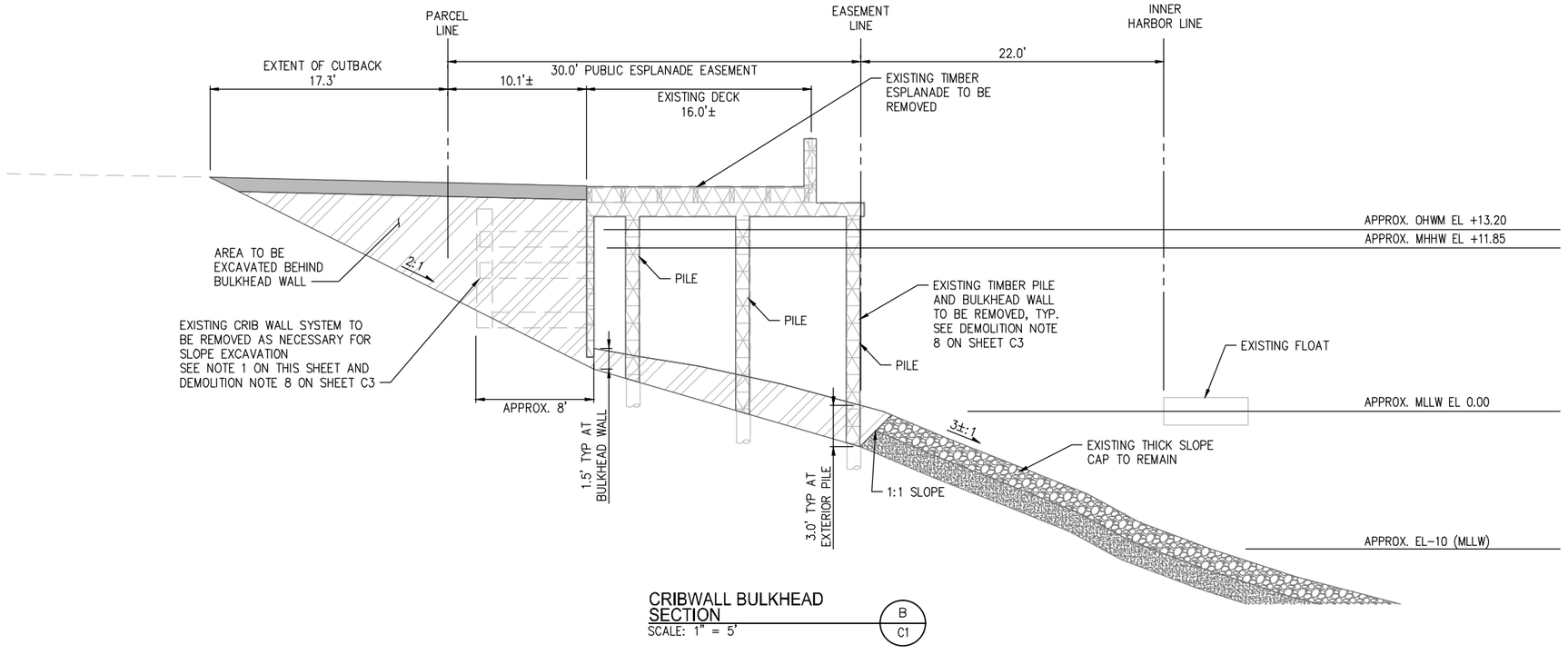
SHEET NO. C1
SHEET 4 OF 19

PLOTTED BY: bosterhout DATE & TIME: Nov 20, 2013 - 11:31am FILE: N:\Struct\173-\173141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C1 Demolition & TESC Plan.dwg



SOLDIER PILE BULKHEAD SECTION
SCALE: 1" = 5'

A
C1



CRIBWALL BULKHEAD SECTION
SCALE: 1" = 5'

B
C1

LEGEND:

PAVEMENT REMOVAL

STRUCTURE REMOVAL

EXCAVATION

NOTES:

1. EXISTING CRIB WALL SYSTEM PER CITY OF TACOMA URBAN ARTERIAL PROJECT NO. 8-1-128(16) CITY IMPROVEMENT NO. 4872 AS-BUILT DRAINAGE DETAILS, DWG NO. C-158 DATED 11/19/73 (INCLUDED ON SHEET C9), ASSUMED TO EXTEND TO LOCATION INDICATED ON SHEET C1.

VERTICAL DATUM:

PROJECT BM:
CITY OF TACOMA MON NO. 2063
CITY PUBLISHED ELEVATION (NGVD '29) = 10.212
MLLW ELEVATION = 16.19
DESCRIPTION: BRASS SURFACE MONUMENT ON THE EAST SIDE OF DOCK STREET, IN FRONT OF 535 DOCK STREET.

PROJECT TBM:
BRASS CAP MONUMENT INTERSECTION OF SOUTH 11TH STREET AND DOCK STREET.
ELEVATION = 18.20 MLLW

GRAPHIC SCALE
0 2.5 5 10 20
1 inch = 5 ft.

CONSTRUCTION SET

PLOTTED BY: bosterhaus DATE & TIME: Nov 20, 2013 - 11:31am FILE: K:\Struct\113-1\113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C2 Demolition and TESC Sections and Details.dwg

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2407 North 31st. Street, Suite 100
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DATE
FIELD BOOKS

DATE	SCALE
11/20/13	AS SHOWI
DESIGNED	CHECKED
RLO	SWK
DRAWN	PROJECT NAME
RLO	
DRAWING NAME	

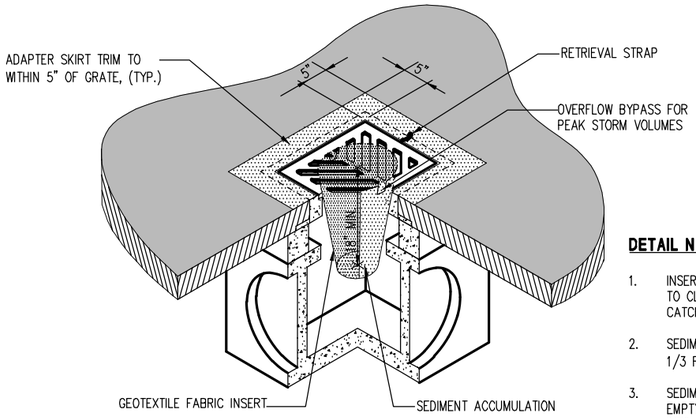
STEVEN WADE KINGERY — STATE OF WASHINGTON — 11/20/13 — 32791 — REGISTERED PROFESSIONAL ENGINEER

ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
DEMOLITION SECTIONS

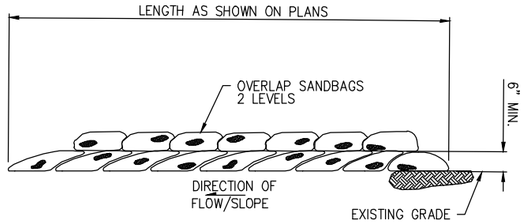
SHEET NO. C2
SHEET 5 OF 19



DETAIL NOTES:

1. INSERT SHALL BE INSTALLED IN ALL OPERATIONAL CATCH BASINS PRIOR TO CLEARING AND GRADING ACTIVITY, OR UPON PLACEMENT OF A NEW CATCH BASIN.
2. SEDIMENT SHALL BE REMOVED FROM THE UNIT WHEN IT BECOMES 1/3 FULL.
3. SEDIMENT REMOVAL SHALL BE ACCOMPLISHED BY REMOVING THE INSERT, EMPTYING INTO APPROPRIATE DISPOSAL LOCATION, AND REINSERTING IT INTO THE CATCH BASIN.
4. INSPECT AFTER EACH STORM EVENT AND CLEAN AND/OR REPLACE WHEN 1/3 FULL OF SEDIMENT.

INLET PROTECTION DETAIL
SCALE: NTS
1 / C1



NOTES:

1. SANDBAGS OF EITHER BURLAP OR WOVEN GEOTEXTILE FABRIC ARE FILLED WITH GRAVEL AND SAND, LAYERED AND PACKED TIGHTLY.
2. INSPECT BARRIERS AND REMOVE SEDIMENT AFTER EACH STORM EVENT.

SANDBAG BERM DETAIL
SCALE: NTS
2 / C1

DEMOLITION NOTES:

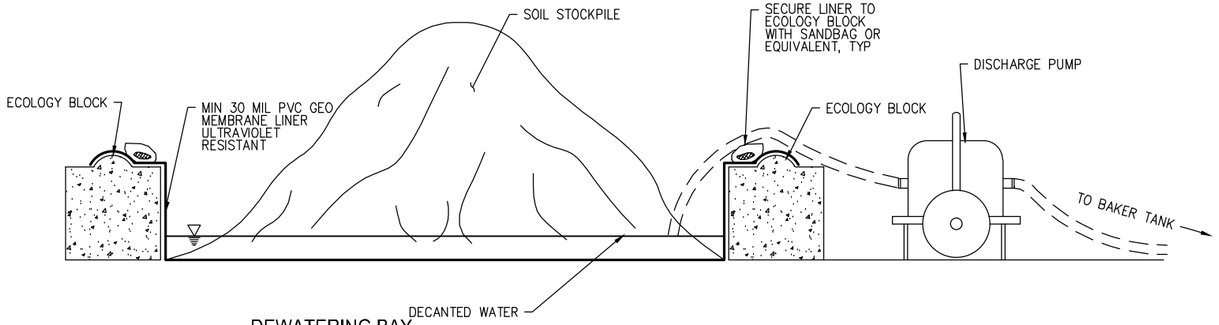
1. DEMOLITION LIMITS OF ASPHALT CONCRETE PAVEMENT TO BE REMOVED SHALL BE SAWCUT.
2. BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION TAKEN FROM A FIELD RUN SURVEY TITLED "TOPOGRAPHIC SURVEY–SITE 9 ESPLANADE" PREPARED BY SITTS AND HILL, DATED 11/21/2011.
3. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF UTILITIES BY CONTACTING A UTILITY LOCATE SERVICE AND SHALL PROVIDE SUFFICIENT NOTIFICATION TO THE AFFECTED UTILITY COMPANIES PRIOR TO STARTING WORK. CONTACT UNDERGROUND UTILITIES LOCATION AT 1–800–424–5555 AT LEAST 48 HOURS BEFORE COMMENCEMENT OF CONSTRUCTION. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN AND TO FURTHER DISCOVER AND AVOID ANY OF THE UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN.
4. MAINTAIN AND PROTECT ALL MANHOLES, CATCH BASINS, FIRE HYDRANTS, MONITORING WELLS, WATER VALVES, PIPING, SURVEY MONUMENTS, OR OTHER IMPROVEMENTS UNLESS OTHERWISE NOTED OR DIRECTED BY THE ENGINEER. CONTRACTOR SHALL REPAIR OR REPLACE ALL ITEMS DAMAGED BY THE CONSTRUCTION OPERATIONS PER THE CONTRACT DOCUMENTS.
5. CONTRACTOR SHALL PROVIDE TV INSPECTION OF EXISTING STORM DRAIN PIPES TO REMAIN AND OUTFALLS PRIOR TO AND AFTER COMPLETION OF CONSTRUCTION. PIPES DAMAGED BY CONSTRUCTION SHALL BE REPAIRED PER CONTRACT DOCUMENTS.
6. REFER TO CONSTRUCTION ACCESS, STAGING AND SEQUENCING PLAN, SEE SHEET G1
7. PRIOR TO RECENT SITE UTILITY WORK, WATER LINE AT GANGWAYS, BETWEEN EXISTING WATER VAULT AT DOCK STREET AND SINGLE CHECK VALVE ENCLOSURES WAS DEEMED UNLOCATABLE BY UTILITY LOCATE COMPANY DURING SITE SURVEY. THESE WATER LINES WERE LOCATED DURING RECENT SITE UTILITY WORK AND ABANDONED IN PLACE. CONTRACTOR SHALL LOCATE ABANDONED WATER LINE AND REMOVE AS NECESSARY FOR SITE GRADING.
8. COMPLETE PILE EXTRACTION SHALL ALWAYS BE THE FIRST METHOD OF PILE REMOVAL. IF PILE BREAKS DURING FIRST EXTRACTION ATTEMPT, CUT THE PILE, EXCAVATE 1' AND ATTEMPT PILE EXTRACTION A SECOND TIME. IF PILE BREAKS THE SECOND TIME, CUT PILE AT THE BASE OF THE EXCAVATION. ALL CREOSOTE REMNANTS MUST BE AT LEAST 2' BELOW FINISHED GRADE.

TEMPORARY EROSION AND SEDIMENT CONTROL NOTES:

1. APPROVAL OF THIS TEMPORARY EROSION/SEDIMENTATION CONTROL (TESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
2. THE IMPLEMENTATION OF THESE TESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT AND UPGRADING OF THESE TESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
3. THE BOUNDARIES OF THE DEMOLITION AND CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
4. THE TESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL DEMOLITION AND CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DOES NOT ENTER THE DRAINAGE SYSTEM, THE FOSS WATERWAY OR ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.
5. THE TESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE TESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT–LADEN WATER DOES NOT LEAVE THE SITE.
6. THE TESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONALITY.
7. THE TESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.
8. AT NO TIME SHALL ANY CATCH BASIN INLET PROTECTION BE MORE THAN 1/3 FULL OF SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT–LADEN WATER INTO THE DOWNSTREAM SYSTEM.
9. STABILIZED CONSTRUCTION ENTRANCES, IF REQUIRED, SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES WILL BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
10. IF DEWATERING (BEYOND THAT SHOWN ON THE PLANS) IS ANTICIPATED OR BECOMES NECESSARY DURING CONSTRUCTION, THE CONTRACTOR SHALL CONTACT A SOURCE CONTROL REPRESENTATIVE WITH THE CITY OF TACOMA AT 253–591–5588.
11. THE CONTRACTOR SHALL, AS A MINIMUM, SWEEP ON A DAILY BASIS ANY DEPOSITS OR DEBRIS WHICH MAY ACCUMULATE ON THE PAVEMENT SURFACE. SHOULD DAILY REMOVAL BE INSUFFICIENT TO KEEP THE PAVEMENT AND ADJACENT STREETS CLEAN, THE CONTRACTOR SHALL PERFORM REMOVAL OPERATIONS ON A MORE FREQUENT BASIS.

TEMPORARY EROSION AND SEDIMENT CONTROL AND DEWATERING SEQUENCE:

1. MARK DEMOLITION/CLEARING/GRADING LIMITS.
2. CALL CITY INSPECTOR TO INSPECT CLEARING/GRADING LIMITS.
3. INSTALL INITIAL EROSION CONTROL PRACTICES (CATCH BASIN INLET PROTECTION INSERTS, SAND BAG BERM, DEWATERING BAYS, BAKER TANK).
4. CONTACT CITY INSPECTOR TO INSPECT INITIAL EROSION CONTROL PRACTICES.
5. BEGIN BANK REPAIR AT SOUTH END OF THE SITE. BANK REPAIR WILL BE DONE IN 25 FOOT TO 50 FOOT SECTIONS AND WILL BE CONDUCTED DURING NIGHT TIME LOW TIDES. EXCAVATION SPOILS WILL BE DEWATERED ON SITE. EACH SECTION OF EXCAVATION SHALL BE COVERED WITH SLOPE PROTECTION MATERIALS PRIOR TO BEGINNING SUBSEQUENT SECTIONS OF EXCAVATION.
   - 5.1. SPOILS FROM EACH NIGHT'S WORK SHALL BE STOCKPILED IN ONE OF FOUR DEWATERING BAYS.
   - 5.2. STOCKPILES SHALL BE ALLOWED TO DEWATER ON SITE FOR FOUR DAYS BEFORE BEING HAULED OFF SITE.
   - 5.3. DEWATERING DISCHARGE SHALL BE PUMPED FROM DEWATERING BAY TO BAKER TANK.
   - 5.4. BAKER TANK TO DISCHARGE TO EXISTING SANITARY SEWER WITH TEMPORARY OVERLAND PIPE/HOSE PENDING CONTRACTOR OBTAINING SPECIAL APPLICATION TO DISCHARGE APPROVAL FROM CITY PRIOR TO DISCHARGE; OR BE HAULED OFF SITE AND LEGALLY DISPOSED OF.
6. SANDBAG BERM SHALL BE ADJUSTED AS NECESSARY TO ACCOMMODATE CONSTRUCTION ACTIVITY.
7. DEWATERING PROCESS SHALL BE USED UNTIL ALL EXCAVATED MATERIAL HAS BEEN REMOVED FROM THE SITE AND PROPERLY DISPOSED OF.
8. CONTACT CITY INSPECTOR FOR APPROVAL OF PERMANENT SITE GRADING AND SLOPE PROTECTION.
9. REMOVE EROSION CONTROL METHODS AS PERMITTED BY CITY INSPECTOR AND REPAIR PERMANENT EROSION PROTECTION AS NECESSARY.



DEWATERING BAY DETAIL
SCALE: NTS
3 / C1

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE 11/20/13 | SCALE NTS
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KINCAID, STATE OF WASHINGTON, 32791, REGISTERED PROFESSIONAL ENGINEER
11/20/13
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
DEMOLITION AND TESC DETAILS AND NOTES

SHEET NO. C3
SHEET 6 OF 19

PLOTTED BY: bosterhoudDATE & TIME: Nov 20, 2013 – 11:31am FILE: N:\Struct\13–1\13141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C3 Demolition and TESC Sections and Details.dwg

ZONE MEASUREMENTS

ZONE A (CRITICAL ROOT ZONE)

THE CRITICAL ROOT ZONE IS THE AREA UNDER A TREE WHOSE RADIUS MEASURES ONE FOOT PER ONE INCH OF DBH FROM THE TRUNK OUTWARDS AND TWENTY-FOUR INCHES (24") IN DEPTH.
FOR EXAMPLE: FOR A TEN INCH DBH TREE, THE CRITICAL ROOT ZONE IS LOCATED AT LEAST TEN FEET (10'-0") OUT FROM THE TRUNK AND TWENTY-FOUR INCHES (24") DEEP

ZONE B (DRIP LINE)

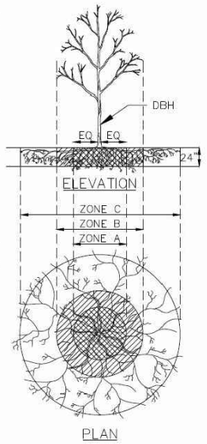
THE DRIP LINE IS THE AREA ON THE GROUND BELOW THE TREE IN WHICH THE BOUNDARY IS DESIGNATED BY THE EDGE OF THE TREE'S CROWN

ZONE C (FEEDER ROOT ZONE)

THE FEEDER ROOT ZONE IS THE AREA UNDER A TREE WHOSE RADIUS MEASURES TWO FEET PER ONE INCH OF DBH FROM THE TRUNK OUTWARDS AND TWENTY-FOUR INCHES (24") IN DEPTH.
FOR EXAMPLE: FOR A TEN INCH DIAMETER TREE, THE CRITICAL ROOT ZONE IS LOCATED AT LEAST TWENTY FEET (20'-0") OUT FROM THE TRUNK AND TWENTY-FOUR INCHES (24") DEEP

TREE PROTECTION ZONE

THE TREE PROTECTION ZONE IS THE AREA SURROUNDING THE TRUNK OF A TREE INTENDED TO PROTECT THE ROOTS AND SOIL WITHIN THE CRITICAL ROOT ZONE AND BEYOND, TO ENSURE FUTURE TREE HEALTH AND STABILITY.
THE LOCATION OF THE TREE PROTECTION ZONE IS AT THE EDGE OF THE CRITICAL ROOT ZONE (ZONE A) OR DRIP LINE (ZONE B), WHICHEVER IS GREATER



PLAN

FENCING/ROOT PROTECTION

FENCING IS TO BE INSTALLED AND MAINTAINED AT TREE PROTECTION ZONE, SEE TYPICAL TREE PROTECTION FENCING STANDARD PLANS NO. L8.1 AND L8.2

URBAN FORESTER'S APPROVAL REQUIRED FOR USE/ACCESS WITHIN ZONE B. PERMISSION FOR USE/ACCESS REQUIRES SURFACE PROTECTION* FOR ALL UNFENCED, UNPAVED SURFACES WITHIN ZONE B

BORING/TUNNELING/JACKING

1. BORING/TUNNELING/JACKING PERMITTED IN ALL ZONES, PROVIDING THAT ALL SOIL DISTURBANCE IS AT A DEPTH GREATER THAN 2'-0" BELOW GRADE
2. RECEIVING/INSERTION PIT NOT PERMITTED WITHIN ZONES A AND B
3. TUNNEL/BORE SHALL NOT EXCEED 6" IN DIA

TRENCHING/EXCAVATION

ZONE A (CRITICAL ROOT ZONE)

1. NO DISTURBANCE ALLOWED WITHOUT SITE-SPECIFIC INSPECTION AND APPROVAL OF METHODS TO MINIMIZE ROOT DAMAGE, EXCEPT IN THE CASE OF BORING/TUNNELING
2. IF ROOTS LARGER THAN 2" IN DIA. ARE ENCOUNTERED, APPROVAL FROM THE URBAN FORESTER IS REQUIRED BEFORE PROCEEDING TRENCHING/EXCAVATION WORK
3. TUNNELING IS REQUIRED TO INSTALL LINES 3'-0" BELOW GRADE OR DEEPER

ZONE B (DRIP LINE)

1. OPERATION OF HEAVY EQUIPMENT AND/OR STOCKPILING OF MATERIALS SUBJECT TO URBAN FORESTER'S APPROVAL
* SURFACE PROTECTION MEASURES REQUIRED
2. TRENCHING PERMITTED AS FOLLOWS:
   –EXCAVATION BY HAND OR WITH A HAND-DRIVEN TRENCHER MAY BE REQUIRED
   –MINIMIZE TRENCH WIDTH TO THE EXTENT POSSIBLE
   –NO DISTURBANCE PERMITTED WITHIN ZONE A
   –MAINTAIN 2/3 OR MORE OF ZONE B IN AN UNDISTURBED CONDITION
3. TUNNELING MAY BE REQUIRED FOR TRENCHES DEEPER THAN 3'-0"

ZONE C (FEEDER ROOT ZONE)

1. OPERATION OF HEAVY EQUIPMENT AND/OR STOCKPILING OF MATERIALS SUBJECT TO URBAN FORESTER'S APPROVAL
* SURFACE PROTECTION MEASURES REQUIRED
2. TRENCHING ALLOWED AS FOLLOWS:
   –EXCAVATION BY HAND OR WITH HAND-DRIVEN TRENCHER MAY BE REQUIRED
   –MINIMIZE TRENCH WIDTH TO THE EXTENT POSSIBLE
   –MAINTAIN 2/3 OR MORE OF ZONE C IN AN UNDISTURBED CONDITION

*SURFACE PROTECTION MEASURES

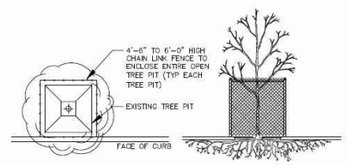
1. WOOD CHIP MULCH LAYER, 6"–12" DEPTH; OR
2. 4" WOOD CHIP MULCH LAYER UNDER 3/4" PLYWOOD; OR
3. 4" GRAVEL OVER STAKED GEOTEXTILE FABRIC
4. 4" WOOD CHIP MULCH LAYER UNDER STEEL PLATES;
5. 4" WOOD CHIP MULCH LAYER UNDER LOGGING ROAD MATS

CITY OF TACOMA DEPARTMENT OF PUBLIC WORKS	APPROVED FOR PUBLICATION CITY ENGINEER DATE 00/00/00	TREE PROTECTION DURING CONSTRUCTION STANDARD PLAN NO. L8.0

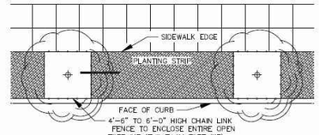
CITY OF TACOMA TREE PROTECTION DURING CONSTRUCTION DETAIL
STANDARD PLAN NO. L8.0 (6 / C1)
SCALE: AS NOTED

NOTES:

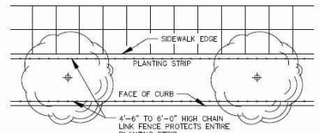
1. TREE PROTECTION REQUIREMENTS INCLUDED IN THIS STANDARD PLAN IS FOR TREES IN THE ROW AND PARKING LOTS/AREAS ONLY
2. REQUIRED PROTECTION MEASURES FOR TREES OTHER THAN THOSE IN TREE PITS AND PLANTING STRIPS ARE CONTAINED IN THE TYPICAL TREE PROTECTION FENCING STANDARD PLAN NO. L8.1
3. REUSABLE TEMPORARY TREE AND LANDSCAPE PROTECTION FENCING CAN BE SUBSTITUTED FOR CHAIN LINK FENCING IN TREE PITS AND PLANTING STRIPS (SEE REUSABLE TREE PROTECTION FENCING FOR ROW AND PARKING AREAS/LOTS STANDARD PLAN NO. L8.3)
4. CONSIDER TRAFFIC TURNING VISIBILITY AND PEDESTRIAN VISIBILITY WHEN SELECTING FENCE HEIGHT; TYPICALLY SHORTER FENCING AROUND TREE PITS BETWEEN SIDEWALK AND ROADWAY IS DESIRED.



TREE IN TREE PIT



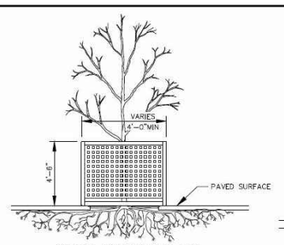
TREE IN PLANTING STRIP–OPTION 1



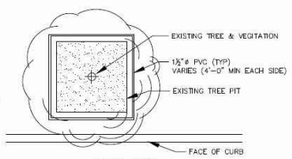
TREE IN PLANTING STRIP–OPTION 2

CITY OF TACOMA DEPARTMENT OF PUBLIC WORKS	APPROVED FOR PUBLICATION CITY ENGINEER DATE 00/00/00	TREE PROTECTION FENCING FOR TREES IN THE ROW AND PARKING AREAS/LOTS STANDARD PLAN NO. L8.2

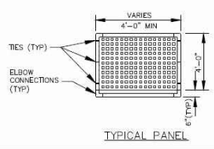
CITY OF TACOMA TREE PROTECTION FENCING FOR TREES IN PARKING AREAS
STANDARD PLAN NO. L8.2 (7 / C1)
SCALE: AS NOTED



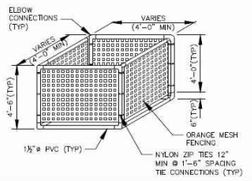
TYPICAL TREE GUARD RAIL



PLAN VIEW



TYPICAL PANEL



CITY OF TACOMA DEPARTMENT OF PUBLIC WORKS	APPROVED FOR PUBLICATION CITY ENGINEER DATE 00/00/00	REUSABLE TREE PROTECTION FENCING FOR ROW AND PARKING AREAS/LOTS STANDARD PLAN NO. L8.3

CITY OF TACOMA REUSABLE TREE PROTECTION FENCING FOR PARKING AREAS
STANDARD PLAN NO. L8.3 (8 / C1)
SCALE: AS NOTED

NOTE:

1. TREES WITHIN THE PROJECT LIMITS ARE WITHIN EXISTING PARKING AREAS, THEREFORE THE CITY OF TACOMA TREE PROTECTION FENCING DETAIL (STANDARD PLAN NO. L8.1) DOES NOT APPLY TO THIS PROJECT.

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED BY DATE FIELD BOOKS
DATE 11/20/13 | SCALE NTS
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KINGSLEY — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

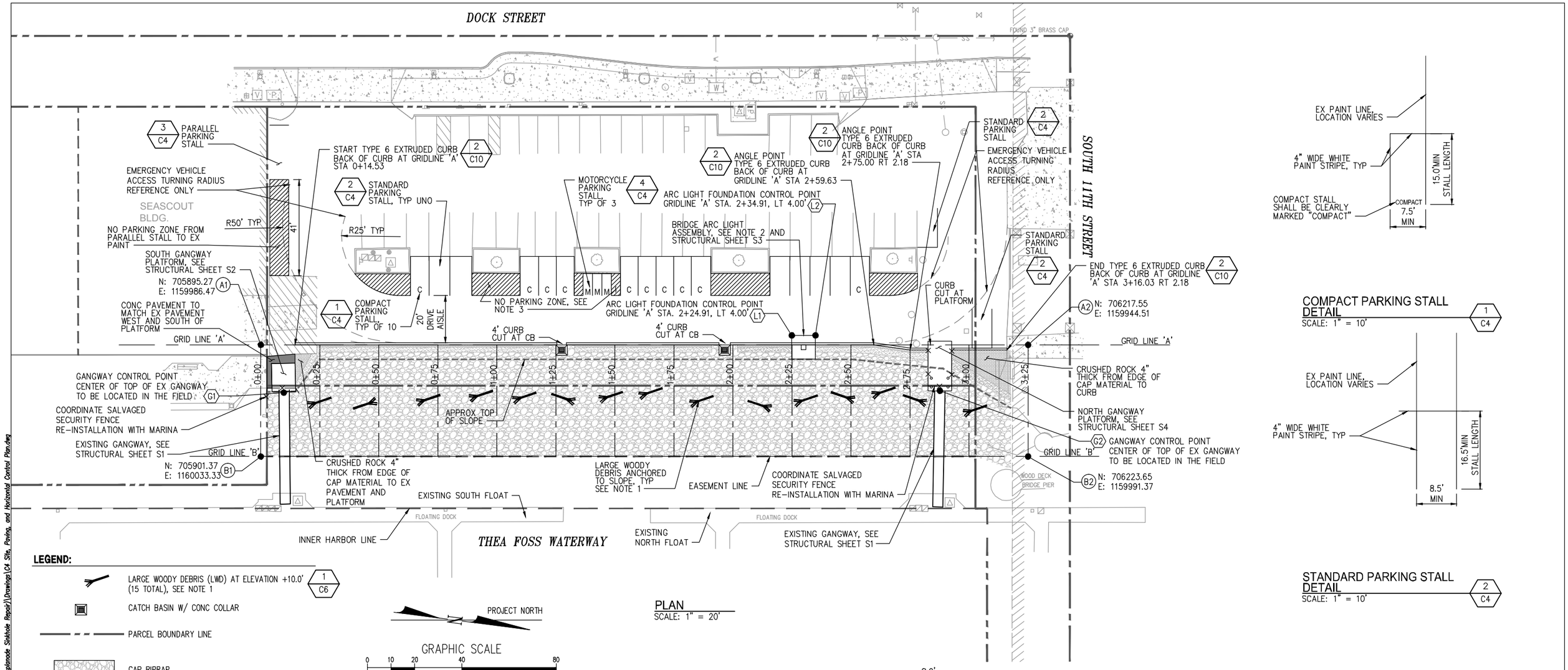
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
CITY OF TACOMA TREE PROTECTION DETAILS

SHEET NO. C3.1
SHEET 7 OF 19

PLOTTED BY: bosterhoudDATE & TIME: Nov 20, 2013 - 11:31am FILE: N:\Struct\112-\113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C3.1 Tree Protection Details.dwg



PLAN
SCALE: 1" = 20'

LEGEND:

- LARGE WOODY DEBRIS (LWD) AT ELEVATION +10.0' (15 TOTAL), SEE NOTE 1 — 1/C6
- CATCH BASIN W/ CONC COLLAR
- PARCEL BOUNDARY LINE
- CAP RIPRAP
- CAP FILTER MATERIAL
- CRUSHED ROCK
- CONC PAVEMENT
- NO PARKING ZONE, SEE NOTE 3
- TYPE 6 EXTRUDED CURB — 2/C10
- SECURITY FENCING, TYPE, SIZE AND LOCATION TO BE COORDINATED WITH THE FHM
- APPROX TOP OF SLOPE

PROJECT NORTH

GRAPHIC SCALE
0 10 20 40 80
1 inch = 20 ft.

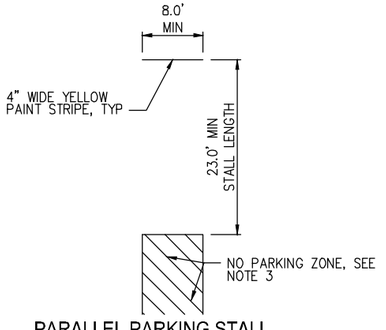
GRAPHIC SCALE
0 5 10 20 40
1 inch = 10 ft.

NOTES:

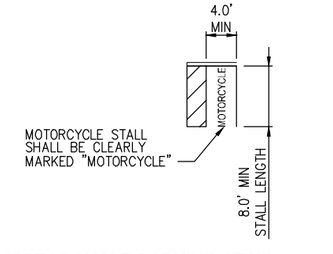
1. LWD SHALL BE DOUGLAS FIR OR CEDAR. LOG DIAMETER SHALL BE NO LESS THAN 18". LOG LENGTH SHALL BE NO LESS THAN 15-FEET AND NO MORE THAN 20-FEET. EACH LOG SHALL HAVE EITHER LIMBS OR ROOT WADS. BARK SHALL REMAIN INTACT ON THE LOGS.
2. CONTRACTOR SHALL RELOCATE EXISTING ARC LIGHT JUNCTION BOX NEAR NEW ARC LIGHT FOUNDATION AND SUPPLY BURIED POWER TO THE RELOCATED LIGHT. CONTRACTOR SHALL COORDINATE WITH OWNER TO ENSURE LIGHT FUNCTIONS AS IT DID PRIOR TO CONSTRUCTION.
3. NO PARKING ZONE SHALL BE PAINTED WITH 4" WIDE YELLOW PAINT LINES AT 45° AND 2' ON CENTER.

COMPACT PARKING STALL DETAIL — 1/C4
SCALE: 1" = 10'

STANDARD PARKING STALL DETAIL — 2/C4
SCALE: 1" = 10'



PARALLEL PARKING STALL DETAIL — 3/C4
SCALE: 1" = 10'



MOTORCYCLE PARKING STALL DETAIL — 4/C4
SCALE: 1" = 10'

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED — BY — DATE — FIELD BOOKS

DATE	SCALE
11/20/13	AS SHOWN
DESIGNED RLO	CHECKED SWK
DRAWN RLO	PROJECT NAME
DRAWING NAME	

STEVEN WADE KINGSLEY — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

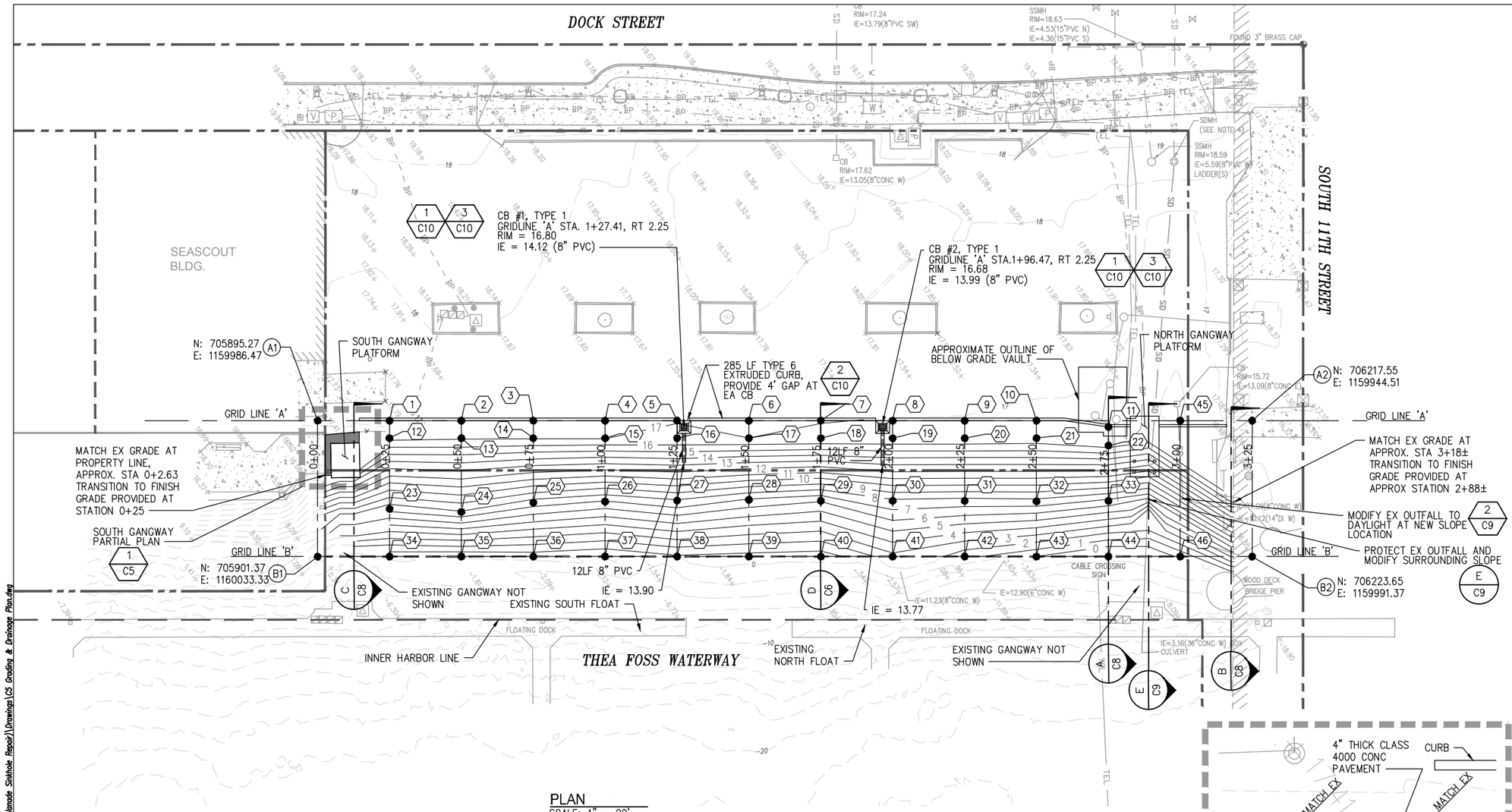
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
SITE, PAVING AND HORIZONTAL CONTROL PLAN

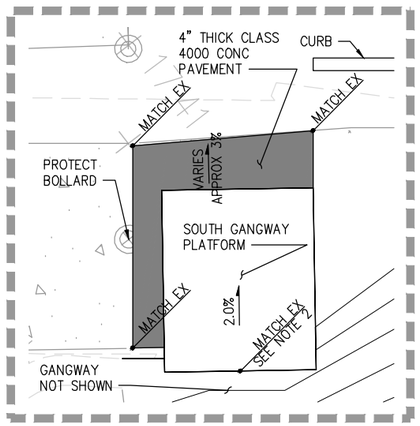
SHEET NO. C4
SHEET 8 OF 19

PLOTTED BY: bosterhaus DATE & TIME: Nov 20, 2013 - 11:32am FILE: W:\Struct\113-1\113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C4 Site, Paving, and Horizontal Control Plan.dwg



PLAN
SCALE: 1" = 20'

SLOPE DATA			
POINT (#)	STATION	OFFSET FROM GRID 'A'	ELEVATION
1	0+25	0.00	17.33
2	0+50	0.00	17.16
3	0+75	0.00	17.15
4	1+00	0.00	17.13
5	1+25	0.00	17.01
6	1+50	0.00	17.09
7	1+75	0.00	17.01
8	2+00	0.00	16.89
9	2+25	0.00	16.92
10	2+50	0.00	16.83
11	2+75	RT 2.18	16.56
12	0+25	RT 6.12	17.27
13	0+50	RT 6.12	17.10
14	0+75	RT 6.12	17.09
15	1+00	RT 6.12	17.07
16	1+25	RT 6.12	16.95
17	1+50	RT 6.12	17.03
18	1+75	RT 6.12	16.95
19	2+00	RT 6.12	16.83
20	2+25	RT 6.12	16.86
21	2+50	RT 6.12	16.77
22	2+75	RT 8.68	16.32
23	0+25	RT 30.70	7.37
24	0+50	RT 31.77	7.87
25	0+75	RT 28.50	7.54
26	1+00	RT 28.12	6.87
27	1+25	RT 27.78	7.88
28	1+50	RT 27.54	6.81
29	1+75	RT 27.85	6.07
30	2+00	RT 27.90	7.79
31	2+25	RT 27.91	7.66
32	2+50	RT 28.05	7.66
33	2+75	RT 27.93	6.69
34	0+25	RT 47.26	0.35
35	0+50	RT 47.26	0.23
36	0+75	RT 47.26	0.41
37	1+00	RT 47.26	0.00
38	1+25	RT 47.26	0.85
39	1+50	RT 47.26	0.61
40	1+75	RT 47.26	0.44
41	2+00	RT 47.26	2.67
42	2+25	RT 47.26	1.23
43	2+50	RT 47.26	0.00
44	2+75	RT 47.26	−1.46
45	3+00	0.00	–
46	3+00	RT 47.26	–



SOUTH GANGWAY PLATFORM PARTIAL PLAN (1/C5)
SCALE: 1" = 5'

PROJECT NORTH

GRAPHIC SCALE
0 10 20 40 80
1 inch = 20 ft.

GRAPHIC SCALE
0 2.5 5 10 20
1 inch = 5 ft.

LEGEND:

- 6 — PROPOSED GRADING CONTOUR
- RELOCATED CATCH BASIN W/ CONC COLLAR
- STORM SEWER
- PARCEL BOUNDARY LINE
- CONC PAVEMENT

VERTICAL DATUM:

PROJECT BM:
CITY OF TACOMA MON NO. 2063
CITY PUBLISHED ELEVATION (NGVD '29) = 10.212
MLLW ELEVATION = 16.19
DESCRIPTION: BRASS SURFACE MONUMENT ON THE EAST SIDE OF DOCK STREET, IN FRONT OF 535 DOCK STREET.

PROJECT TBM:
BRASS CAP MONUMENT INTERSECTION OF SOUTH 11TH STREET AND DOCK STREET.
ELEVATION = 18.20 MLLW

HORIZONTAL DATUM:

WASHINGTON STATE PLANE COORDINATE SYSTEM NAD 83/91 SOUTH ZONE PER CITY OF TACOMA

NOTE:

1. ADDITIONAL OUTFALLS AT THE EX BULKHEAD WALLS ORIGINATE FROM UNKNOWN SOURCES. CONTRACTOR SHALL CONFIRM OUTFALL IS ABANDONED/PLUGGED OR DETERMINE SOURCE. IF OUTFALL SOURCE IS ACTIVE STORMWATER LINE, MODIFY OUTFALL PER (2/C9)

   SEE DEMOLITION NOTE 5 ON SHEET C3.
   IF OUTFALL SOURCE IS OTHER THAN AN ACTIVE STORMWATER LINE, CONTRACTOR SHALL NOTIFY CITY ENGINEER AND ADDRESS OUTFALL AS DIRECTED BY THE CITY.

2. CONTRACTOR TO FIELD SURVEY ELEVATION OF EXISTING GANGWAY PLATFORM AT GANGWAY CONNECTION PRIOR TO DEMOLITION AND MATCH ELEVATION AT SAME LOCATION ON NEW GANGWAY PLATFORM.

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE 11/20/13 | SCALE 1" = 20'
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KINCAID — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

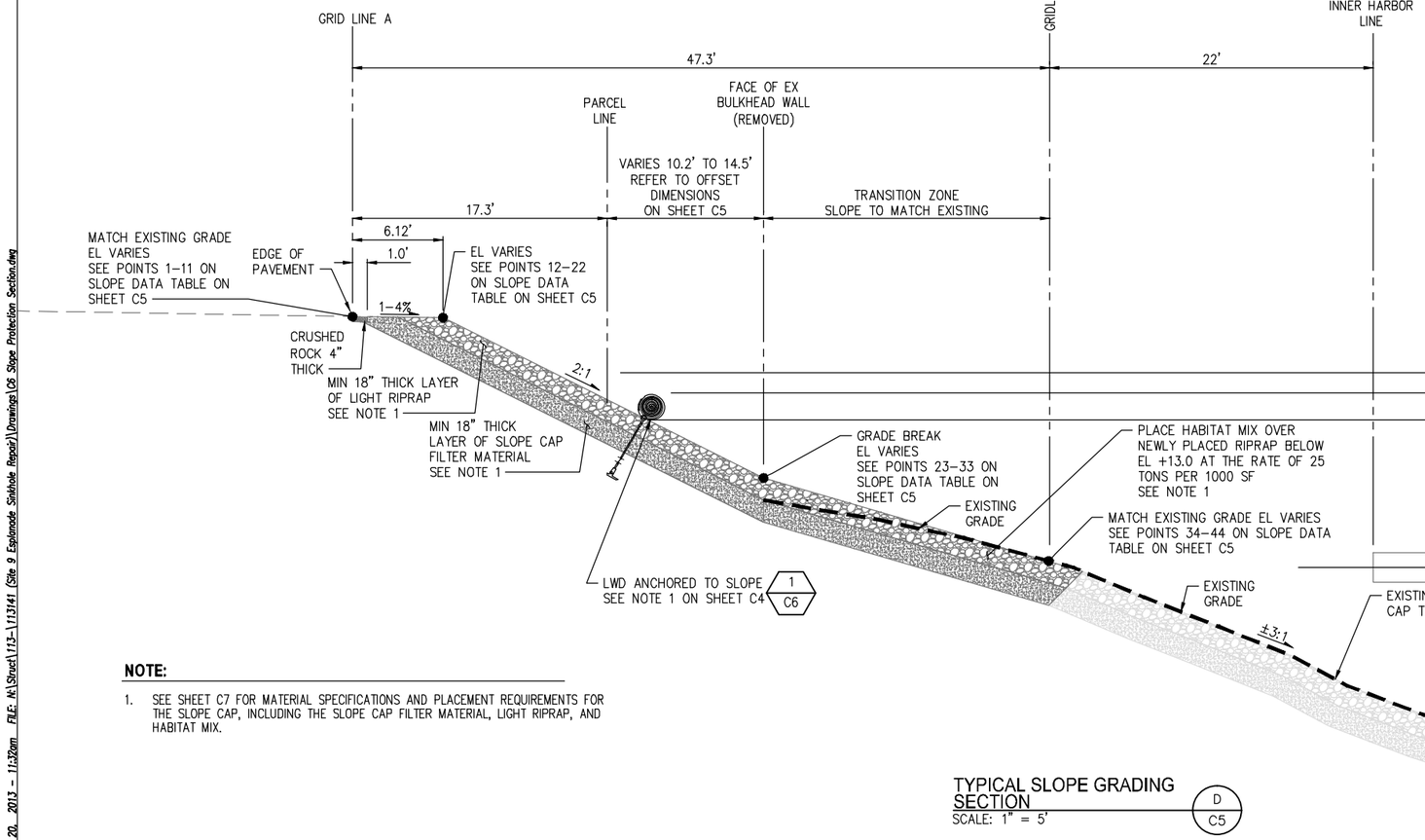
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

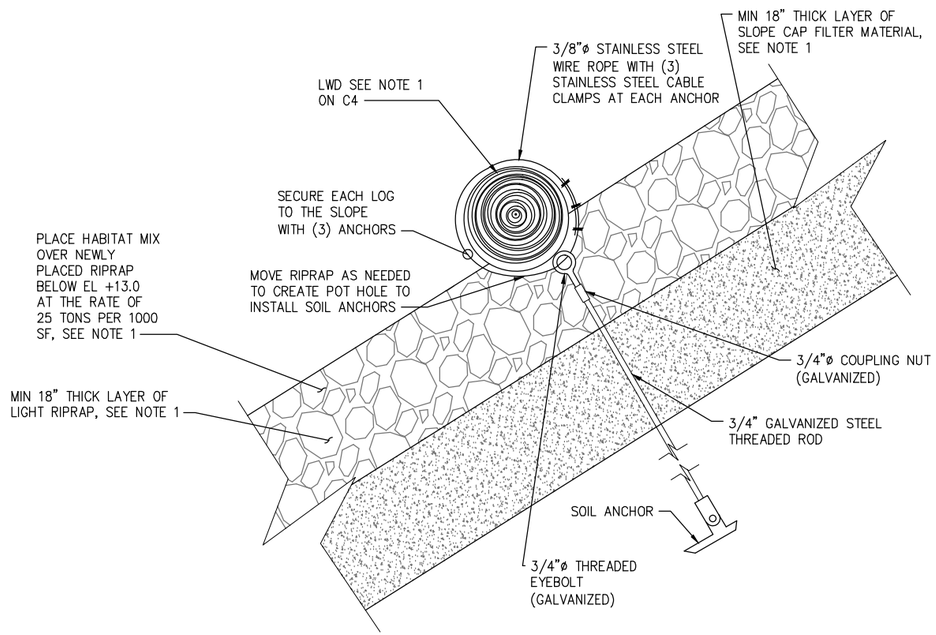
SITE 9 BULKHEAD WALL REMOVAL
GRADING AND DRAINAGE PLAN

SHEET NO. C5
SHEET 9 OF 19

PLOTTED BY: lcosterhoud DATE & TIME: Nov 20, 2013 – 11:32am FILE: N:\Struct\113-\113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C5 Grading & Drainage Plan.dwg



TYPICAL SLOPE GRADING SECTION
SCALE: 1" = 5'
D
C5



LARGE WOODY DEBRIS ANCHOR DETAIL
SCALE: NTS
1
C4

VERTICAL DATUM:

PROJECT BM:
CITY OF TACOMA MON NO. 2063
CITY PUBLISHED ELEVATION (NGVD '29) = 10.212
MLLW ELEVATION = 16.19
DESCRIPTION: BRASS SURFACE MONUMENT ON THE EAST SIDE OF DOCK STREET, IN FRONT OF 535 DOCK STREET.

PROJECT TBM:
BRASS CAP MONUMENT INTERSECTION OF SOUTH 11TH STREET AND DOCK STREET.
ELEVATION = 18.20 MLLW

GRAPHIC SCALE
0 2.5 5 10 20
1 inch = 5 ft.

NOTE:

1. SEE SHEET C7 FOR MATERIAL SPECIFICATIONS AND PLACEMENT REQUIREMENTS FOR THE SLOPE CAP, INCLUDING THE SLOPE CAP FILTER MATERIAL, LIGHT RIPRAP, AND HABITAT MIX.

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

Tacoma

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE 11/20/13 | SCALE AS SHOWN
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KNOX — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
SLOPE PROTECTION SECTION

SHEET NO. C6
SHEET 10 OF 19

PLOTTED BY: bosterhoudDATE & TIME: Nov 20, 2013 - 11:32am FILE: N:\Struct\113-1\13141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C6 Slope Protection Section.dwg

GENERAL

1.01 DESCRIPTION OF WORK

The work described in this specification includes identification, characterization, and approval of materials used for maintenance of slope areas in the Thea Foss and Wheeler-Osgood Waterways. Materials to be used for slope maintenance activities may include the following:

- Slope cap filter material;
- Rip Rap;
- Quarry spalls; and
- Habitat mix.

1.02 QUALITY ASSURANCE

Sampling, testing, and inspection for compliance with this specification shall be in accordance with the requirements specified herein.

1.03 STANDARD SPECIFICATIONS

The Standard Specifications for the work described in this section shall be the Standard Specifications for Road, Bridge, and Municipal Construction as prepared by the Washington Department of Transportation (WSDOT) and the American Public Works Association (APWA), Washington State Chapter, 2006 Edition.

1.04 SUBMITTALS

The following submittals shall be provided for slope maintenance materials:

A. Source Identification (per Paragraph 2.02-A).

B. Material Source Characterization (per Paragraph 2.02).

C. Shipping Receipts and Material Volumes for slope maintenance materials (per Paragraph 3.01).

Test reports shall be provided by a laboratory that is independent of the supplier.

PART 2 - PRODUCTS

2.01 GENERAL

Materials shall be of the quality, size, shape, and gradation or equal to that specified herein. Material sources shall be selected well in advance of the time when the material will be required in the work. Suitable representative samples and test reports, as described below, must be submitted to and approved by the Engineer prior to delivery of materials to the jobsite.

U.S. Standard Sieve Size	Percent Passing (by weight)	
2 inch	100	
1/1/2 inch	80 to 95	
3/4 inch	60 to 80	
No. 4	40 to 60	
No. 10	30 to 50	
No. 40	10 to 20	
No. 200	0 to 5 max.	(wet screen)

PART 3 - EXECUTION

3.01 GENERAL

Slope maintenance materials shall be provided from a source approved by EPA. The supplier shall provide daily reports of the quantities of slope maintenance materials used. The reports shall include tabulated summaries of volumes placed for each material. Shipping receipts for all materials delivered to the site shall also be submitted on a daily basis.

2.02 MATERIAL SOURCE CHARACTERIZATION

Material source characterization shall be performed as specified below to assure that materials used for slope maintenance are natural, native, virgin materials, free of unwanted materials including debris or recycled materials, and meet the requirements of these specifications. Any material that has been determined to be substandard by the City of Tacoma for any reason will be rejected. In the event that a material is rejected, it shall be removed from the site.

Slope cap filter material, rip rap, quarry spalls and habitat mix were placed on shoreline slopes within the Thea Foss and Wheeler-Osgood Waterways as part of Thea Foss and Wheeler-Osgood Waterways Remediation Project. Slope maintenance activities will use materials that meet the specifications for these materials approved for use by the United States Environmental Protection Agency (EPA) as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project.

Each material source shall be approved by EPA, in accordance with these specifications, prior to materials being bought to the area requiring maintenance. Specific sources used to supply these materials as part of the Thea Foss and Wheeler-Osgood Waterway Remediation Project have already been approved by EPA. Where a previously approved borrow source is identified as the source for materials to be used for slope maintenance, the Material Source Characterization will consist of Source Identification (2.02 A), Source Inspection (2.02 B), and Grain Size Distribution (2.02 C. 1). The Material Source Characterization for sources not previously approved by EPA shall include all of the requirements specified below. The Contractor shall submit a characterization of any and all imported material prior to any on-site placement.

A. Source Identification

Prior to material source sampling, documentation of the origin of each type of maintenance material including the names, addresses, and source identification numbers and maps identifying specific location(s) of material source(s).

B. Source Inspection

All material sources shall be inspected at the source by a representative of the City of Tacoma and the supplier(s) of the material. The witnessing of the inspection by a representative of the City shall in no way release the supplier(s) from complying with the Specifications and in no way shall be construed as approval of any particular source of material.

C. Testing, Reporting, and Certification

Samples of the source material comprising slope cap filter material and habitat mix shall undergo all of the following tests. Rip rap and quarry spalls will meet the requirements of 2.03 and 2.04.

1. Grain Size Distribution (ASTM D 422-63).
2. Particle Specific Gravity (ASTM D 854).
3. Weight per unit volume of uncompacted materials.

NOTE:

1. CAP MATERIAL SPECIFICATIONS FROM "THEA FOSS AND WHEELER-OSGOOD WATERWAYS SLOPE AREA MAINTENANCE PLAN." ALL WORK WITHIN THIS PROJECT IS CLASSIFIED AS SLOPE AREA MAINTENANCE FOR THE PURPOSES OF CONFORMING TO THE ABOVE SPECIFICATIONS

SLOPE PROTECTION SPECIFICATIONS
NTS

1
–

4. Priority Pollutant Metals (EPA SW 846 6010B/6020/ 7000 Series).
5. Volatile Organic Compounds (EPA SW 846 8260B).
6. Semi-volatile Organic Compounds (EPA SW 846 8270C).
7. Chlorinated Pesticides (EPA Method 8081).
8. Polychlorinated Biphenyls (EPA Method 8082).
9. Total Organic Carbon (EPA Method 9060).

The results of such tests shall be provided at least two weeks before delivery of the materials to the jobsite. The results of each test shall be provided in a report that clearly identifies the following:

1. Source of samples.
2. Sampling dates.
3. Chain of custody.
4. Sampling locations.
5. Supplier's certification that the samples tested and the results provided are representative of materials that shall be delivered to the site.

The supplier shall ensure the chemical nature of the material used for slope maintenance in the Thea Foss and Wheeler-Osgood Waterways does not pose a risk to human health or the environment. As such, imported slope maintenance materials shall be, at a minimum, less than the Sediment Quality Objective (SQO) concentrations for Commencement Bay (EPA 1989) and the Explanation of Significant Differences (EPA 2000).

D. Inspection of Materials at the Jobsite

Slope maintenance materials shall be visually inspected upon delivery. Materials shall be inspected for presence of foreign, recycled, or reprocessed material. Material may be rejected due to identification of any such material or as a result of substandard test results. Materials may be segregated for testing based on appearance or odor. Segregated material may be tested according to procedures at the City of Tacoma's discretion.

2.03 SLOPE CAP FILTER MATERIAL

Slope cap filter material shall be clean, free-draining sand and gravel from a recognized and established borrow site. Individual particles shall be free from all objectionable coating. The material shall contain no organic matter or soft friable particles in quantities considered objectionable. Slope cap filter material shall meet the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing (by weight)
6 inch	100
4 inch	90 to 100
3/4 inch	50 to 90
No. 4	35 to 65
No. 10	15 to 45
No. 40	2 to 10
No. 200	0 to 2 (wet screen)

2.04 RIPRAP

Riprap shall consist of broken stone from an approved source that is hard, sound, dense, and durable. It shall be free from seams, cracks, and other defects tending to destroy its resistance to weather and seawater. Dry unit weight shall not be less than 160 pounds per solid cubic foot. Riprap shall meet the degradation, wear, and specific gravity requirements of Section 9-13 of the Standard Specifications. Rock for Riprap shall be angular, each piece having its greatest dimension not greater than three times its least dimension, and shall meet the following gradation requirements:

Light Riprap:

Light Riprap shall be large rock, 12 to 15 inches in size with up to 25 percent by weight smaller than 12 inches. The portion smaller than 12 inches shall be crushed rock that is greater than the U.S. No. 4 Standard Sieve size.

Heavy Riprap:

Weight In Pounds	Percent Lighter (by weight)
1,000	100
400	55 to 90
50	20 to 50
2	5 to 15

2.05 QUARRY SPALLS

Quarry spalls shall consist of broken stone from an approved source, free from segregation, seams, cracks or other defects and shall conform with the requirements for quality and gradation in Section 9-13.6, QUARRY SPALLS of the Standard Specifications.

2.06 HABITAT MIX

Habitat mix shall consist of 2-inch minus pit-run, rounded material from an approved source, uniform in quality and substantially free from wood, roots, bark and other extraneous materials. The individual particles shall be free from all objectionable coating and shall contain no organic matter or soft friable particles in quantities considered objectionable by the City of Tacoma. The material shall conform to the following gradation:

CONSTRUCTION SET

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2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

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NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE 11/20/13 | SCALE AS SHOWN
DESIGNED RLO | CHECKED SWK
DRAWN RLO | PROJECT NAME
DRAWING NAME

STEVEN WADE KINGSLEY — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

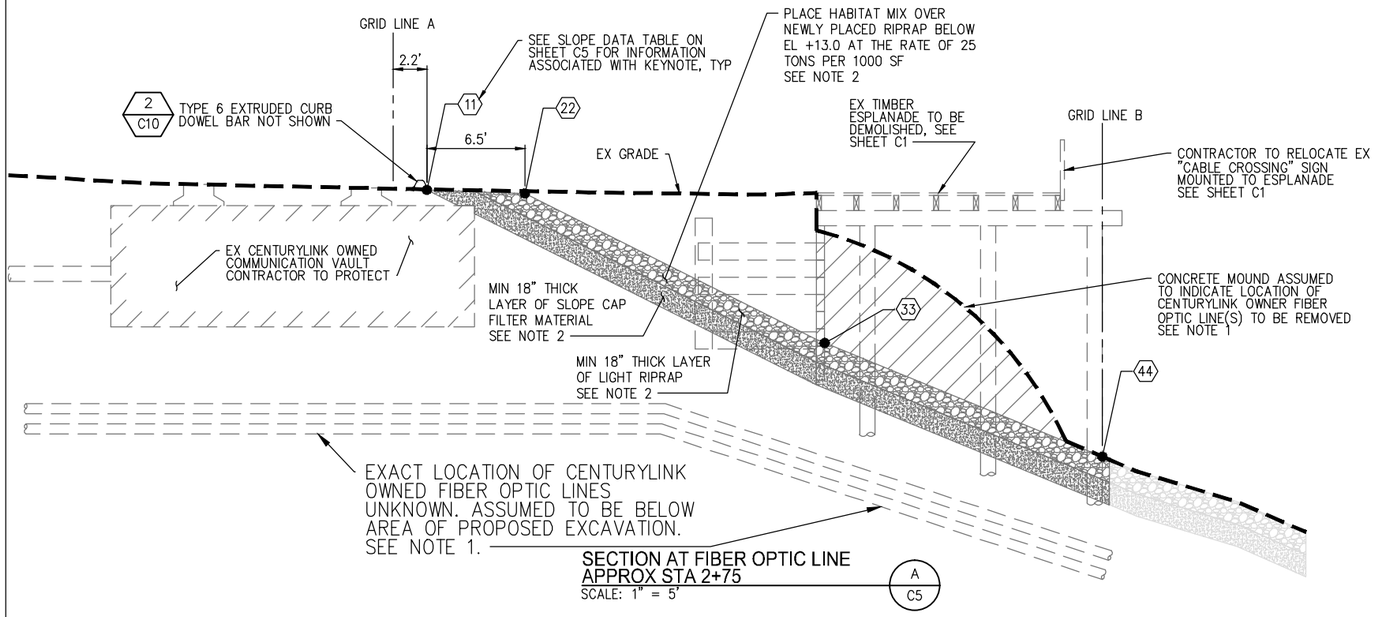
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

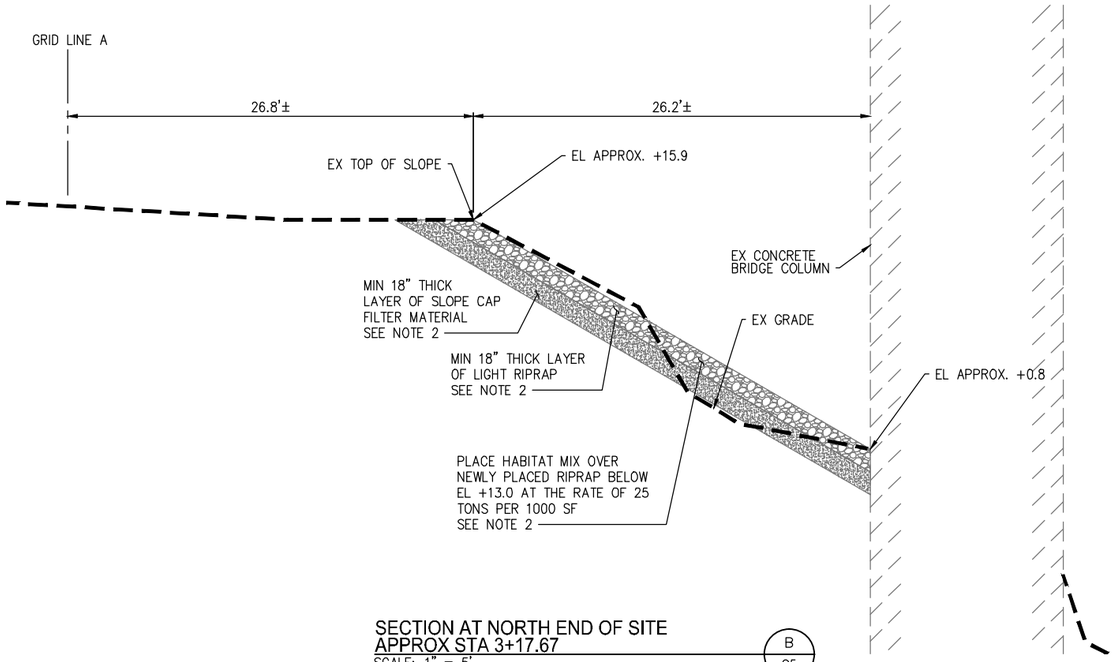
SITE 9 BULKHEAD WALL REMOVAL
SLOPE PROTECTION DETAILS

SHEET NO. C7
SHEET 11 OF 19

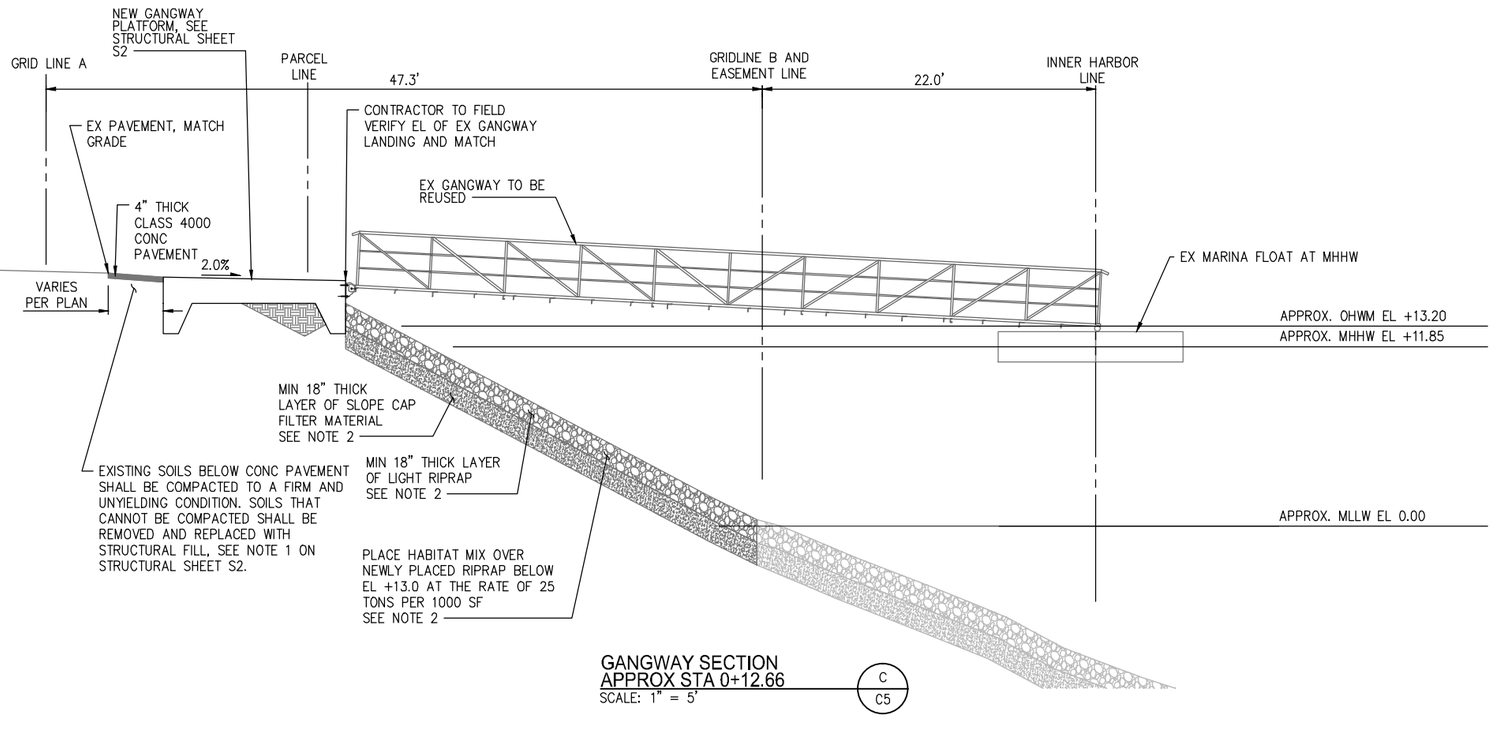
PLOTTED BY: bosterhoudDATE & TIME: Nov. 20, 2013 - 11:30am FILE: N:\Struct\113-\113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C7 Slope Protection Details.dwg



SECTION AT FIBER OPTIC LINE
APPROX STA 2+75
SCALE: 1" = 5'
A / C5



SECTION AT NORTH END OF SITE
APPROX STA 3+17.67
SCALE: 1" = 5'
B / C5



GANGWAY SECTION
APPROX STA 0+12.66
SCALE: 1" = 5'
C / C5

NOTES:

1. **EXACT LOCATION OF EXISTING FIBER OPTIC TELECOMMUNICATIONS CABLE IS UNKNOWN. CONTRACTOR TO LOCATE CABLE(S) (HORIZONTALLY AND VERTICALLY) PRIOR TO COMMENCEMENT OF CONSTRUCTION AND SHALL NOTIFY ENGINEER OF ANY CONFLICTS. DUE TO THE LOCATION AND CRITICAL NATURE OF THE TELECOMMUNICATIONS LINK HOUSED WITHIN THE CROSSING, THE CONTRACTOR SHALL COORDINATE WITH THE CENTURYLINK FIELD ENGINEER AND RISK MANAGEMENT STAFF TO CREATE A CONTINGENCY PLAN FOR POTENTIAL DISRUPTION PRIOR TO THE START OF CONSTRUCTION.**
2. SEE SHEET C7 FOR MATERIAL SPECIFICATIONS AND PLACEMENT REQUIREMENTS FOR THE SLOPE CAP, INCLUDING THE SLOPE CAP FILTER MATERIAL, LIGHT RIPRAP, AND HABITAT MIX.

VERTICAL DATUM:

PROJECT BM:
CITY OF TACOMA MON NO. 2063
CITY PUBLISHED ELEVATION (NGVD '29) = 10.212
MLLW ELEVATION = 16.19
DESCRIPTION: BRASS SURFACE MONUMENT ON THE EAST SIDE OF DOCK STREET, IN FRONT OF 535 DOCK STREET.

PROJECT TBM:
BRASS CAP MONUMENT INTERSECTION OF SOUTH 11TH STREET AND DOCK STREET.
ELEVATION = 18.20 MLLW

GRAPHIC SCALE
0 2.5 5 10 20
1 inch = 5 ft.

CONSTRUCTION SET

kpff Consulting Engineers
2407 North 31st. Street, Suite 100
Tacoma, Washington 98407
(253) 396-0150 Fax (253) 396-0162

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555

NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED BY DATE
FIELD BOOKS

DATE	SCALE
11/20/13	AS SHOWI
DESIGNED	CHECKED
RLO	SWK
DRAWN	PROJECT NAME
RLO	
DRAWING NAME	

STEVEN WADE KINGSLEY — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

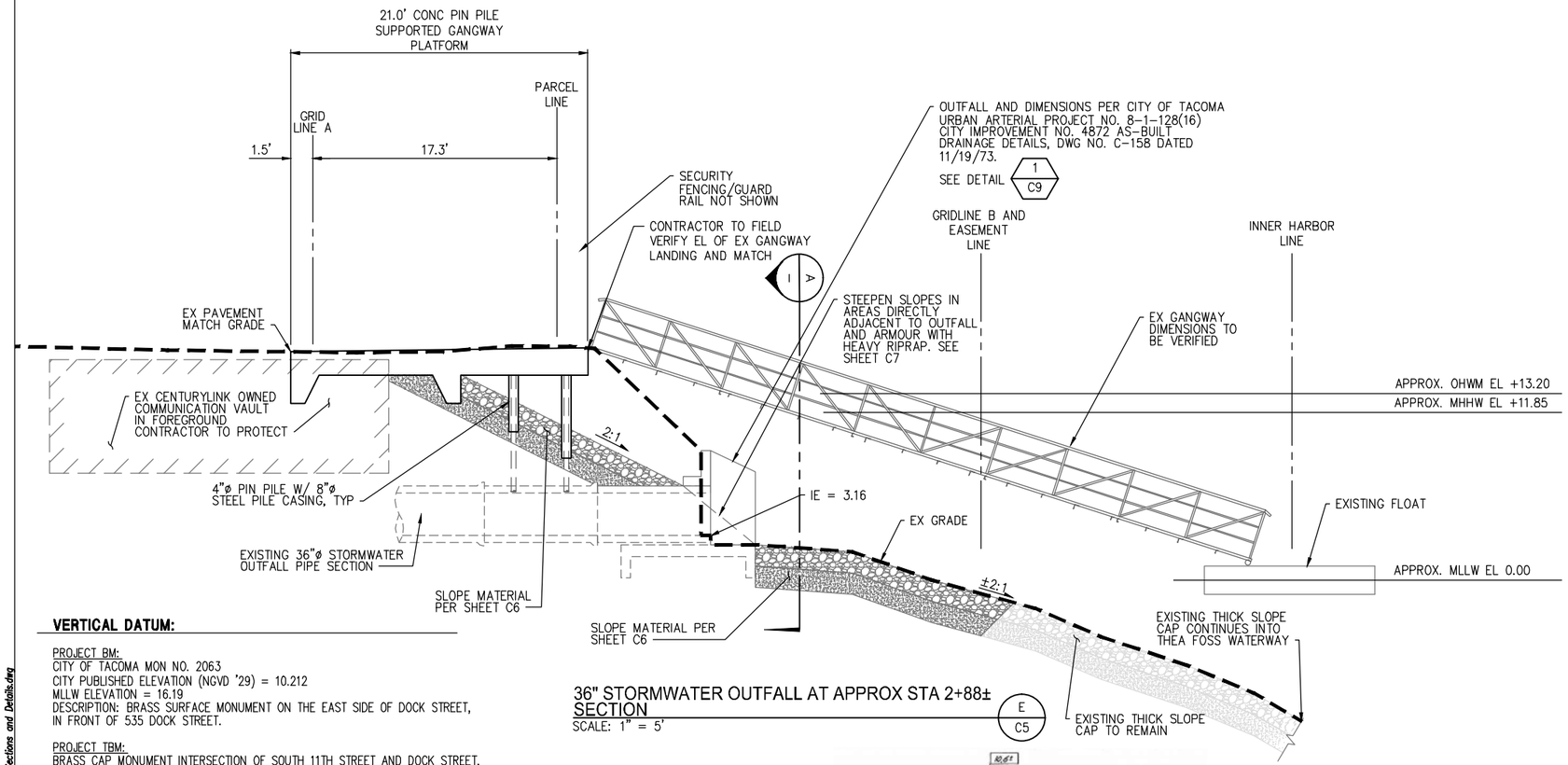
ASST. CONSTRUCTION DIVISION MANAGER

CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

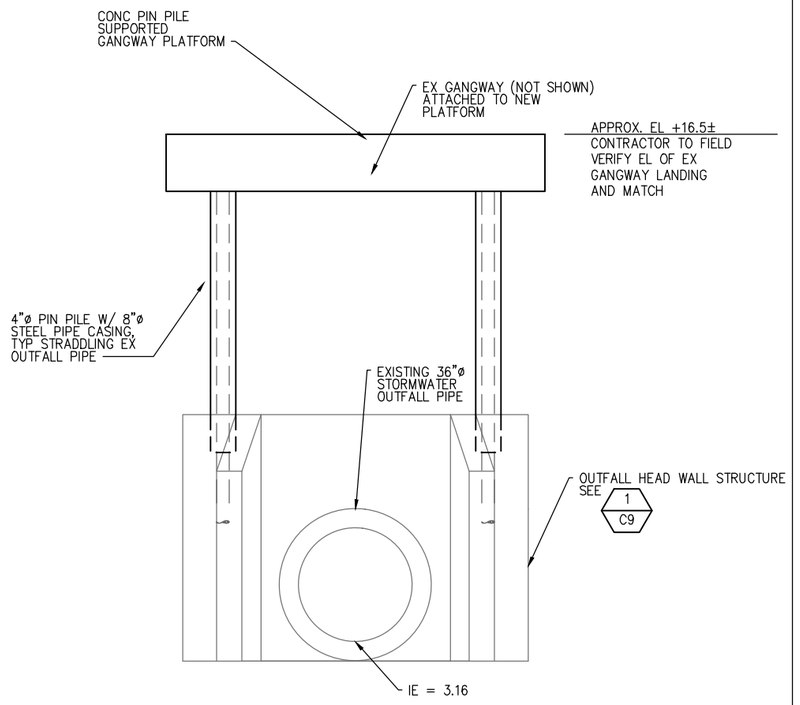
SITE 9 BULKHEAD WALL REMOVAL
MISCELLANEOUS CIVIL SECTIONS

SHEET NO. C8
SHEET 12 OF 19

PLOTTED BY: bosterhoudDATE & TIME: Nov 20, 2013 - 11:31am FILE: N:\Struct\113-1113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C8 Misc Civil Sections.dwg



36" STORMWATER OUTFALL AT APPROX STA 2+88±
SECTION
SCALE: 1" = 5'
E C5



SECTION A
SCALE: 1" = 2'
A –

VERTICAL DATUM:

PROJECT BM:
CITY OF TACOMA MON NO. 2063
CITY PUBLISHED ELEVATION (NGVD '29) = 10.212
MLLW ELEVATION = 16.19
DESCRIPTION: BRASS SURFACE MONUMENT ON THE EAST SIDE OF DOCK STREET, IN FRONT OF 535 DOCK STREET.

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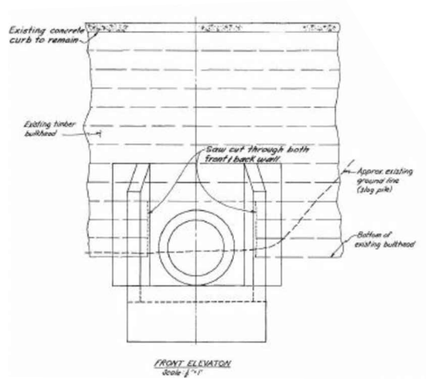
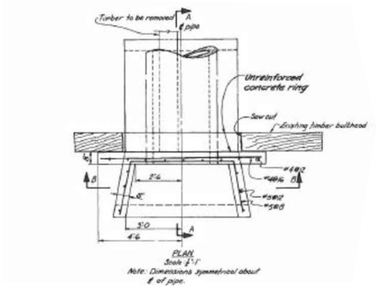
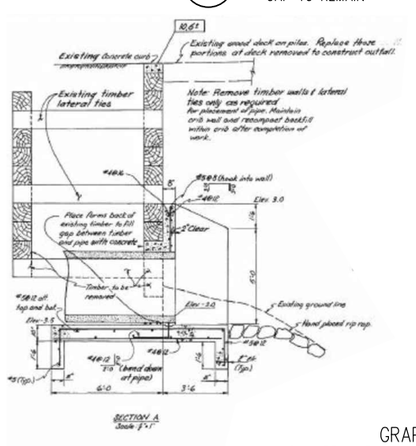
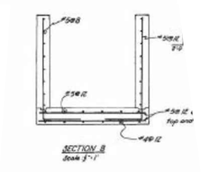


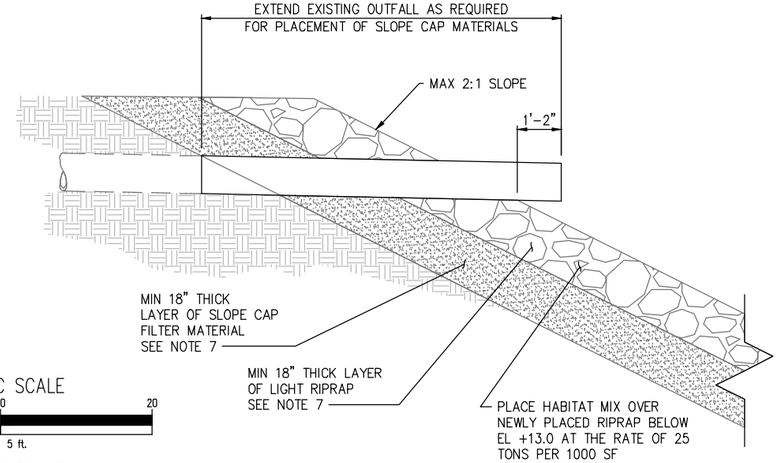






GRAPHIC SCALE
0 2.5 5 10 20
1 inch = 5 ft.

GRAPHIC SCALE
0 1 2 4 8
1 inch = 2 ft.



OUTFALL MODIFICATION DETAIL
SCALE: 1" = 2'
2 C5

OUTFALL MODIFICATION NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE CITY OF ALL MODIFICATIONS TO EXISTING OUTFALLS OR DRAINS PRIOR TO CONSTRUCTION AND PREPARE A PLAN SHOWING THE PROPOSED MODIFICATION. REMOVE ANY SEDIMENT AND DEBRIS FROM THE END OF THE OUTFALL PIPE PRIOR TO PIPE EXTENSION.
2. PIPE EXTENSIONS SHALL BE CONSTRUCTED OF MATERIALS MATCHING THE EXISTING OUTFALL PIPE OR AS DIRECTED BY CITY INSPECTOR
3. OUTFALL EXTENSIONS SHALL HAVE A MINIMUM PIPE LENGTH OF 3 FEET. REMOVE A PORTION OF THE EXISTING OUTFALL PIPE IF NECESSARY TO INSTALL THE MINIMUM LENGTH EXTENSION.
4. CONNECT EXTENSION PIPE TO THE EXISTING OUTFALL PIPE USING A FLEXIBLE PIPE COUPLING OR OTHER CITY APPROVED CONNECTION DEVICE.
5. REMOVE ANY BACKFLOW PREVENTION DEVICES FOUND ON EXISTING OUTFALL PIPES AND REINSTALL ON PIPE EXTENSIONS AS DIRECTED BY CITY INSPECTOR.
6. PLACE SLOPE CAP MATERIALS AROUND PIPE EXTENSIONS AS REQUIRED TO SUPPORT THE PIPE EXTENSION. ALLOW DRAINAGE AND PROVIDE THE MINIMUM SPECIFIED CAPPING THICKNESS.
7. SEE SHEET C7 FOR MATERIAL SPECIFICATIONS AND PLACEMENT REQUIREMENTS FOR THE SLOPE CAP, INCLUDING THE SLOPE CAP FILTER MATERIAL, LIGHT RIPRAP, AND HABITAT MIX.

AS-BUILT NOTES:

1. DRAWINGS TAKEN FROM CITY OF TACOMA URBAN ARTERIAL PROJECT NO. 8-1-128(16) CITY IMPROVEMENT NO. 4872 AS-BUILT DRAINAGE DETAILS, DWG NO. C-158 DATED 11/19/73.

CITY OF TACOMA AS-BUILT FOR REFERENCE ONLY
NTS
1 C9

CONSTRUCTION SET

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2407 North 31st. Street, Suite 100
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(253) 396-0150 Fax (253) 396-0162

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NO	REVISION	DATE	APPD

FINAL CONSTRUCTION CHECKED
BY
DATE
FIELD BOOKS

DATE	SCALE
11/20/13	AS SHOWN
DESIGNED	CHECKED
RLO	SWK
DRAWN	PROJECT NAME
RLO	
DRAWING NAME	

STEVEN WADE KINCAID — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13
ASST. CONSTRUCTION DIVISION MANAGER

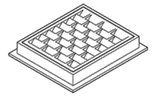
CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
MISCELLAEOUS CIVIL SECTION AND DETAILS

SHEET NO. C9
SHEET 13 OF 19

PLOTTED BY: bosterhoudDATE & TIME: Nov 20, 2013 - 11:31am FILE: N:\Struct\13-\13141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C9 Misc Civil Sections and Details.dwg

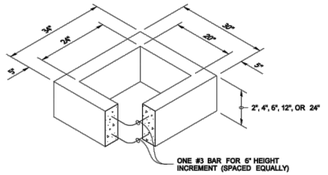
DRAWN BY: LISA CYFORD



FRAME AND VANED GRATE

PIPE ALLOWANCES	
PIPE MATERIAL	MAXIMUM INSIDE DIAMETER
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP ★ (STD. SPEC. 9-05.20)	12"
SOLID WALL PVC (STD. SPEC. 9-05.12(1))	15"
PROFILE WALL PVC (STD. SPEC. 9-05.12(2))	15"

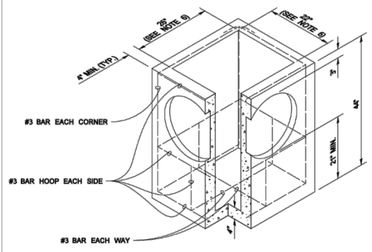
★ CORRUGATED POLYETHYLENE STORM SEWER PIPE



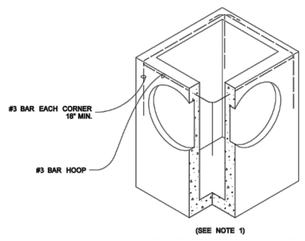
RECTANGULAR ADJUSTMENT SECTION

NOTES

1. As acceptable alternatives to the rebar shown in the PRECAST BASE SECTION, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the ALTERNATIVE PRECAST BASE SECTION. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 20". Knockouts shall have a wall thickness of 2" minimum to 2.5" maximum. Provide a 1.5" minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with Standard Specification 9-04.3.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5'.
4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1:24 or steeper.
6. The opening shall be measured at the top of the Precast Base Section.
7. All pickup holes shall be grouted full after the basin has been placed.



PRECAST BASE SECTION



ALTERNATIVE PRECAST BASE SECTION

CASEY M. KRAMER — STATE OF WASHINGTON — 44535 — REGISTERED PROFESSIONAL ENGINEER

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CATCH BASIN TYPE 1

STANDARD PLAN B-5.20-01

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

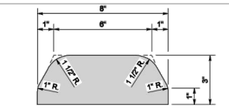
Pasco Bakotich III 06-16-11

STATE DESIGN ENGINEER — DATE

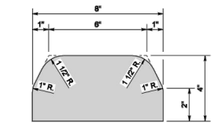
Washington State Department of Transportation

TYPE 1 CATCH BASIN
NTS
1 / C5

DRAWN BY: BILL BERENS



TYPE 1
(HOT MIX ASPHALT)



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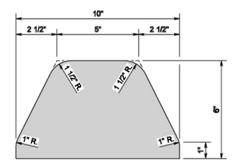

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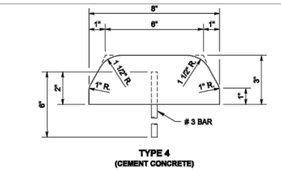

TYPE 4
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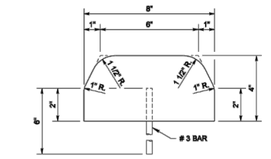

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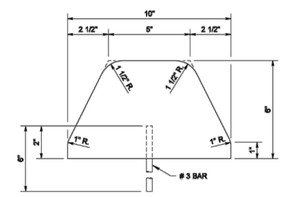

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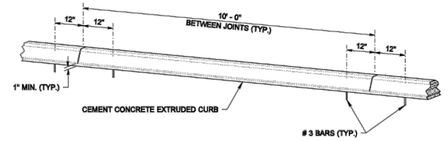
(CEMENT CONCRETE)



SPACING OF ANCHOR BARS
(FOR TYPES 4, 5, AND 6)

NOTE

JOINTS MAY BE FORMED DURING INSTALLATION USING A RIGID DIVIDER OR SAWCUT AFTER CONCRETE CURES TO MINIMUM STRENGTH.

KEN LEROY SMITH — STATE OF WASHINGTON — 31802 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES AUGUST 26, 2007

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EXTRUDED CURB

STANDARD PLAN F-10.42-00

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

Ken L. Smith *01-23-07*

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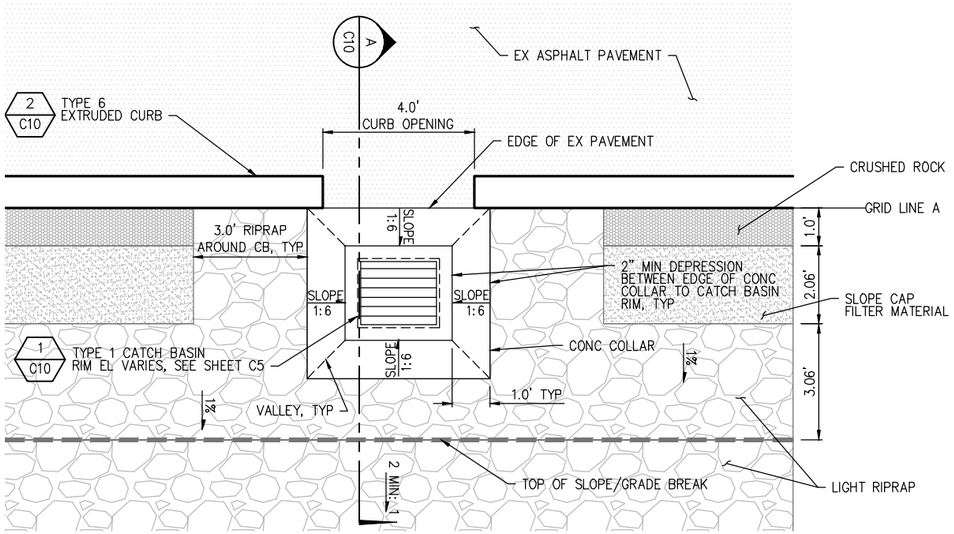
Washington State Department of Transportation

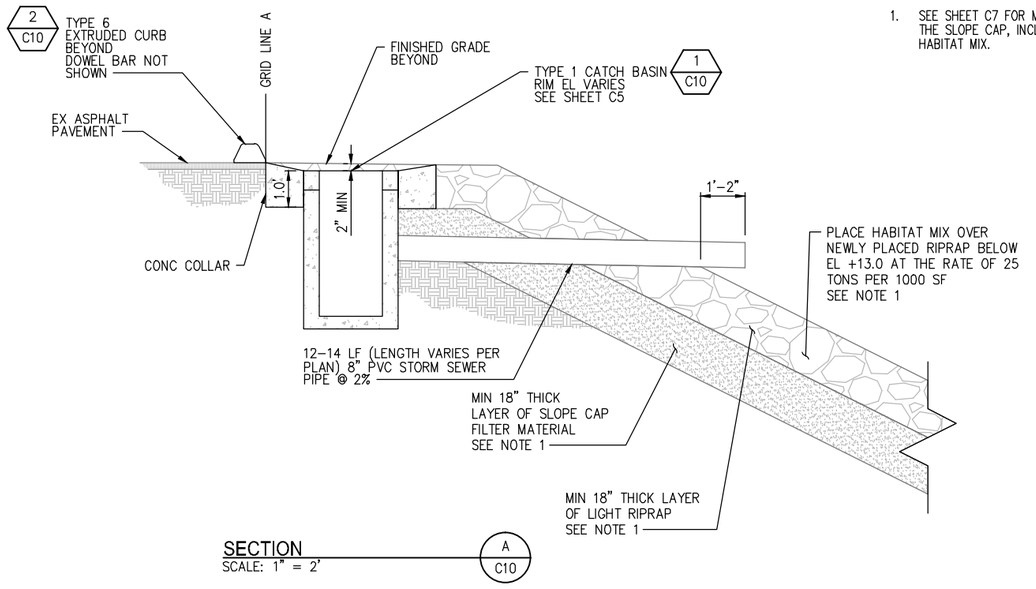
EXTRUDED CURB
NTS
2 / C4



CATCH BASIN W/ CONC COLLAR DETAIL
SCALE: 1" = 2'
3 / C5

NOTE:

1. SEE SHEET C7 FOR MATERIAL SPECIFICATIONS AND PLACEMENT REQUIREMENTS FOR THE SLOPE CAP, INCLUDING THE SLOPE CAP FILTER MATERIAL, LIGHT RIPRAP, AND HABITAT MIX.



SECTION
SCALE: 1" = 2'
A / C10

GRAPHIC SCALE
0 1 2 4 8
1 inch = 2 ft.

CONSTRUCTION SET

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DESIGNED	CHECKED
RLO	SWK
DRAWN	PROJECT NAME
RLO	
DRAWING NAME	

STEVEN WADE KING — STATE OF WASHINGTON — 32791 — REGISTERED PROFESSIONAL ENGINEER — 11/20/13

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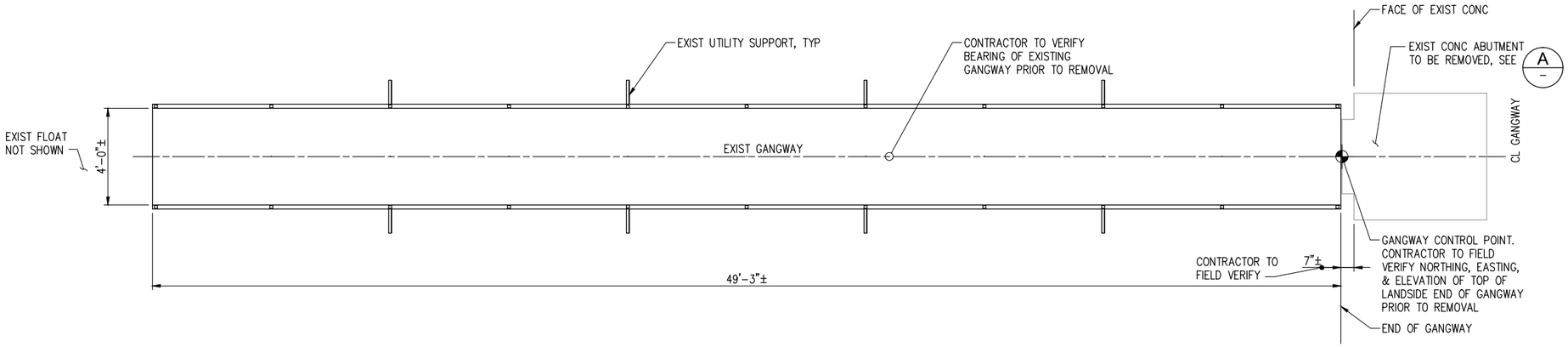
CITY OF TACOMA
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL

MISCELLANEOUS CIVIL DETAILS

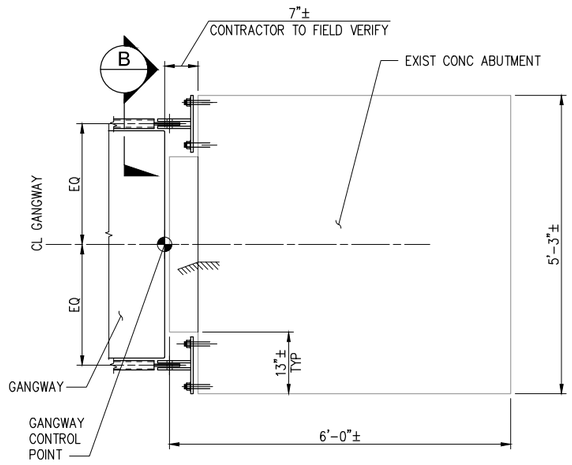
SHEET NO. C10
SHEET 14 OF 19

PLOTTED BY: bosterhaus DATE & TIME: Nov 20, 2013 - 11:31am FILE: K:\Struct\113-1\113141 (Site 9 Esplanade Sinkhole Repair)\Drawings\C10 Misc Civil Sections and Details.dwg



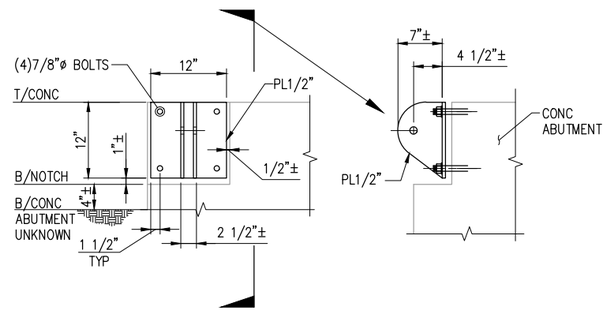
PLAN & ELEVATION EXISTING GANGWAY

SCALE: 3/8"=1'-0" (1)



PLAN - EXISTING PLATFORM

SCALE: 3/4"=1'-0" (A –)



EXISTING GANGWAY ATTACHMENT TO PLATFORM

SCALE: 1"=1'-0" (B –)

0 1 2 4 8
SCALE: 3/8"=1'-0"

0 1 2 4
SCALE: 3/4"=1'-0"

0 1 2 3
SCALE: 1"=1'-0"

CONSTRUCTION SET

PLOTTED BY: dmumma DATE & TIME: Nov 20, 2013 - 10:42am FILE: N:\Struct\113-113141 (Site 9 Esplanade Sinkhole Repair)\struct DWGS\S1-S2-PRELIM.dwg

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DRAWN	PROJECT NAME
DEM	
DRAWING NAME	

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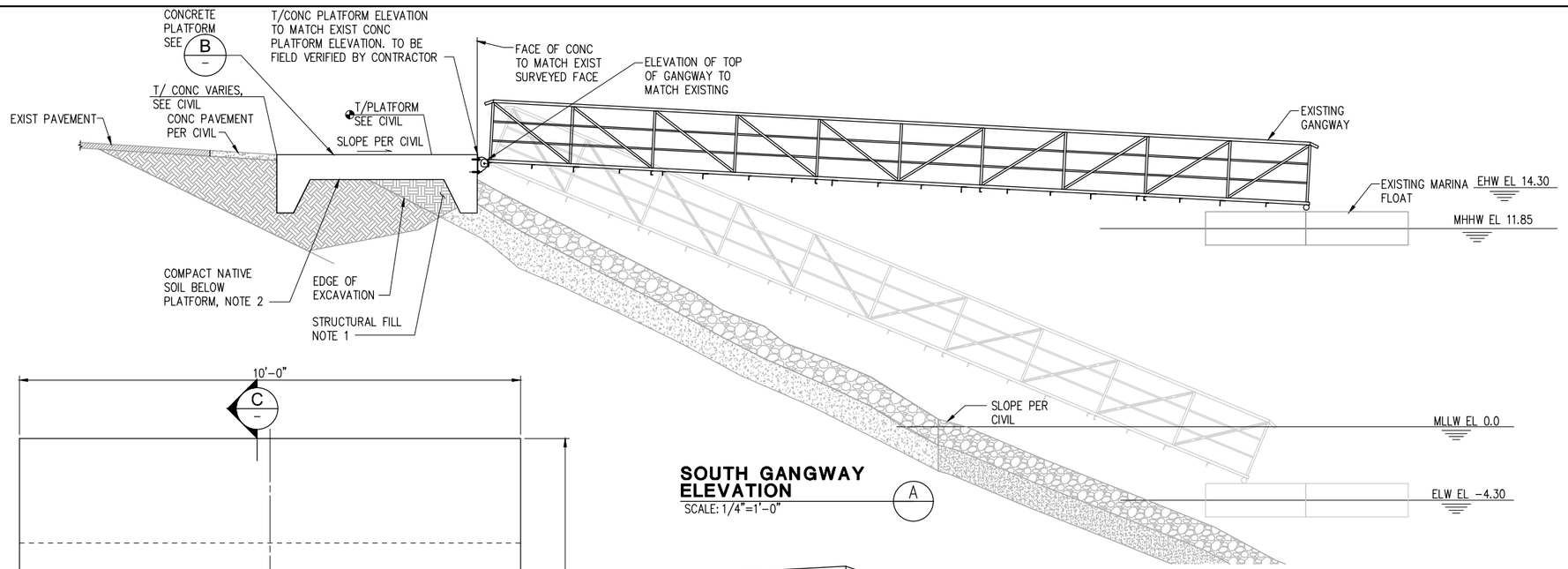
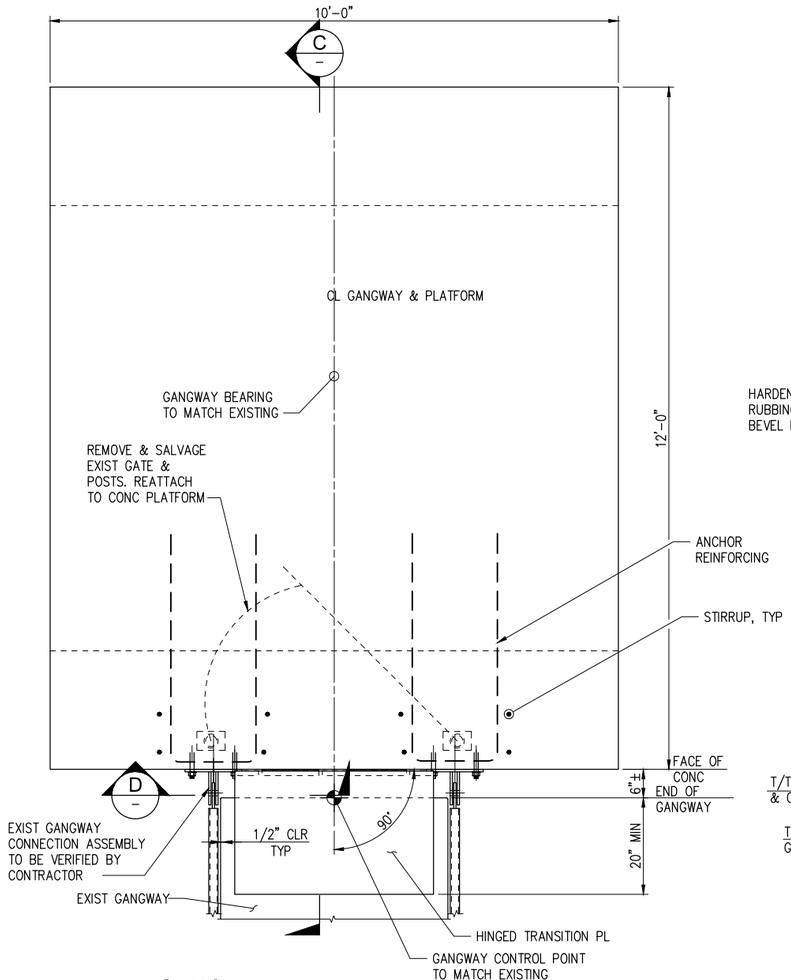
DEPARTMENT OF PUBLIC WORKS

SITE 9 BULKHEAD WALL REMOVAL
EXISTING GANGWAY

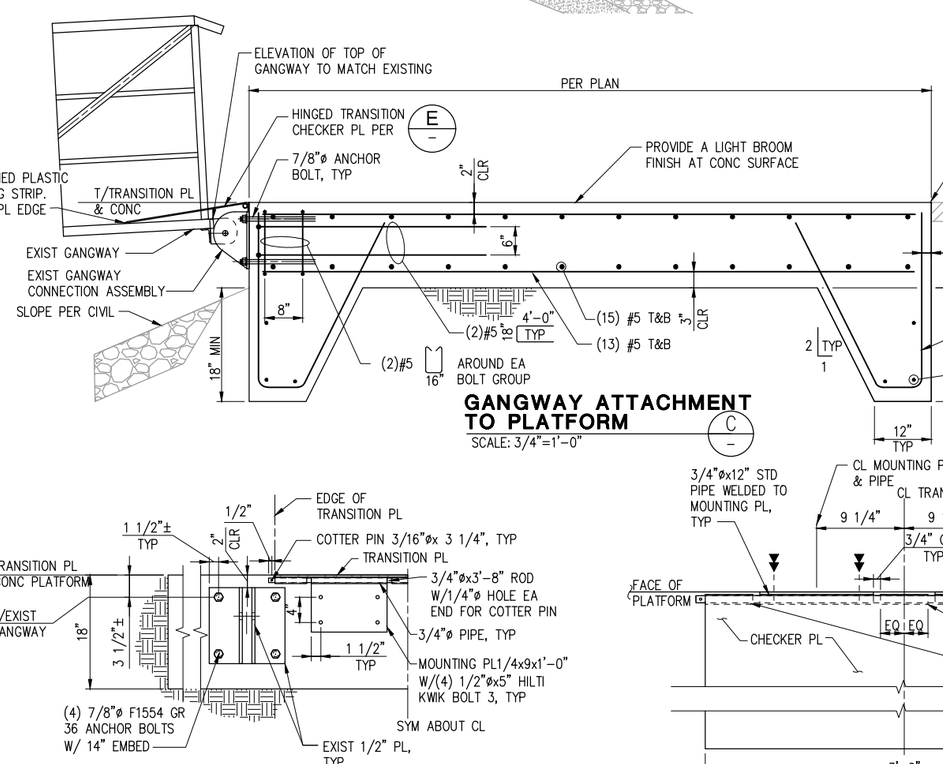
SHEET NO. S1
SHEET 15 OF 19



SOUTH GANGWAY ELEVATION (A)
SCALE: 1/4"=1'-0"

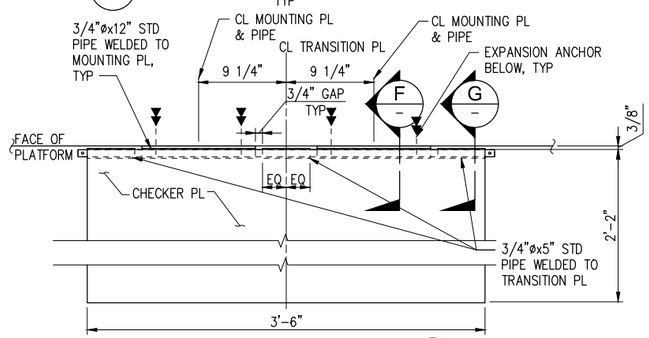


GANGWAY PLATFORM PLAN (B)
SCALE: 3/4"=1'-0"

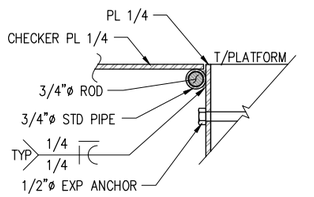


GANGWAY ATTACHMENT TO PLATFORM (C)
SCALE: 3/4"=1'-0"

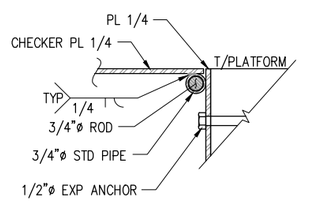
SECTION (D)
SCALE: 1"=1'-0"



TRANSITION PLATE (E)
SCALE: 1 1/2"=1'-0"



SECTION (F)
SCALE: 3"=1'-0"



SECTION (G)
SCALE: 3"=1'-0"

MATERIAL LIST
CONCRETE f'c = 4,000 PSI
ANCHOR BOLTS F1554 GR 36 & GR 105
CONCRETE REINFORCEMENT ASTM A615 GR 60
STEEL PIPE ASTM A 53 GRADE B
HEADED SHEAR STUDS ASTM A108
ALL OTHER STEEL ASTM A 36, UNO

NOTES:
1. STRUCTURAL FILL SHALL CONFORM TO WSDOT STANDARD SPECIFICATION 9-03.14(1), GRAVEL BORROW. STRUCTURAL FILL SHALL BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY PER ASTM D 1557.
2. THE GEOTECHNICAL ENGINEER WILL OBSERVE AND CONFIRM THE EXISTING SOIL BELOW THE FOUNDATION ELEMENTS. EXISTING SOILS SHALL BE COMPACTED TO A FIRM AND UNYIELDING CONDITION. SOILS THAT CANNOT BE COMPACTED SHALL BE REMOVED AND REPLACED WITH STRUCTURAL FILL.
3. ALL STEEL MATERIALS SHALL BE HOT-DIP GALVANIZED PER ASTM A123 & IN CONFORMANCE W/ AISC SPECIFICATION 360-10.

0 1 2 3 — SCALE: 1"=1'-0"
0 1 2 — SCALE: 1 1/2"=1'-0"
0 1 2 4 — SCALE: 3/4"=1'-0"
0 3" 6" 1' — SCALE: 3"=1'-0"
0 4 8 12 — SCALE: 1/4"=1'-0"

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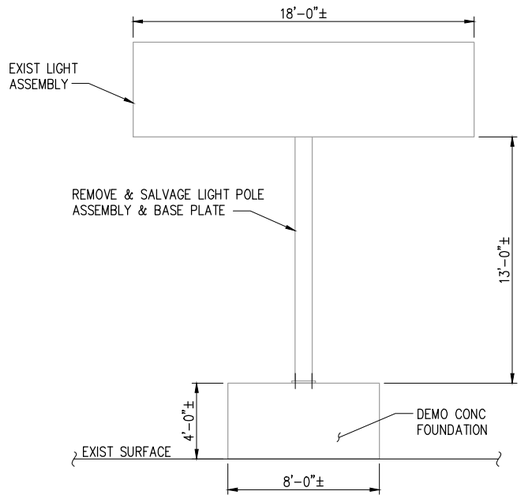
SITE 9 BULKHEAD WALL REMOVAL
SOUTH GANGWAY FOUNDATION

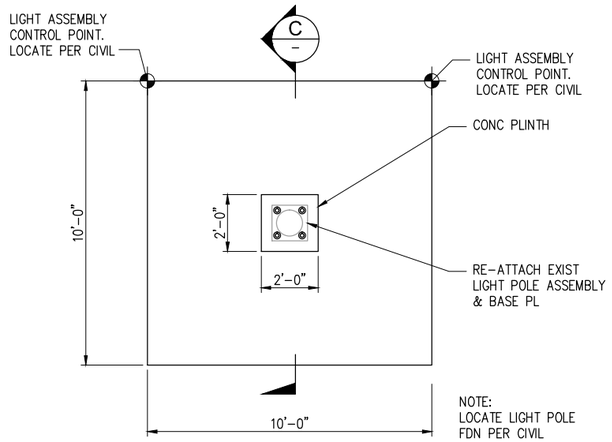
SHEET NO. S2
SHEET 16 OF 19

PLOTTED BY: dmumma DATE & TIME: Nov 20, 2013 - 10:43am FILE: N:\Struct\113-\113141 (Site 9 Esplanade Sinkhole Repair)\struct DWGS\S1-S2-PRELIM.dwg

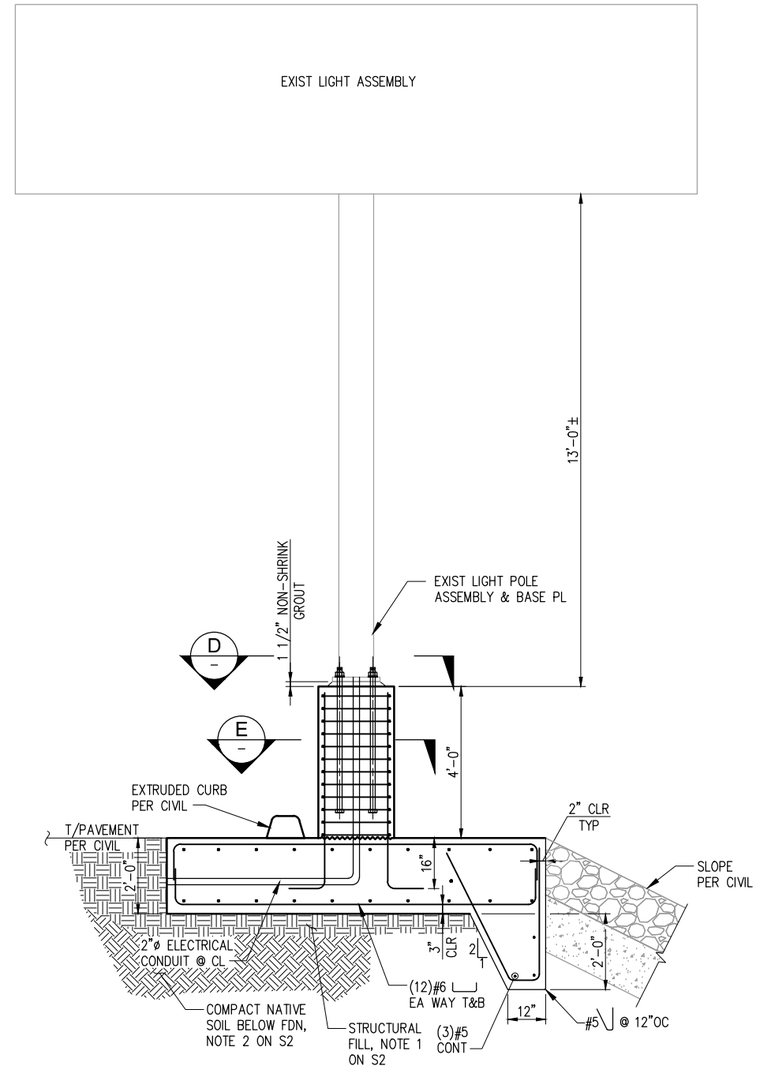


DEMO PLAN
SCALE: 1/4"=1'-0" (A)

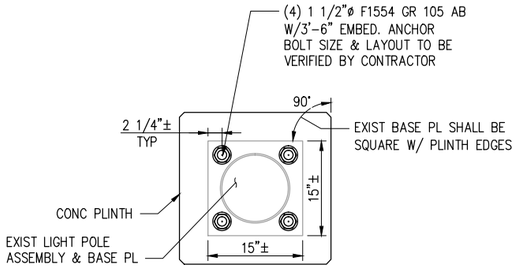
NOTE:
LOCATION AND ORITENTATION OF LIGHT ASSEMBLY SHALL BE VERIFIED BY THE CONTRACTOR AND THE CITY PRIOR TO REINSTALLATION.



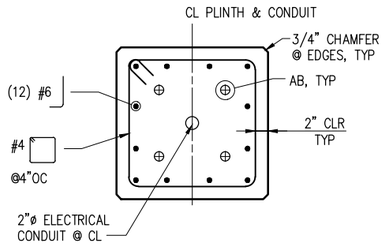
CONC FDN PLAN
SCALE: 3/8"=1'-0" (B)



SECTION
SCALE: 1/2"=1'-0" (C)



SECTION
SCALE: 1"=1'-0" (D)



SECTION
SCALE: 1"=1'-0" (E)

0 1 2 3 — SCALE: 1"=1'-0"

0 1 2 4 8 — SCALE: 3/8"=1'-0"

0 1 2 4 6 — SCALE: 1/2"=1'-0"

0 4 8 12 — SCALE: 1/4"=1'-0"

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DRAWING NAME

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CITY OF TACOMA
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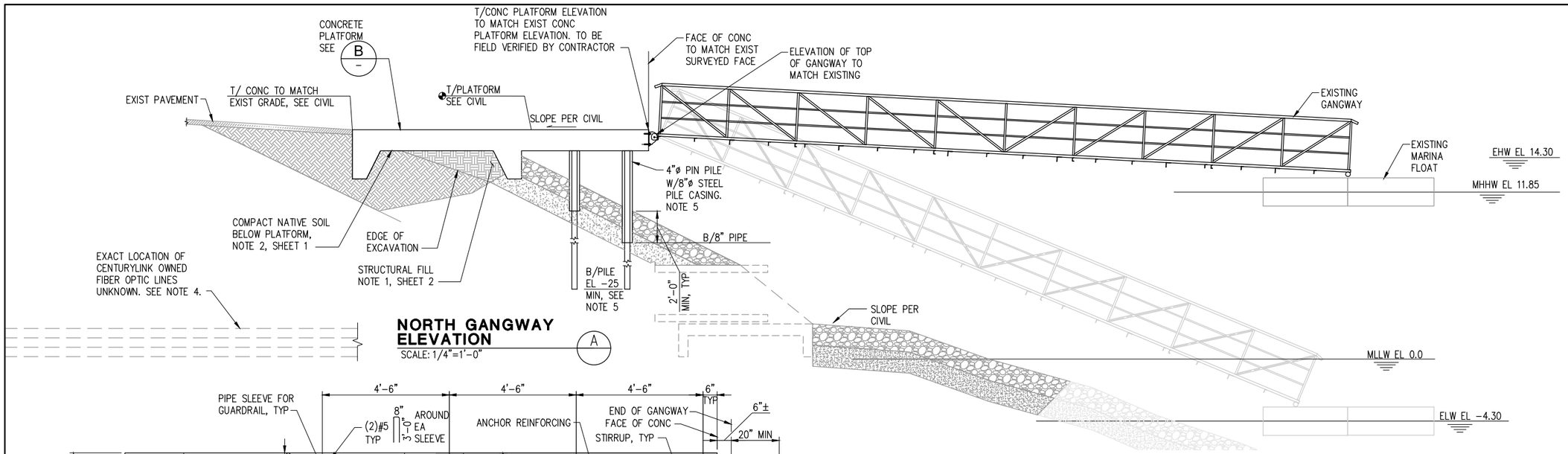
SITE 9 BULKHEAD WALL REMOVAL
BRIDGE ARC LIGHT FOUNDATION

SHEET NO. S3
SHEET 17 OF 19

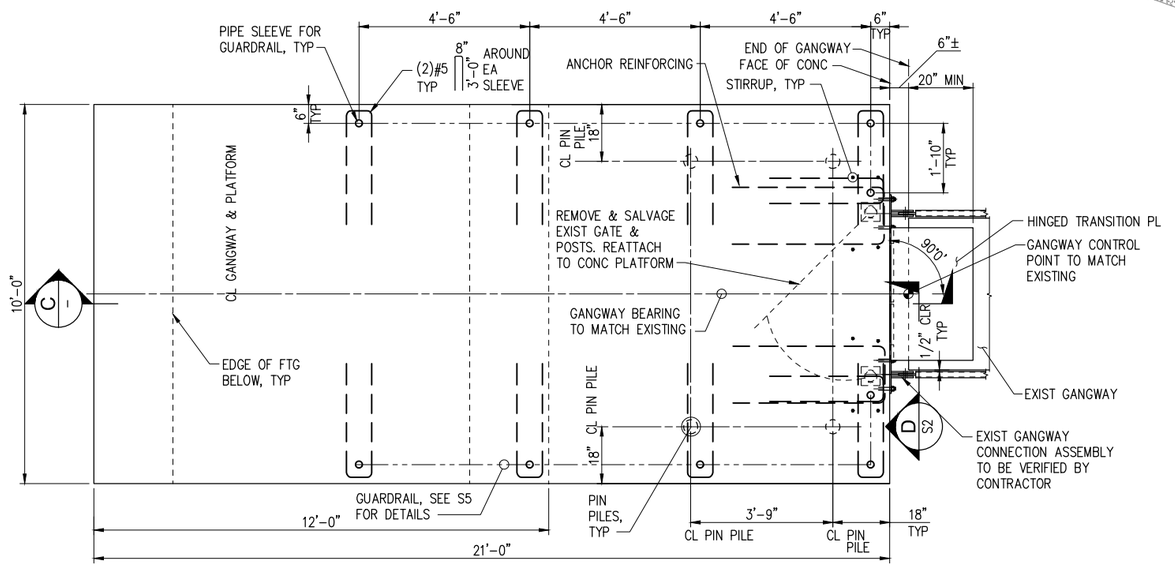
PLOTTED BY: dmumma DATE & TIME: Nov 20, 2013 - 10:44am FILE: N:\Struct\13-\13141 (Site 9 Esplanade Sinkhole Repair)\struct DWGS\S3-PRELIM.dwg



NORTH GANGWAY ELEVATION

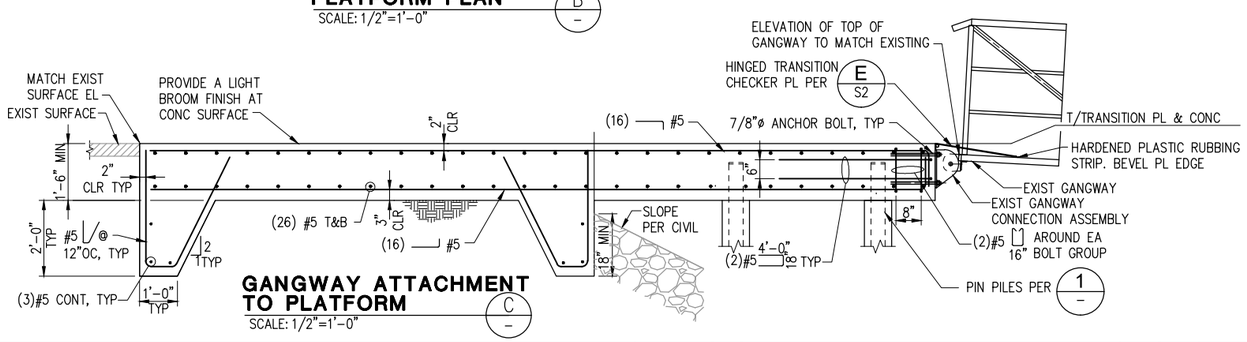
SCALE: 1/4"=1'-0" (A)

NOTES:
1. FOR INFORMATION NOT SHOWN REGARDING MATERIAL LIST AND NOTES SEE S2.
2. THE CONTRACTOR SHALL PROVIDE GROUT CONFORMING TO WSDOT STANDARD SPECIFICATION 9-20.3 (4). THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO ENSURE NO GROUT ENTERS WATER.
3. FOR INFORMATION ON GUARDRAIL SEE S5.
4. CONTRACTOR TO VERIFY A MINIMUM 5'-0" CLEARANCE BETWEEN CENTURYLINK UNDERGROUND CONDUIT SYSTEM AND PIN PILE. SEE CIVIL SHEET C8 FOR ADDITIONAL INFORMATION.
5. THE PIN PILES SHALL HAVE A MINIMUM ULTIMATE BEARING CAPACITY OF 18 KIPS. THE ACCEPTABLE REFUSAL CRITERIA SHALL BE LESS THAN 1" OF PILE PENETRATION IN 15 SECONDS USING AN 850 LB HYDRAULIC HAMMER OPERATING AT LEAST 950 BLOWS PER MINUTE.



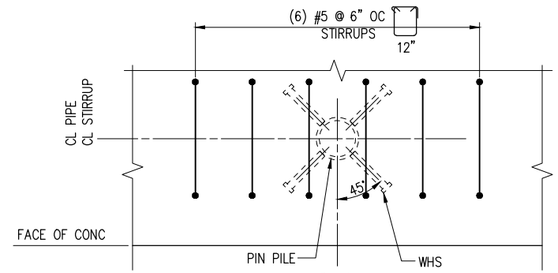
GANGWAY PLATFORM PLAN

SCALE: 1/2"=1'-0" (B)

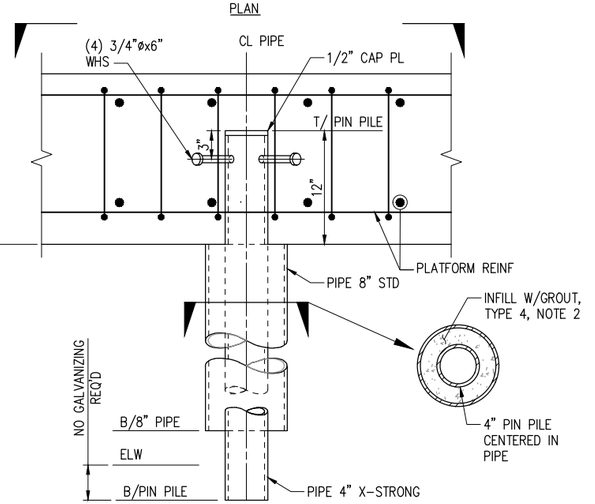


GANGWAY ATTACHMENT TO PLATFORM

SCALE: 1/2"=1'-0" (C)



PLAN



PIN PILE

SCALE: NTS (1)

SCALE: 1/4"=1'-0"

SCALE: 1/2"=1'-0"

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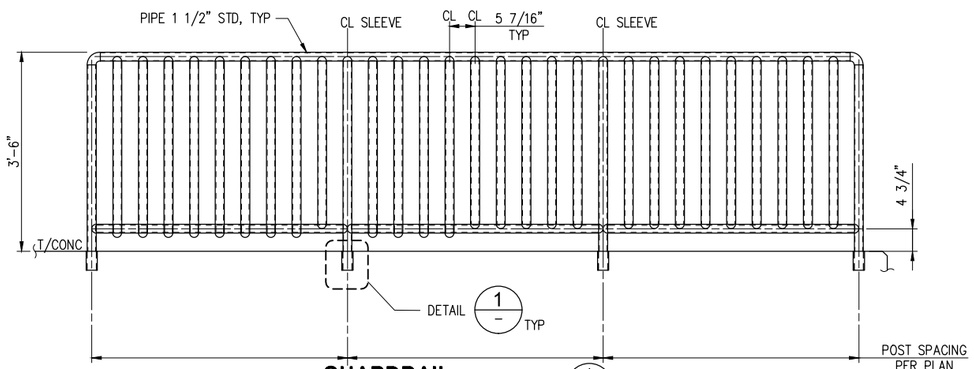
SITE 9 BULKHEAD WALL REMOVAL
NORTH GANGWAY FOUNDATION

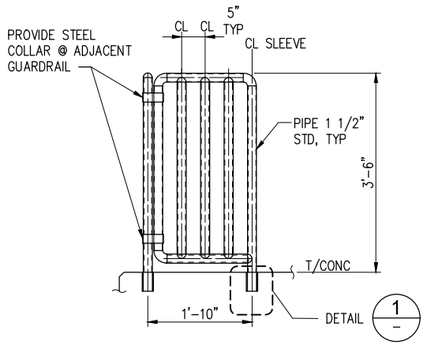
SHEET NO. S4
SHEET 18 OF 19

PLOTTED BY: dmumma DATE & TIME: Nov 20, 2013 - 10:45am FILE: N:\Struct\13-\13141 (Site 9 Esplanade Sinkhole Repair)\struct DWGS\S4-S5-PRELIM.dwg



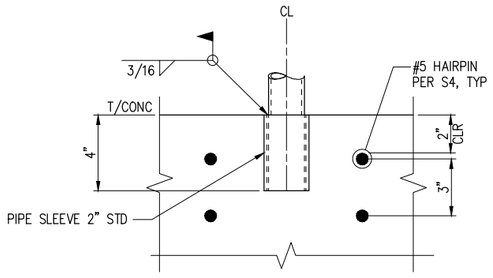
GUARDRAIL
SCALE: 3/4"=1'-0"

A –



GUARDRAIL AT CORNER
SCALE: 3/4"=1'-0"

B –



DETAIL
SCALE: 3"=1'-0"

1 –

0 3" 6" 1'
SCALE: 3"=1'-0"

0 1 2 4
SCALE: 3/4"=1'-0"

CONSTRUCTION SET

PLOTTED BY: dmumma DATE & TIME: Nov 20, 2013 - 10:45am FILE: N:\Struct\113-\113141 (Site 9 Esplanade Sinkhole Repair)\struct DWGS\S4-S5-PRELIM.dwg

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FIELD BOOKS

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DESIGNED NAG | CHECKED SEK
DRAWN DEM | PROJECT NAME
DRAWING NAME

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SITE 9 BULKHEAD WALL REMOVAL
NORTH GANGWAY GUARDRAIL

SHEET NO. S5
SHEET 19 OF 19

Joint Aquatic Resources Permit Application

WASHINGTON STATE
Joint Aquatic Resources Permit Application (JARPA) Form[1,2]

USE BLACK OR BLUE INK TO ENTER ANSWERS IN THE WHITE SPACES BELOW.

US Army Corps of Engineers
Seattle District

AGENCY USE ONLY

Date received:

Agency reference #: _____

Tax Parcel #(s): _____

_____

_____

Part 1–Project Identification

1. Project Name (A name for your project that you create. Examples: Smith's Dock or Seabrook Lane Development) [help]
Emergency Bulkhead Removal and Esplanade Replacement – Development Site 9

Part 2–Applicant

The person and/or organization responsible for the project. [help]

2a. Name (Last, First, Middle)			
Tom Rutherford			
2b. Organization (If applicable)			
City of Tacoma			
2c. Mailing Address (Street or PO Box)			
747 Market Street, Room 544			
2d. City, State, Zip			
Tacoma, Washington 98402			
2e. Phone (1)	**2f.** Phone (2)	**2g.** Fax	**2h.** E-mail
(253) 591-5767	( )	(253) 591-5181	TRutherford @ci.tacoma.wa.us

[1] Additional forms may be required for the following permits:

- If your project may qualify for Department of the Army authorization through a Regional General Permit (RGP), contact the U.S. Army Corps of Engineers for application information (206) 764-3495.
- If your project might affect species listed under the Endangered Species Act, you will need to fill out a Specific Project Information Form (SPIF) or prepare a Biological Evaluation. Forms can be found at http://www.nws.usace.army.mil/Missions/CivilWorks/Regulatory/PermitGuidebook/EndangeredSpecies.aspx.
- Not all cities and counties accept the JARPA for their local Shoreline permits. If you need a Shoreline permit, contact the appropriate city or county government to make sure they accept the JARPA.

[2] To access an online JARPA form with [help] screens, go to http://www.epermitting.wa.gov/site/alias__resourcecenter/jarpa_jarpa_form/9984/jarpa_form.aspx.

For other help, contact the Governor's Office of Regulatory Assistance at 1-800-917-0043 or help@ora.wa.gov.

Part 3–Authorized Agent or Contact

Person authorized to represent the applicant about the project. (Note: Authorized agent(s) must sign 11b of this application.) [help]

3a. Name (Last, First, Middle)			
Tom Rutherford			
3b. Organization (If applicable)			
City of Tacoma, Public Works Department.			
3c. Mailing Address (Street or PO Box)			
747 Market Street, Rm 544			
3d. City, State, Zip			
Tacoma, WA 98402			
3e. Phone (1)	**3f.** Phone (2)	**3g.** Fax	**3h.** E-mail
253-591-5767			trutherford@ci.tacoma.wa.us

Part 4–Property Owner(s)

Contact information for people or organizations owning the property(ies) where the project will occur. Consider both **upland and aquatic** ownership because the upland owners may not own the adjacent aquatic land. [help]

☒ Same as applicant. (Skip to Part 5.)

☐ Repair or maintenance activities on existing rights-of-way or easements. (Skip to Part 5.)

☐ There are multiple upland property owners. Complete the section below and fill out JARPA Attachment A for each additional property owner.

☐ Your project is on Department of Natural Resources (DNR)-managed aquatic lands. If you don't know, contact the DNR at (360) 902-1100 to determine aquatic land ownership. If yes, complete JARPA Attachment E to apply for the Aquatic Use Authorization.

4a. Name (Last, First, Middle)			
4b. Organization (If applicable)			
4c. Mailing Address (Street or PO Box)			
4d. City, State, Zip			
4e. Phone (1)	**4f.** Phone (2)	**4g.** Fax	**4h.** E-mail
	( )	( )	

Part 5–Project Location(s)

Identifying information about the property or properties where the project will occur. [help]

☐ There are multiple project locations (e.g. linear projects). Complete the section below and use JARPA Attachment B for each additional project location.

5a. Indicate the type of ownership of the property. (Check all that apply.) [help]

☐ Private
☐ Federal
☒ Publicly owned (state, county, city, special districts like schools, ports, etc.)
☐ Tribal
☐ Department of Natural Resources (DNR) – managed aquatic lands (Complete JARPA Attachment E)

5b. Street Address (Cannot be a PO Box. If there is no address, provide other location information in 5p.) [help]

1117 and 1119 Dock Street

5c. City, State, Zip (If the project is not in a city or town, provide the name of the nearest city or town.) [help]

Tacoma, Washington 98402

5d. County [help]

Pierce

5e. Provide the section, township, and range for the project location. [help]

¼ Section	Section	Township	Range
NW	4	3E	20N

5f. Provide the latitude and longitude of the project location. [help]

- Example: 47.03922 N lat. / -122.89142 W long. (Use decimal degrees - NAD 83)

47.253235 N lat / 122.434650 W long.

5g. List the tax parcel number(s) for the project location. [help]

- The local county assessor's office can provide this information.

8950001963 and 8950001962

5h. Contact information for all adjoining property owners. (If you need more space, use JARPA Attachment C.) [help]

Name	Mailing Address	Tax Parcel # (if known)
City of Tacoma Public Works Department	747 Market Street, Rm 408 Tacoma, WA 98402	890001964, 8950001961

5i. List all wetlands on or adjacent to the project location. [help]

None

5j. List all waterbodies (other than wetlands) on or adjacent to the project location. [help]

Thea Foss Waterway, Commencement Bay, Puget Sound

5k. Is any part of the project area within a 100-year floodplain? [help]

☒ Yes ☐ No ☐ Don't know

5l. Briefly describe the vegetation and habitat conditions on the property. [help]

The upland area is a paved parking lot with landscaped trees bounded by concrete curbing. The area is on the highly urbanized waterfront of downtown Tacoma, Washington

5m. Describe how the property is currently used. [help]

Inwater, the area is an active marina. Upland, the area is used as a pedestrian esplanade and adjacent parking area for the marina.

5n. Describe how the adjacent properties are currently used. [help]

Immediately to the north are the 11th Street right-of-way and the Murray Morgan Bridge. To the south is Development Site 8 owned by the City of Tacoma. Site 8 currently contains two vacant buildings. The Foss Harbor Marina is located to the east of the site and the Dock Street right-of-way is located to the west of the site.

5o. Describe the structures (above and below ground) on the property, including their purpose(s) and current condition. [help]

The site is composed of a paved parking area upland and an active marina inwater. Between the two is an overwater pedestrian esplanade composed of wood. The pedestrian esplanade and parking area are presently closed due to bulkhead failure. Sinkholes are present in the parking area due to the failing bulkhead.

5p. Provide driving directions from the closest highway to the project location, and attach a map. [help]

Interstate 5 to Exit 133
Left at fork for I-705
Schuster Pkway exit
Right onto S 4th St.
Left into parking area (Figure 1).

Part 6–Project Description

6a. Briefly summarize the overall project. You can provide more detail in 6b. [help]

The project is an emergency action to remove a failing bulkhead and replace a damaged pedestrian boardwalk over a 300 foot reach in Development Site 9. The bulkhead will be replaced by a 27 foot cutback which will be excavated at a 2-to-1 slope behind the bulkhead. The cutback will create 3,870 square feet of additional marine waters of the United States. The cutback will be topped with stabilizing cap material and a habitat mix of sand and gravel. Intertidal enhancement will also occur below the removed bulkhead down to an elevation of MLLW (0 feet). The wooden boardwalk will be replaced with a pre-cast concrete structure.

6b. Describe the purpose of the project and why you want or need to perform it. [help]

The purpose of the project is to replace a failing bulkhead and pedestrian boardwalk. The area is presently closed and unusable and represents a public safety hazard. Replacement is also required to access the existing marina and refurbish the existing parking lot.

The project also represents an opportunity to greatly increase ecological functions within the intertidal zone. The failing vertical bulkhead is situated at +4.6 feet MLLW, eliminating middle and upper intertidal habitat. The bulkhead removal, cutback, and substrate enhancement will restore some upper and middle intertidal ecological function and enhance middle and lower intertidal ecological functions, while replacing a failing bulkhead and again providing safe access to this portion of the waterfront.

6c. Indicate the project category. (Check all that apply) [help]

- ☐ Commercial
- ☐ Residential
- ☐ Institutional
- ☐ Transportation
- ☒ Recreational
- ☒ Maintenance
- ☒ Environmental Enhancement

6d. Indicate the major elements of your project. (Check all that apply) [help]

☐ Aquaculture	☐ Culvert	☐ Float	☐ Retaining Wall (upland)
☐ Bank Stabilization	☐ Dam / Weir	☐ Floating Home	☐ Road
☐ Boat House	☐ Dike / Levee / Jetty	☐ Geotechnical Survey	☐ Scientific Measurement Device
☐ Boat Launch	☐ Ditch	☐ Land Clearing	☐ Stairs
☐ Boat Lift	☒ Dock / Pier	☐ Marina / Moorage	☐ Stormwater facility
☐ Bridge	☐ Dredging	☐ Mining	☐ Swimming Pool
☒ Bulkhead	☐ Fence	☐ Outfall Structure	☐ Utility Line
☐ Buoy	☐ Ferry Terminal	☒ Piling/Dolphin	
☐ Channel Modification	☐ Fishway	☐ Raft	

☒ Other: Habitat creation and enhancement

6e. Describe how you plan to construct each project element checked in 6d. Include specific construction methods and equipment to be used. [help]

- Identify where each element will occur in relation to the nearest waterbody.
- Indicate which activities are within the 100-year floodplain.

Overview

After the evaluation of several alternatives, the City has decided that the entire timber esplanade/bulkhead along Site 9 will be removed and the shoreline modified by cutting it back and creating new intertidal habitat. Enhancement of existing intertidal zone below the bulkhead will also occur. After habitat creation and enhancements, new esplanade with light penetrating surfaces will be constructed over the cut back intertidal zone (Sheets 1-8). Following are details of the bulkhead removal, cutback, intertidal habitat creation and enhancement, and esplanade replacement.

Cutback, Intertidal Creation, and Intertidal Enhancement

A 27-foot cutback behind the bulkhead will be excavated and graded at a 2-to-1 slope for the entire length of Development Site 9 (approximately 300 feet), resulting in the creation of new intertidal habitat of the United States (Sheet 3). Cutback elevations will range from the existing upland parking area to about +4.6 feet mean lower low water (MLLW) at the base of the existing bulkhead. Excavation for the cutback will occur before bulkhead removal to minimize water quality impacts to the marine nearshore. Further enhancements of the intertidal zone will be conducted in front of the former bulkhead to MLLW (0 feet) for the length of Development Site 9 (Sheets 4 and 5). In this area, all existing rubble and debris will be removed.

New substrates will be laid in the newly created and enhanced intertidal areas to stabilize the slope and enhance ecological functions. A 1.5-foot layer of slope cap material composed of clean borrow sand and gravel will be laid to stabilize the slope. On top of the cap, a 1.5-foot layer of light riprap (12- to 15-inch diameter) will be placed and covered with a habitat mix of gravel and sand at an application rate of 25 tons per 1,000 square feet (Sheet 5). The light riprap is necessary to stabilize the habitat mix and the application rate will fill voids and overtop the riprap by a minimum depth of 12 inches.

Habitat mix will consist of a 2-inch-minus pit-run, rounded material from an approved source conforming to the following gradation:

US Standard Sieve Size	**Percent Passing (by weight)**
6-inch	100
4-inch	90 to 100
0.75-inch	50 to 90
No. 4	35 to 65
No.10	15 to 45
No. 40	2 to 10
No. 200	0 to 2

This habitat mix has been used in several beach restoration and enhancement areas within Commencement Bay.

The cutback and excavation will result in the creation of approximately 3,870 square feet of new intertidal marine waters of the United States behind the bulkhead between MHHW and +4.6 feet MLLW. In front of the bulkhead, approximately 6,030 square feet of intertidal habitat between +4.6 feet and MLLW will be enhanced with rubble removal and habitat mix.

In addition, approximately 15 logs, rootwads intact, will be permanently anchored onto the cap at an elevation between +9 and +10 feet MLLW. Large woody debris (LWD) will be at least 12 inches diameter at breast height (dbh) and 18 feet in length, and anchored along the entire length of the esplanade at Development Site 9 (Sheets 4 and 5).

Bulkhead and esplanade removal will result in the removal of 81 creosote-treated piles. Timber piles will be pulled completely out of the bottom or cut off below the mud line.

Sequencing for Habitat Creation and Enhancement

The first order of work will be to remove the damaged timber esplanade. After this work is completed, intertidal restoration will begin at the south end of the project area, moving north. Cutback and enhancement will occur in sections of 25 to 50 feet at a time. The work will follow the tide cycles allowing for most or all of the excavation and backfill to be performed in the dry. Since the project is scheduled for December and January, there will be a considerable amount of work done during the nighttime low tides.

The construction of each section of repair will begin by excavating the existing bank line at the lowest point, near MLLW (0 feet). The rubble will be excavated from this low point up to the waterward edge of the existing bulkhead. Sediment and rubble will either be stockpiled, decanted, and hauled off, or loaded directly into trucks and hauled off. The capping, light riprap and habitat mix will be immediately placed in the area of rubble removal in the lower intertidal zone. The section behind the bulkhead would then be cutback followed by bulkhead removal. The section will then be completed by placing the capping material, light riprap, and habitat mix material on the excavated slope of the cutback area in the newly created upper intertidal zone. Once the current section is completed, the operation will move ahead parallel to the bank line and begin a new section at the next low tide cycle.

Staging areas for all construction activities will be on the existing adjacent parking lot. Machinery to be used during the cutback, rubble removal, and substrate placement include backhoe/track hoes, cranes, and dump trucks. All construction activities will be conducted from upland parking areas, and no heavy machinery will be placed on the existing intertidal zone. During esplanade replacement, all decking will be composed of pre-cast concrete panels that will be laid in place using machinery in the parking area. Pile driving will be conducted in the dry using an impact pile driver.

Esplanade Replacement

After emergency repairs and substrate enhancements, a new esplanade will be constructed over the newly created intertidal habitat (Sheets 6, 7, and 8). The esplanade will be composed of pre-cast concrete sections. The length of the new esplanade will be 264.1 feet and occupy approximately 2,028 square feet of overwater coverage below mean higher high water (MHHW), supported by thirty, 16- to 16.5-inch concrete and steel piles (Sheet 6). Only concrete piles (16.5-inch) will be driven into the intertidal zone at an elevation of approximately +7 feet MLLW. Steel piles (16-inch) will support the landward side of the esplanade entirely upland at an elevation of approximately +14 feet MLLW (ordinary high water is at +13.2 feet MLLW; Sheet 7). All pile driving will be conducted with an impact pile driver.

In addition, ten steel 4-inch pin piles will be driven to support the gangway landing on the north side of the site (Sheet 8). All pin piles will be driven in the dry with a vibratory hammer. After driving, an 8-inch steel sleeve will be attached to each pin pile for protection.

The new esplanade will be 20 feet wide, extending waterward to approximately +5.0 feet MLLW (Sheet 7). The

middle to lower portions of the intertidal zone will be free of overwater structure. The new esplanade will occupy approximately 61.1 percent less area over the intertidal zone (2,058 square feet for the new esplanade compared with the existing structure of 5,290 square feet). This is because the existing esplanade is entirely over the intertidal zone where as the proposed new esplanade will be moved landward with about 51 percent of it situated above MHHW (Sheet 8).

The new esplanade will be designed with thirty-six, 16.5-foot and six, 6 foot panels of grating extending the length of the structure to allow light penetration to the intertidal zone below (Sheet 7). Panels will be 2.75 feet and 4 feet wide (Sheet 8). The grating will be a minimum of 60 percent open area for a net open area of 923 square feet, further reducing the net overwater coverage to 1,504 square feet (2,058 square feet of esplanade and landing minus 60 percent of 923 square feet of grating; Sheet 6).

Excavators will be used to cutback, grade, and place substrate materials. All machinery will be operated from upland shore areas. Dump trucks will be used to transport excavated materials to approved off-site disposal sites and bring in substrate materials. All staging of materials and machinery will occur on the adjacent paved parking lot. A shore-bound impact pile driver will be used for all pile driving. All pile driving will be conducted in the dry at lower tidal elevations.

6f. What are the anticipated start and end dates for project construction? (Month/Year) [help]

- If the project will be constructed in phases or stages, use JARPA Attachment D to list the start and end dates of each phase or stage.

Start date: December 1 2013

End date: February 14, 2013 for emergency bulkhead removal, cutback, and intertidal creation/enhancements

Esplanade replacement is anticipated to occur after emergency bulkhead removal, probably Winter 2014.

6g. Fair market value of the project, including materials, labor, machine rentals, etc. [help]

1.5 – 2 million dollars

6h. Will any portion of the project receive federal funding? [help]

- **If yes**, list each agency providing funds.

☐ Yes ☐ No ☒ Don't know

Part 7–Wetlands: Impacts and Mitigation

☐ Check here if there are wetlands or wetland buffers on or adjacent to the project area. (If there are none, skip to Part 8.) [help]

7a. Describe how the project has been designed to avoid and minimize adverse impacts to wetlands. [help]

☐ Not applicable

7b. Will the project impact wetlands? [help]

☐ Yes ☐ No ☐ Don't know

7c. Will the project impact wetland buffers? [help]

☐ Yes ☐ No ☐ Don't know

7d. Has a wetland delineation report been prepared? [help]

- **If Yes**, submit the report, including data sheets, with the JARPA package.

☐ Yes ☐ No

7e. Have the wetlands been rated using the Western Washington or Eastern Washington Wetland Rating System? [help]

- **If Yes**, submit the wetland rating forms and figures with the JARPA package.

☐ Yes ☐ No ☐ Don't know

7f. Have you prepared a mitigation plan to compensate for any adverse impacts to wetlands? [help]

- **If Yes**, submit the plan with the JARPA package and answer 7g.
- **If No, or Not applicable**, explain below why a mitigation plan should not be required.

☐ Yes ☐ No ☐ Not applicable

7g. Summarize what the mitigation plan is meant to accomplish, and describe how a watershed approach was used to design the plan. [help]

7h. Use the table below to list the type and rating of each wetland impacted, the extent and duration of the impact, and the type and amount of mitigation proposed. Or if you are submitting a mitigation plan with a similar table, you can state (below) where we can find this information in the plan. [help]

Activity (fill, drain, excavate, flood, etc.)	Wetland Name[1]	Wetland type and rating category[2]	Impact area (sq. ft. or Acres)	Duration of impact[3]	Proposed mitigation type[4]	Wetland mitigation area (sq. ft. or acres)

[1] If no official name for the wetland exists, create a unique name (such as "Wetland 1"). The name should be consistent with other project documents, such as a wetland delineation report.
[2] Ecology wetland category based on current Western Washington or Eastern Washington Wetland Rating System. Provide the wetland rating forms with the JARPA package.
[3] Indicate the days, months or years the wetland will be measurably impacted by the activity. Enter "permanent" if applicable.
[4] Creation (C), Re-establishment/Rehabilitation (R), Enhancement (E), Preservation (P), Mitigation Bank/In-lieu fee (B)

Page number(s) for similar information in the mitigation plan, if available: _____

7i. For all filling activities identified in 7h, describe the source and nature of the fill material, the amount in cubic yards that will be used, and how and where it will be placed into the wetland. [help]

7j. For all excavating activities identified in 7h, describe the excavation method, type and amount of material in cubic yards you will remove, and where the material will be disposed. [help]

Part 8–Waterbodies (other than wetlands): Impacts and Mitigation

In Part 8, "waterbodies" refers to non-wetland waterbodies. (See Part 7 for information related to wetlands.) [help]

☒ Check here if there are waterbodies on or adjacent to the project area. (If there are none, skip to Part 9.)

8a. Describe how the project is designed to avoid and minimize adverse impacts to the aquatic environment. [help]

☐ Not applicable

Impact Avoidance and Minimization Measures

Best Management Practices

Best management practices (BMPs) will be employed to reduce the potential for construction-related impacts on listed species and their habitats. The following will be incorporated into the design of the bulkhead and esplanade replacement project:

- All in-water work will be conducted within agency-approved work windows to minimize potential adverse effects to aquatic life, including ESA-listed salmonids (July 16 to February 14).
- All 15 intertidal piles will be driven in the dry at lower tidal elevations to minimize the release of waterborne noise and water quality impacts
- Only concrete piles will be used in the intertidal zone, reducing noise-related impacts.
- Continuous debris containment and/or sorbent booms will be deployed around slope areas during cutback excavation, slope stabilization, substrate enhancement, and pile removal/driving activities. Containment booms will be constructed with silt curtains 10 feet in depth, deployed to contain debris and suspended sediment.

Conservation Measures

Several design attributes of both the emergency bulkhead removal and the esplanade replacement will substantially enhance intertidal habitats over existing conditions.

- Bulkhead removal and cutback/regrade of the slope behind the bulkhead will create 3,870 square feet of additional marine waters of the United States and reestablish ecological functions within the upper intertidal zone.
- Middle to lower reaches of the intertidal zone will be enhanced by removing existing concrete rubble and debris.
- Habitat mix will be laid down both above and below the bulkhead at elevations between MHHW and MLLW.
- Additional enhancement by the anchoring of 15 pieces of LWD will be conducted in the middle intertidal zone.
- The total intertidal area created (3,870 square feet) and enhanced (6,030 square feet) will be approximately 9,900 square feet, substantially exceeding the 2,058 square feet of overwater coverage occupied by the new

esplanade (1,504 net square feet accounting for grating).

- The new esplanade will occupy approximately 61.1 percent less area over the intertidal zone relative to the existing structure.
- Forty-two grated openings will be situated along the entire new esplanade, allowing the penetration of light to the newly created intertidal zone.
- Approximately 81 creosote-treated timber piles, all of which are within the intertidal zone, will be removed and replaced with 14 concrete piles within the intertidal zone. If possible, the entire pile will be removed. If the pile breaks or cannot be removed whole, it will be cut a minimum of 3 feet below the mud line and the hole filled with clean sand to the existing grade. If the hole is not filled right away, an absorbent boom will be placed around the hole to contain any residual creosote from the pile.
- The entire bulkhead and esplanade will be removed so that habitat creation, capping, substrate enhancement, and LWD anchoring can be conducted in advance of construction of the new esplanade.

8b. Will your project impact a waterbody or the area around a waterbody? [help]

☒ Yes ☐ No

Beneficial intertidal habitat creation/enhancement in Thea Foss Waterway, Commencement Bay is associated with this project.

8c. Have you prepared a mitigation plan to compensate for the project's adverse impacts to non-wetland waterbodies? [help]

- **If Yes**, submit the plan with the JARPA package and answer 8d.
- **If No, or Not applicable,** explain below why a mitigation plan should not be required.

☐ Yes ☒ No ☐ Not applicable

See conservation measures presented in Section 8a. The project design removes a bulkhead that intrudes into the intertidal zone while creating/enhancing 9,900 square feet of intertidal habitat within the project area. The proposed pedestrian boardwalk will also have a reduced overwater footprint relative to the existing structure and light penetrating surfaces built into the design. No further mitigation or a mitigation plan is required.

8d. Summarize what the mitigation plan is meant to accomplish. Describe how a watershed approach was used to design the plan.

- If you already completed 7g you do not need to restate your answer here. [help]

8e. Summarize impact(s) to each waterbody in the table below. [help]

Activity (clear, dredge, fill, pile drive,	Waterbody name[1]	Impact location[2]	Duration of impact[3]	Amount of material (cubic yards) to be placed in or	Area (sq. ft. or linear ft.) of waterbody

etc.)				removed from waterbody	directly affected
Rubble Removal	Thea Foss Waterway.	Commencement Bay, Tacoma, WA	2 months	~800 cy of rubble and debris removed	6,030 sf
Cutback	Thea Foss Waterway	Commencement Bay, Tacoma, WA	2 months	2,490 cy removed from cutback behind bulkhead	3,870 sf
Substrate Enhancement	Thea Foss Waterway	Commencement Bay, Tacoma, WA	2 months	25 tons/1,000 sf (345 tons) placed	9,900 sf
Capping material	Thea Foss Waterway	Commencement Bay, Tacoma, WA	2 months	734 cy of light riprap 767 cy of cap material placed	9,900 sf

[1] If no official name for the waterbody exists, create a unique name (such as "Stream 1") The name should be consistent with other documents provided.
[2] Indicate whether the impact will occur in or adjacent to the waterbody. If adjacent, provide the distance between the impact and the waterbody and indicate whether the impact will occur within the 100-year flood plain.
[3] Indicate the days, months or years the waterbody will be measurably impacted by the work. Enter "permanent" if applicable.

8f. For all activities identified in 8e, describe the source and nature of the fill material, amount (in cubic yards) you will use, and how and where it will be placed into the waterbody. [help]

New substrates will be laid in the newly created (MHHW to +4.6 ft MLLW) and enhanced (+4.6 feet to MLLW) intertidal areas to stabilize the slope and enhance ecological functions. A 1.5-foot layer of slope cap material composed of clean borrow sand and gravel will be laid to stabilize the slope . On top of the cap, a 1.5-foot layer of light riprap (12 to 15 inch diameter) will be placed and covered with a habitat mix of gravel and sand at an application rate of 25 tons per 1,000 square feet (Sheet 5). The light riprap is necessary to stabilize the habitat mix and the application rate will fill voids and overtop the riprap by a minimum of 12 inches.

Habitat mix will consist of a 2-inch-minus pit-run, rounded material from an approved source conforming to the following gradation:

US Standard Sieve Size	Percent Passing (by weight)
6-inch	100
4-inch	90 to 100
0.75-inch	50 to 90
No. 4	35 to 65
No.10	15 to 45
No. 40	2 to 10
No. 200	0 to 2

All substrates will be obtained from licensed quarries.

8g. For all excavating or dredging activities identified in 8e, describe the method for excavating or dredging, type and amount of material you will remove, and where the material will be disposed. [help]

Approximately 2,490 cubic yards of material will be excavated during the cutback creation of new intertidal habitat. Approximately 800 cubic yards of rubble and debris will be removed within the lower intertidal zone. Material will be removed with excavators situated on the existing parking area. Sediment and rubble will either be stockpiled, decanted, and hauled off; or loaded directly into trucks and hauled off. Disposal will occur at licensed and approved upland disposal sites.

Part 9–Additional Information

Any additional information you can provide helps the reviewer(s) understand your project. Complete as much of this section as you can. It is ok if you cannot answer a question.

9a. If you have already worked with any government agencies on this project, list them below. [help]

Agency Name	Contact Name	Phone	Most Recent Date of Contact
US Army Corps of Engineers	Olivia Romano	(206) 764-6960	September 23, 2013
US Army Corps of Engineers	Jim Green	(206) 316-3156	October 28, 2013
NOAA Fisheries	Jeff Fisher	(360)-534-9342	September 25, 2013
Washington Department of Fish and Wildlife	Leonard Machut	(360) 602-0364	September 18, 2013
US Environmental Protection Agency	Rebecca Chu	(206) 553-1774	September, 2013
Washington Department of Ecology	Marv Coleman	(206) 407-6259	September, 2013
Washington Department of Ecology	Lori Ochoa	(360) 407-6926	October 16, 2013

9b. Are any of the wetlands or waterbodies identified in Part 7 or Part 8 of this JARPA on the Washington Department of Ecology's 303(d) List? [help]

- **If Yes,** list the parameter(s) below.
- If you don't know, use Washington Department of Ecology's Water Quality Assessment tools at: http://www.ecy.wa.gov/programs/wq/303d/.

☒ Yes ☐ No

PCBs in Tissue

9c. What U.S. Geological Survey Hydrological Unit Code (HUC) is the project in? [help]

- Go to http://cfpub.epa.gov/surf/locate/index.cfm to help identify the HUC.

17110019 Puget Sound

9d. What Water Resource Inventory Area Number (WRIA #) is the project in? [help]

- Go to http://www.ecy.wa.gov/services/gis/maps/wria/wria.htm to find the WRIA #.

WRIA 10 Puyallup

9e. Will the in-water construction work comply with the State of Washington water quality standards for turbidity? [help]

- Go to http://www.ecy.wa.gov/programs/wq/swqs/criteria.html for the standards.

☒ Yes ☐ No ☐ Not applicable

9f. If the project is within the jurisdiction of the Shoreline Management Act, what is the local shoreline environment designation? [help]

- If you don't know, contact the local planning department.
- For more information, go to: http://www.ecy.wa.gov/programs/sea/sma/laws_rules/173-26/211_designations.html.

☐ Rural ☒ Urban ☐ Natural ☐ Aquatic ☐ Conservancy ☐ Other _____

9g. What is the Washington Department of Natural Resources Water Type? [help]

- Go to http://www.dnr.wa.gov/BusinessPermits/Topics/ForestPracticesApplications/Pages/fp_watertyping.aspx for the Forest Practices Water Typing System.

☒ Shoreline ☐ Fish ☐ Non-Fish Perennial ☐ Non-Fish Seasonal

9h. Will this project be designed to meet the Washington Department of Ecology's most current stormwater manual? [help]

- **If No**, provide the name of the manual your project is designed to meet.

☒ Yes ☐ No

2012 Draft Stormwater Management Manual for Western Washington:

9i. Does the project site have known contaminated sediment? [help]

- **If Yes**, please describe below.

☐ Yes ☒ No

Sediments were remediated in 2006. The shoreline adjacent to the timber bulkhead and beneath and waterward of the timber esplanade underwent remediation as part of the city's remedial actions for the Thea Foss Waterway. Remedial actions included dredging and capping the shoreline slope waterward of the face of the timber esplanade as well as placement of sand and gravel (i.e., habitat mix) beneath the timber esplanade. The shoreline slope from the waterward face of the timber esplanade to an approximate elevation of -20 feet MLLW was dredged and capped in 2004 and 2005. The cap that was placed on the shoreline slope consists of an approximate 18-inch layer of sand and gravel that is armored with an approximate 18-inch layer of riprap. Additionally, the voids of the riprap armoring were filled with sand and rounded gravel habitat mix to enhance the habitat at the site. The shoreline slope cap was constructed at an approximate 1.5 foot vertical to 1-foot horizontal (1.5V/1H) slope.

9j. If you know what the property was used for in the past, describe below. [help]

The site was formerly the Hicks-Bull, Coast Iron Works and Steam Plant. Operations included machine shops, fish packing, welding, and auto repair.

9k. Has a cultural resource (archaeological) survey been performed on the project area? [help]

- **If Yes**, attach it to your JARPA package.

☒ Yes ☐ No

9l. Name each species listed under the federal Endangered Species Act that occurs in the vicinity of the project area or might be affected by the proposed work. [help]

- Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*);
- Coastal-Puget Sound Bull trout (*Salvelinus confluentus*);
- Puget Sound steelhead trout (*O. mykiss*);
- Bocaccio (*Sebastes paucispinis*);
- Canary rockfish (*S. pinniger*);
- Yelloweye rockfish (*S. ruberrimus*);
- Eulachon (*Thaleichthys pacificus*)
- Green Sturgeon (*Acipenser medirostris*)
- Southern resident Orca (*Orcinus orca*);
- Marbled murrelet (Brachyramphus marmoratus).

9m. Name each species or habitat on the Washington Department of Fish and Wildlife's Priority Habitats and Species List that might be affected by the proposed work. [help]

**Species:

Fish
Longfin Smelt, Surfsmelt, Chum Salmon, Coastal Res./ Searun Cutthroat, Coho Salmon, Pink Salmon, Pacific Cod, Pacific Hake, Walleye Pollock, Black Rockfish, Brown Rockfish, Copper Rockfish, Quillback Rockfish, Redstripe Rockfish, Yellowtail Rockfish, Lingcod, Pacific Sand Lance, English Sole, Rock Sole

Birds
Bald Eagle, Golden Eagle, Northern Goshawk, Peregrine Falcon, Harlequin Duck, Common Murre, Western grebe, Great Blue Heron, Brant, W WA nonbreeding concentrations of: Loons, Grebes, Cormorants, Fulmar, Shearwaters, Storm-petrels, Alcids, Purple Martin

Marine mammals
Dall's Porpoise, Gray Whale, Harbor Seal, Pacific Harbor Porpoise, California Sea Lion

Habitat:
Puget Sound Nearshore

**Does not include ESA-listed species included in Section 9k

Part 10–SEPA Compliance and Permits

Use the resources and checklist below to identify the permits you are applying for.

- Online Project Questionnaire at http://apps.ecy.wa.gov/opas/.
- Governor's Office of Regulatory Assistance at (800) 917-0043 or help@ora.wa.gov.
- For a list of addresses to send your JARPA to, click on agency addresses for completed JARPA.

10a. Compliance with the State Environmental Policy Act (SEPA). (Check all that apply.) [help]

- For more information about SEPA, go to www.ecy.wa.gov/programs/sea/sepa/e-review.html.

☐ A copy of the SEPA determination or letter of exemption is included with this application.

☒ A SEPA determination is pending with the City of Tacoma (lead agency). The expected decision date is

early-November.

☐ I am applying for a Fish Habitat Enhancement Exemption. (Check the box below in 10b.) [help]

☐ This project is exempt (choose type of exemption below).

☐ Categorical Exemption. Under what section of the SEPA administrative code (WAC) is it exempt?

_____

☐ Other: _____

☐ SEPA is pre-empted by federal law.

10b. Indicate the permits you are applying for. (Check all that apply.) [help]

LOCAL GOVERNMENT

Local Government Shoreline permits:

☒ Substantial Development ☐ Conditional Use ☐ Variance

☐ Shoreline Exemption Type (explain): _____

Other city/county permits:

☐ Floodplain Development Permit ☒ Critical Areas Ordinance

STATE GOVERNMENT

Washington Department of Fish and Wildlife:

☒ Hydraulic Project Approval (HPA) ☐ Fish Habitat Enhancement Exemption – Attach Exemption Form

Effective July 10, 2012, you must submit a check for $150 to Washington Department of Fish and Wildlife, unless your project qualifies for an exemption or alternative payment method below. **Do not send cash.**

Check the appropriate boxes:

☒ $150 check enclosed with previous JARPA, dated 10/10/13. (Check # 1328618)
Attach check made payable to Washington Department of Fish and Wildlife.

☐ Charge to billing account under agreement with WDFW. (Agreement # _____)

☐ My project is exempt from the application fee. (Check appropriate exemption)

- ☐ HPA processing is conducted by applicant-funded WDFW staff. (Agreement # _____)
- ☐ Mineral prospecting and mining.
- ☐ Project occurs on farm and agricultural land. (Attach a copy of current land use classification recorded with the county auditor, or other proof of current land use.)
- ☐ Project is a modification of an existing HPA originally applied for, prior to July 10, 2012. (HPA # _____)

Washington Department of Natural Resources:

☐ Aquatic Use Authorization

Complete JARPA Attachment E and submit a check for $25 payable to the Washington Department of Natural Resources. **Do not send cash.**

Washington Department of Ecology:

☒ Section 401 Water Quality Certification

FEDERAL GOVERNMENT
United States Department of the Army permits (U.S. Army Corps of Engineers): ☒ Section 404 (discharges into waters of the U.S.) ☒ Section 10 (work in navigable waters) Under the auspices of the Nationwide Permit Program (Nationwide Permit 3 and 27)
United States Coast Guard permits: ☐ Private Aids to Navigation (for non-bridge projects)

Part 11–Authorizing Signatures

Signatures are required before submitting the JARPA package. The JARPA package includes the JARPA form, project plans, photos, etc. [help]

11a. Applicant Signature (required) [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities, and I agree to start work only after I have received all necessary permits.

I hereby authorize the agent named in Part 3 of this application to act on my behalf in matters related to this application. _____ (initial)

By initialing here, I state that I have the authority to grant access to the property. I also give my consent to the permitting agencies entering the property where the project is located to inspect the project site or any work related to the project. _____ (initial)

Applicant Printed Name	Applicant Signature	Date

11b. Authorized Agent Signature [help]

I certify that to the best of my knowledge and belief, the information provided in this application is true, complete, and accurate. I also certify that I have the authority to carry out the proposed activities and I agree to start work only after all necessary permits have been issued.

Authorized Agent Printed Name	Authorized Agent Signature	Date

11c. Property Owner Signature (if not applicant). [help]
Not required if project is on existing rights-of-way or easements.

I consent to the permitting agencies entering the property where the project is located to inspect the project site or any work. These inspections shall occur at reasonable times and, if practical, with prior notice to the landowner.

Property Owner Printed Name	Property Owner Signature	Date

18 U.S.C §1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious, or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years or both.

If you require this document in another format, contact the Governor's Office of Regulatory Assistance (ORA) at (800) 917-0043.
People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call (877) 833-6341.
ORA publication number: ENV-019-09 rev. 06-12

0 2,500 5,000 10,000 Feet

N

Thea Foss Pedestrian Esplanade
Tacoma, Washington

Site Vicinity Map

12599-05 10/13

HARTCROWSER

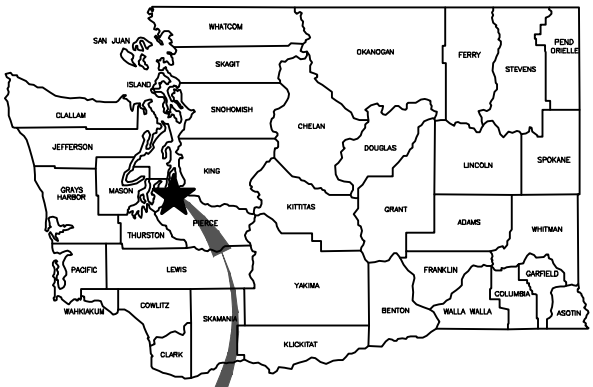
Figure
1

R:\GIS\PROJECTS\12599\05\fig_1-site vicinity.mxd

US ARMY CORPS OF ENGINEERING
PERMIT

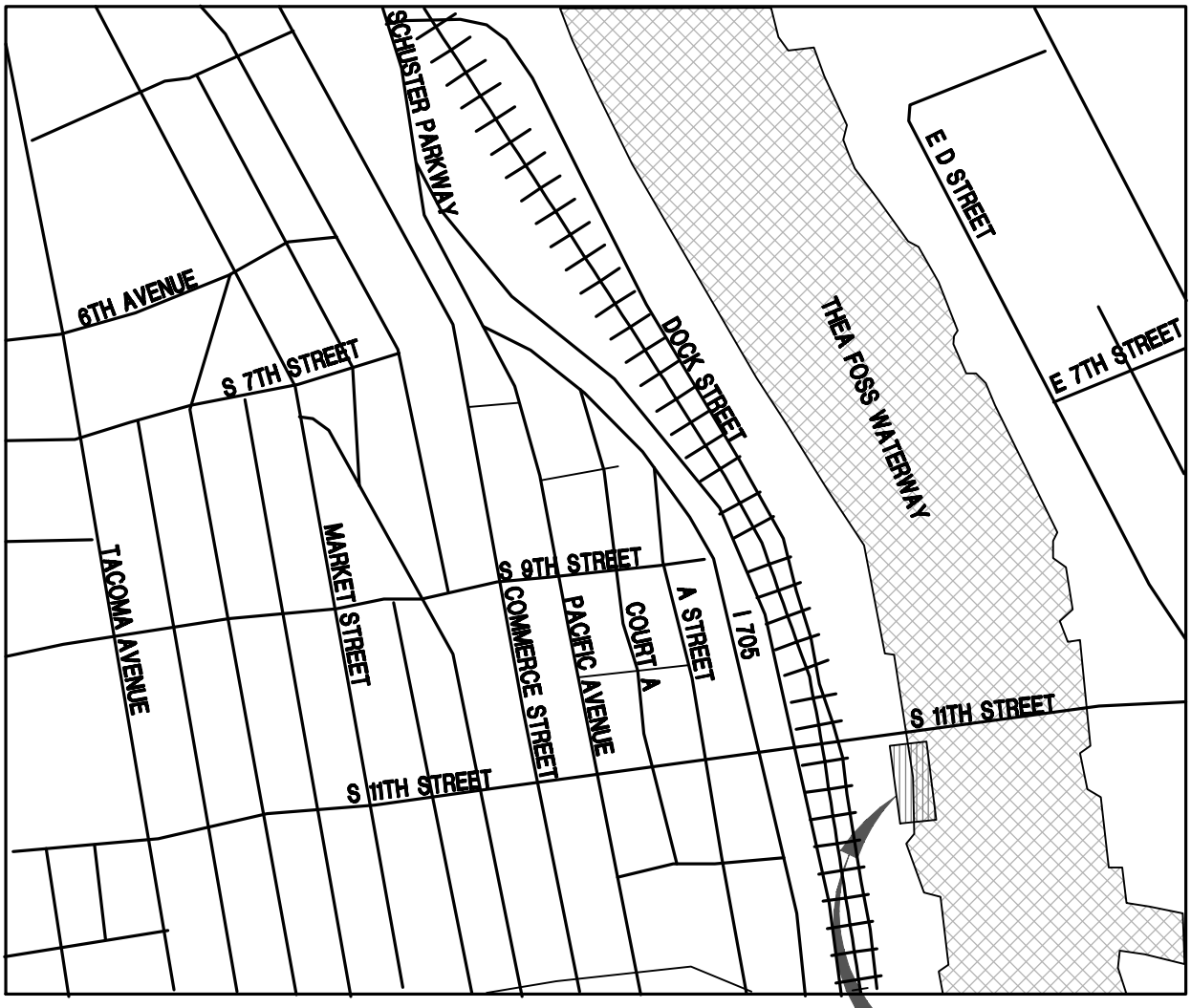
SITE 9 BULKHEAD REPAIR AND ESPLANADE CONSTRUCTION

SECTION 04, TOWNSHIP 20 NORTH, RANGE 03 EAST



PROJECT LOCATION

STATE MAP
NO SCALE



VICINITY MAP
NO SCALE

SITE 9
ESPLANADE
SITE

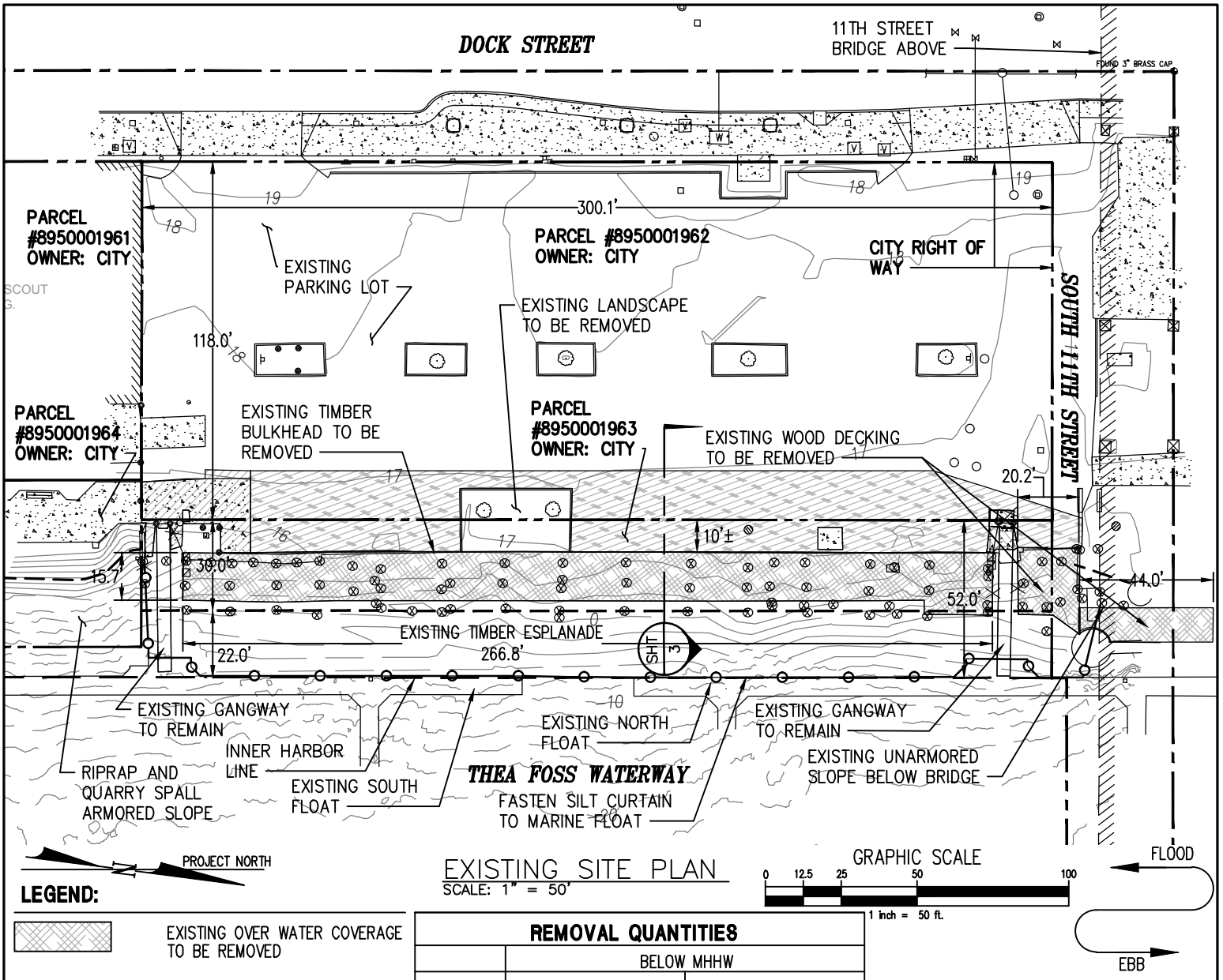
Tacoma

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

ADJACENT PROPERTY OWNERS:
1. CITY/8950001961
2. CITY/8950001964

LOCATION (PARCEL#):
8950001962 & 8950001963
LAT/LONG:
47° 15'11.82"N
122° 26'4.46"W
SHEET 1 OF 8 DATE: 10/29/13

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION
IN: THEA FOSS WATERWAY
NEAR: TACOMA
COUNTY: PIERCE
STATE: WASHINGTON



EXISTING SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

LEGEND:

- EXISTING OVER WATER COVERAGE TO BE REMOVED
- EXISTING ASPHALT PAVEMENT TO BE REMOVED
- EXISTING CONCRETE PAVEMENT TO BE REMOVED
- ⊗ TIMBER PILE TO BE REMOVED SEE NOTE 1 & 2.
- MHHW (EL = +11.85)
- SILT CURTAIN

REMOVAL QUANTITIES

	BELOW MHHW	
	EXIST QUANTITY TO BE REMOVED	EXIST OVER WATER AREA TO BE REMOVED (SF)
PILES	81	
TIMBER ESPLANADE		4,350
WOOD DECK		940
TOTAL	81	5,290

TOTAL EXCAVATION QUANTITIES

	EXCAVATION AREA (SF)	EXCAVATION VOLUME (CY)
BELOW MHHW	10,950	1,434
ABOVE MHHW	3,000	1,112
TOTAL	13,950	2,490

NOTES:

1. COMPLETE PILE EXTRACTION SHALL ALWAYS BE THE FIRST METHOD OF PILE REMOVAL. IF PILE BREAKS DURING FIRST EXTRACTION ATTEMPT, CUT THE PILE, EXCAVATE 1' AND ATTEMPT PILE EXTRACTION A SECOND TIME. IF PILE BREAKS THE SECOND TIME, CUT PILE AT THE BASE OF THE EXCAVATION. ALL CREOSOTE REMNANTS MUST BE AT LEAST 2' BELOW FINISHED GRADE.

2. ABSORBENT BOOMS SHALL BE USED DURING ALL PILE EXTRACTION AND SHALL REMAIN IN PLACE UNTIL HOLES CREATED BY PILE EXTRACTION ARE FILLED.

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

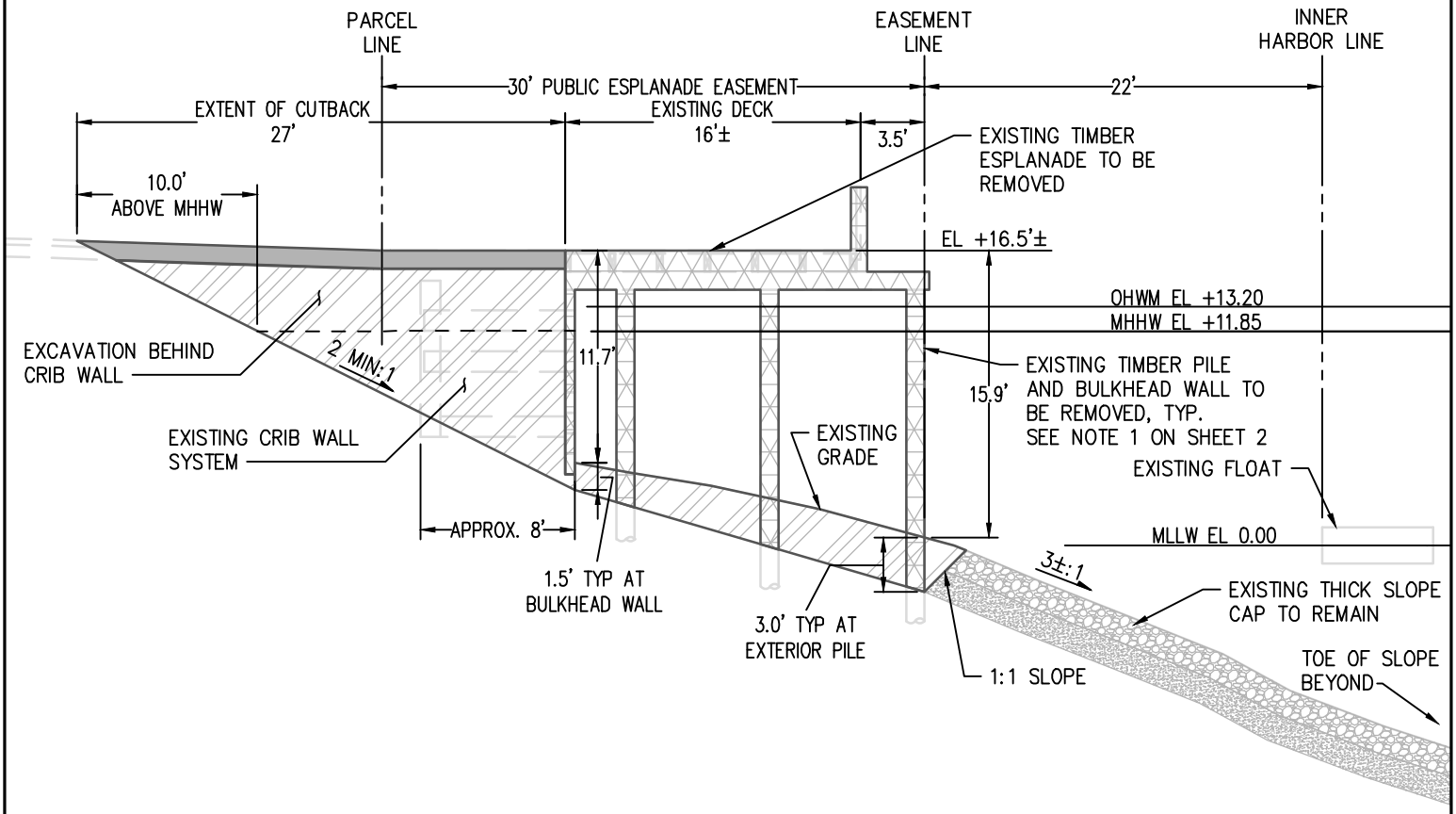
EXISTING SITE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 2 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 2.5 5 10 20

1 inch = 10 ft.

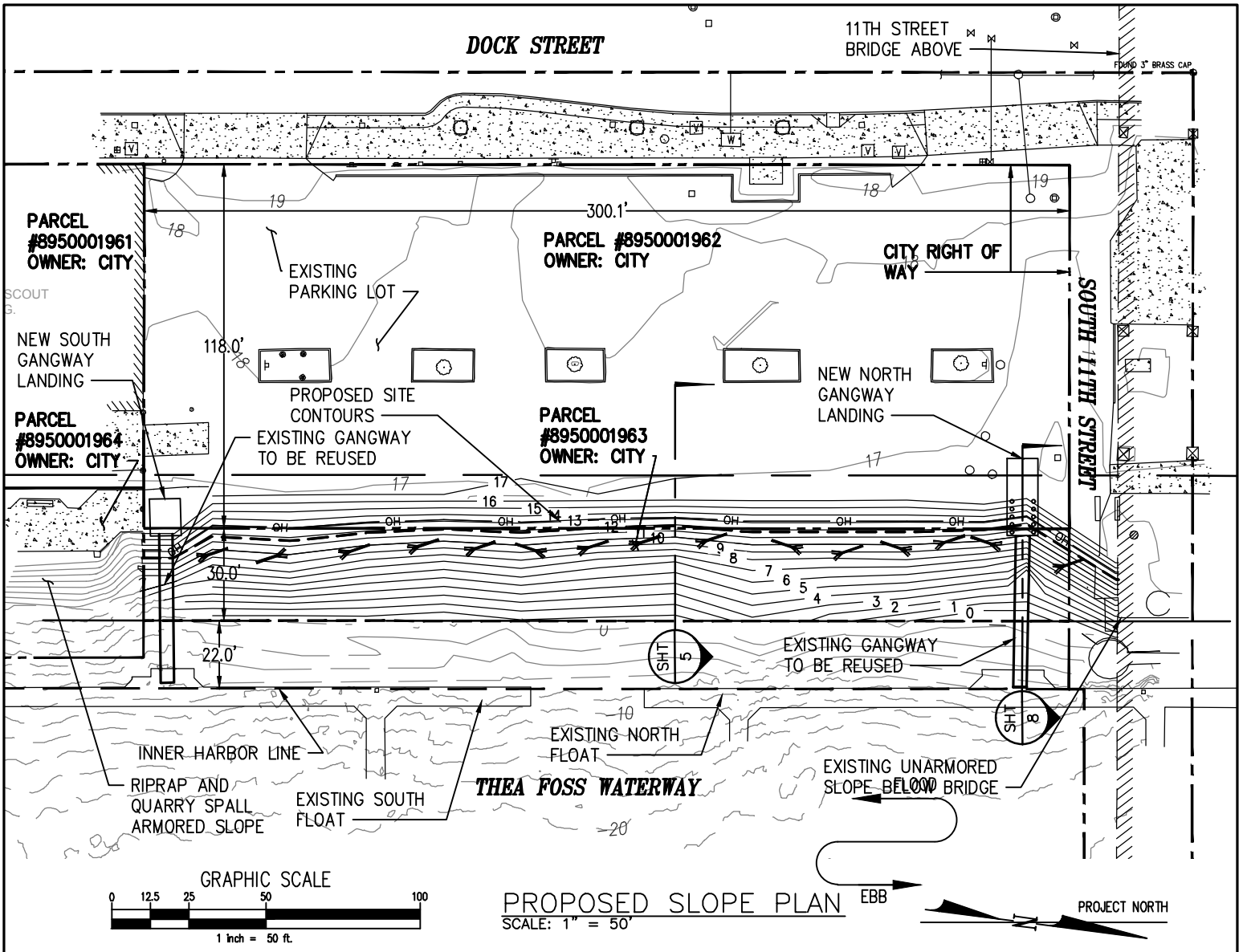
EXISTING SECTION

SCALE: 1" = 10'

LEGEND:

- PAVEMENT REMOVAL
- TIMBER STRUCTURE REMOVAL
- EXCAVATION

US ARMY CORPS OF ENGINEERS PERMIT EXISTING SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 3 **OF** 8 **DATE:** 10/29/13



PROPOSED SLOPE PLAN

SCALE: 1" = 50'

LEGEND:

- LARGE WOODY DEBRIS (LWD) AT EL +10.0 (15 TOTAL)
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- PROPOSED GRADING CONTOUR

FILL QUANTITIES		
	FILL AREA (SF)	FILL VOLUME (CY)
FILL BELOW MHHW	9,270	1,167
FILL ABOVE MHHW	4,800	334
TOTAL	14,070	1,501

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

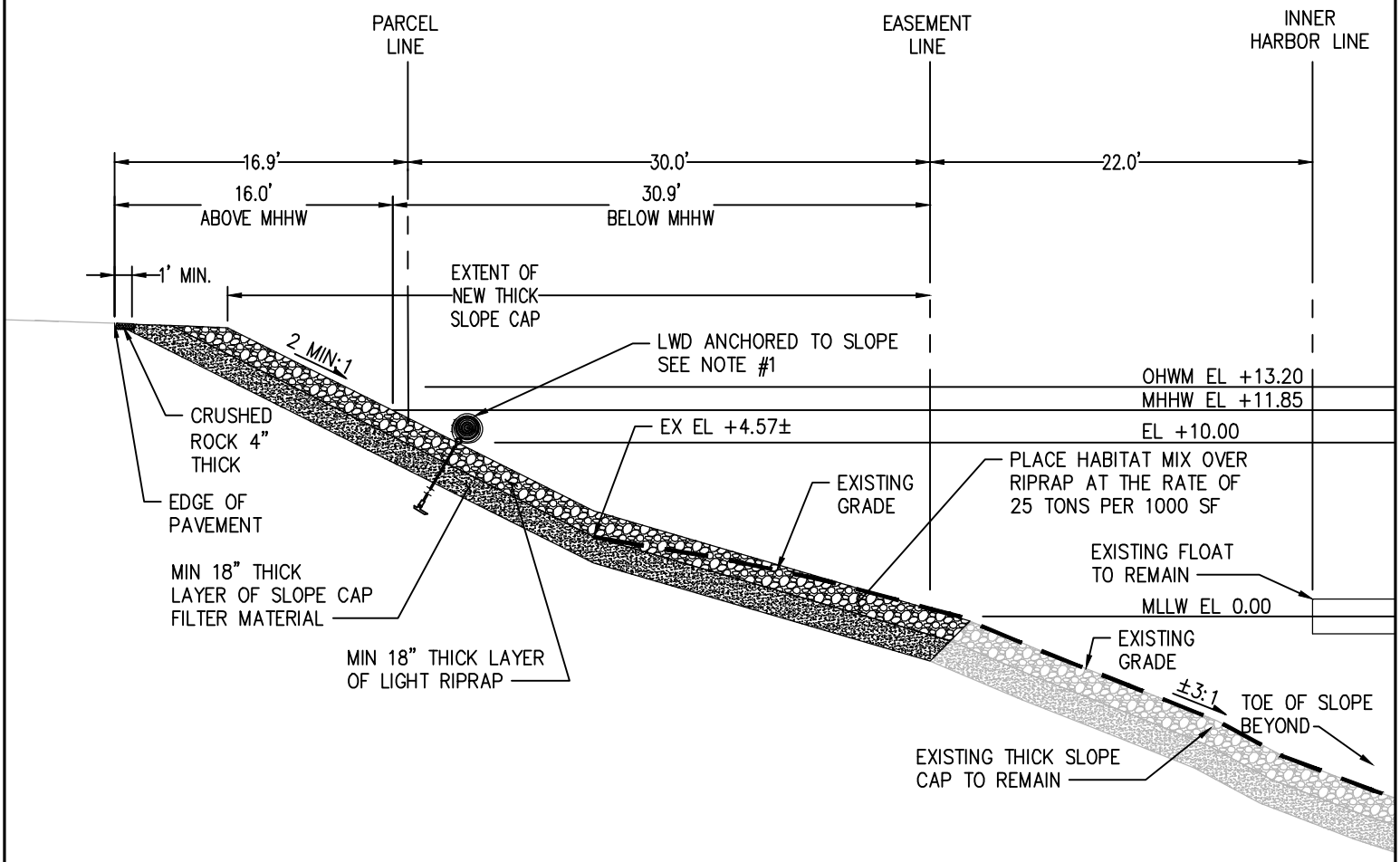
PROPOSED SLOPE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 4 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 2.5 5 10 20

1 inch = 10 ft.

PROPOSED SLOPE SECTION

SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

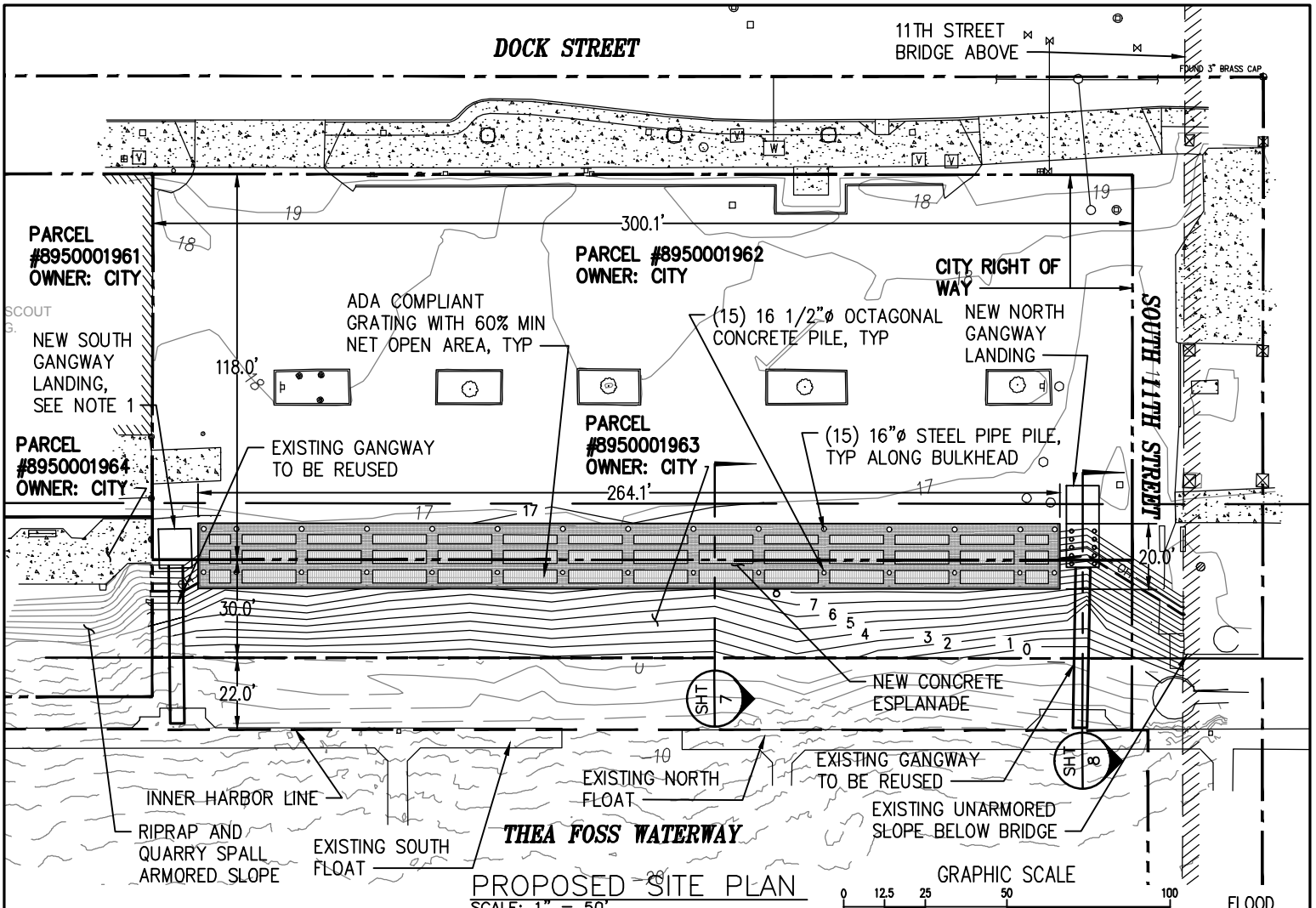
LIGHT RIPRAP FILL MATERIAL

NOTES:

1. LWD SHALL BE DOUGLAS FIR OR CEDAR. LOG DIAMETER SHALL BE NO LESS THAN 18" UNLESS OTHERWISE APPROVED BY THE ENGINEER. LOG LENGTH SHALL BE NO LESS THAN 15-FEET AND NO MORE THAN 20-FEET. EACH LOG SHALL HAVE EITHER LIMBS OR ROOT WADS. BARK SHALL REMAIN INTACT ON THE LOGS.

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SLOPE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 5 **OF** 8 **DATE:** 10/29/13



PROPOSED SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

FLOOD

EBB

PROJECT NORTH

LEGEND:

- PROPOSED CONCRETE ESPLANADE
- PROPOSED MARINA FLOAT
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- PROPOSED GRADING CONTOUR

NOTES:

1. THE NEW SOUTH GANGWAY LANDING IS POSITIONED ABOVE THE TOP OF THE SLOPE AND THEREFORE NOT CONSIDERED IN OVER WATER COVERAGE CALCULATIONS.

PROPOSED QUANTITIES

	ABOVE MHHW		BELOW MHHW		ABOVE OHWM		BELOW OHWM	
	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)
CONCRETE PILES	1		14		0		15	
STEEL PILES	15		0		15		0	
STEEL PIN PILES	6		4		4		6	
NORTH LANDING		220		30		193		57
GROSS CONCRETE ESPLANADE AREA		3,253		2,028		2,377		2,904
GRATED AREA		1,351		923		742		1,532
TOTAL (SEE NOTE 1)	22	2,662*	18	1,504*	19	2,125*	21	2,042*

*TOTAL AREA = (GROSS AREA) – 0.6(GRATED AREA) + NORTH LANDING AREA

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

PROPOSED SITE PLAN

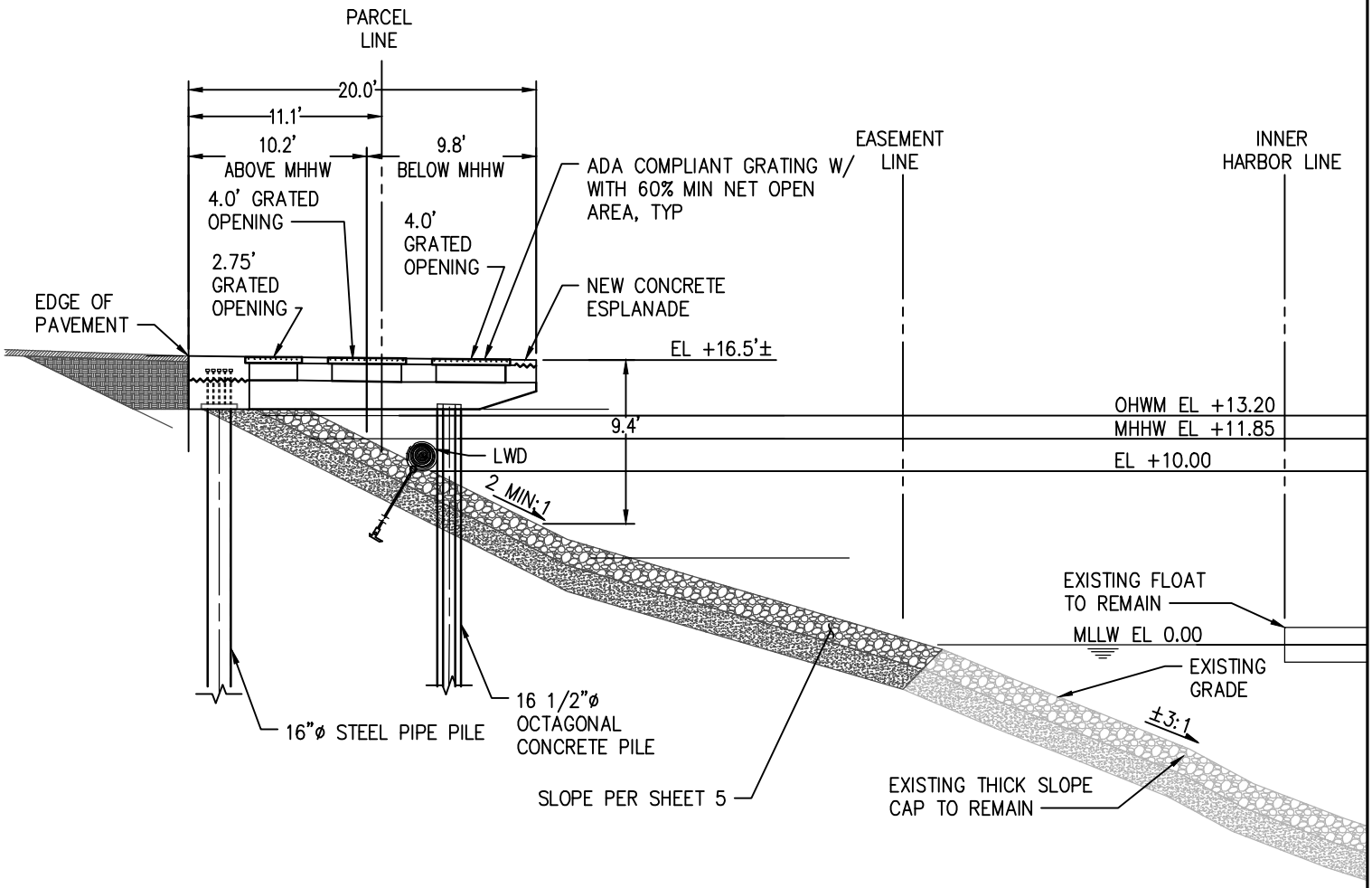
REFERENCE:

APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 6 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 5 10 20 40

1 inch = 10 ft.

PROPOSED SECTION

SCALE: 1" = 10'

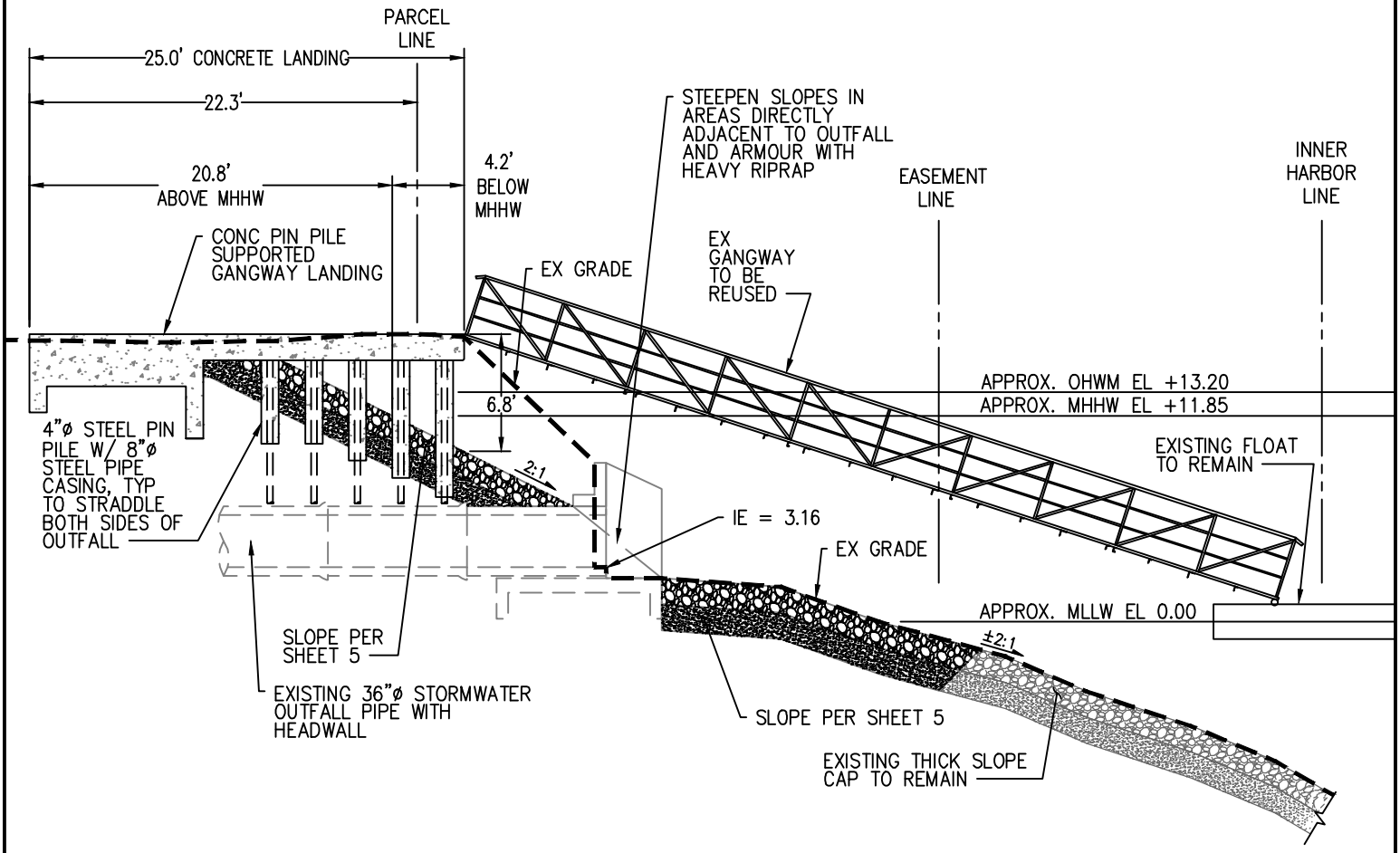
LEGEND:

CAP FILTER FILL MATERIAL

LIGHT RIPRAP FILL MATERIAL

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 7 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 5 10 20 40

1 inch = 10 ft.

PROPOSED SECTION AT NORTH GANGWAY LANDING

SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

LIGHT RIPRAP FILL MATERIAL

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED GANGWAY LANDING SECTION	REFERENCE: APPLICANT: CITY OF TACOMA (CITY)	PROPOSED PROJECT: BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION LOCATION (PARCEL#): 8950001962 & 8950001963 SHEET 8 OF 8 DATE: 10/29/13

Photograph 1 – Settlement of the upland parking area resulting from bulkhead failure

Photograph 2 – Settlement of the upland parking area resulting from bulkhead failure

Photograph 3 – Bulkhead failure

Photograph 4 – Deteriorated bulkhead wall

THEA FOSS AND WHEELER-OSGOOD WATERWAYS
SLOPE AREA MAINTENANCE PLAN

INTRODUCTION

Remedial actions completed on shoreline slopes within the Thea Foss and Wheeler-Osgood Waterways include slope capping, slope rehabilitation, and habitat enhancement. The remedial actions performed in the Thea Foss and Wheeler-Osgood Waterways are shown on Figure 1. As part of the Operations, Maintenance, and Monitoring Plan (OMMP) for the Thea Foss and Wheeler-Osgood Waterways Remediation Project, low tide inspections and subtidal hydrographic surveys of capped shoreline slope areas are performed to ensure the effectiveness of the remedial actions and to identify slope areas that may require maintenance.

The purpose of this Slope Area Maintenance Plan is to present the objectives and procedures for performing all maintenance of remedial actions constructed on shoreline slopes. Specific maintenance activities will be identified based on the results of inspections and surveys and documented in Preliminary Findings Memoranda and annual OMMP monitoring reports. Subsequent maintenance activities will be performed by the City of Tacoma (City) or a City contractor in accordance with the objectives and procedures described in this plan. The scope of this plan includes activities to maintain shoreline slope areas where remedial construction was performed as part of this project. The types of observed features on shoreline slopes that may require maintenance include, but are not limited to, the following:

- Remnant, treated piling protruding through an area of slope cap;
- Cap material sloughing that exposes underlying contaminated material;
- Contaminated debris protruding through an area of slope cap;
- Erosion or damage to stormwater outfall aprons and/or concrete splash pads; and
- Erosion or damage from waterway activities (i.e., marine, commercial, or industrial operations, construction, etc.).

The objectives of maintenance of shoreline slope areas include the following:

- Return the area requiring maintenance to post-remedial construction conditions;
- Maintain containment of underlying contaminated materials;
- Minimize the potential for transport of contamination to the water column or to the surface of adjacent areas through implementation of Best Management Practices (BMPs) during completion of maintenance activities;
- Minimize the potential for down-slope movement of slope materials during completion of maintenance activities; and
- Reuse existing slope area materials (i.e., filter material, rip rap, quarry spalls, etc.) to the extent practicable.

The objectives identified above are the basis for the procedures to be implemented during maintenance of shoreline slope areas.

SLOPE AREA REMEDIATION AND MONITORING

Remedial actions completed in slope areas of the Thea Foss and Wheeler-Osgood Waterways include slope capping, slope rehabilitation, and habitat enhancement. Slope areas are subject to monitoring through completion of low tide slope cap inspections and hydrographic surveys. The following sections summarize the design for remedial actions and describe the monitoring activities to be performed as part of OMMP for the Thea Foss and Wheeler-Osgood Waterways Remediation Project.

Slope Area Remedial Actions

Slope caps (thick slope caps, quarry spall caps, and grout mat caps) were constructed in specific slope areas of the Thea Foss and Wheeler-Osgood Waterways (Figure 1). Slope caps were constructed to contain contaminated sediment and debris; remnant, treated (i.e., creosote treated) piling; and to stabilize shoreline slopes. Thick slope and quarry spall cap components consist of the following design elements:

- 18-inches of slope cap filter material;
- Covered by 18-inches of armor material (riprap or quarry spalls);and
- Habitat mix placed at rates of 25 tons per 1,000 square feet or 15 tons per 1,000 square feet to fill in the voids of the riprap and quarry spalls, respectively.

The remedial design drawings for thick slope and quarry spall caps and specifications for cap materials are provided in Appendix A.

Grout mat caps were constructed in Remedial Area 3 (RA 3) , RA 19A, and 19B (Figure 1). The grout mat caps consist of one (i.e., RA 19A and RA 19B) or two (i.e., RA 3) approximately 6-inch thick layers of concrete placed in limited shoreline slope areas. Grout mat caps were constructed to reduce the required thickness of the cap and to preserve required berthing depths for vessels utilizing these areas in addition to containing contaminated materials and stabilizing shoreline slopes. The remedial design drawings for the grout mat caps constructed in RA 3, RA 19A, and RA 19B are provided in Appendix B.

The slope caps were constructed from the base or toe of the shoreline slope to varying elevations up the slope depending on specific features of a given slope area. In multiple remedial areas, slope caps were constructed from the base of the shoreline slope up to existing bulkheads or shoreline armoring, a previously constructed habitat enhancement area, or new sheet pile walls (i.e., RA 1, RA 8, RA 14, RA 19A, RA 19B, and RA 20). In two remedial areas, slope caps were constructed up to the waterward face of existing buildings and/or structures and quarry spalls and/or habitat mix was placed under the overwater portion of the structure to enhance the substrate (i.e., RA 8 and RA 20). Habitat enhancement was performed on top of or adjacent to the capped areas in several areas (RA 8 and RA 20). Slope caps were also constructed to the top of the slope bank in multiple remedial areas (i.e., RA 3, RA 8, RA 19B, and RA 20). The remedial design for a specific shoreline slope area will be reviewed when determining the scope of maintenance activities for a given area to ensure that they meet the intent of the designed elements and return the shoreline slope to post-construction conditions.

Slope Area Monitoring

Slope area monitoring is performed through completion of low tide slope cap inspections and subtidal hydrographic surveys. Data collected during these monitoring events are evaluated and used to identify specific slope areas that may require maintenance.

Low Tide Slope Cap Inspections

The OMMP specifies that low tide slope cap inspections be performed to verify the physical integrity of the intertidal portion of slope caps and containment of underlying contaminated sediment. Low tide slope cap inspections are performed on the exposed shoreline portion of slope caps (including grout mat caps) constructed in RA 1, RA 3, RA 8, RA 14, RA 19A, RA 19B, and RA 20, as well as the Sheen Source Removal Area in the Wheeler-Osgood Waterway, when tidal elevations are at or below 0 feet Mean Lower Lower Water (MLLW). Inspections of the slope caps include documentation of the following:

- Slope cap coverage;
- Areas of exposed sediment due to erosion or sloughing;
- Apparent down-slope movement of cap materials; and
- Presence of debris at the cap surface.

A baseline low tide slope cap inspection was completed in 2006 and subsequent monitoring events will be completed in Year 2 (2008), Year 4 (2010), Year 7 (2013), and Year 10 (2016) according to the schedule presented in the OMMP. Additional slope cap inspections may be completed after any event that could cause a slope failure, such as an earthquake or storm surge.

The results of low tide slope cap inspections are presented in Preliminary Findings Memoranda and annual OMMP monitoring reports. Results of monitoring events will be used as the basis for identifying maintenance activities that may be required in slope areas.

Hydrographic Surveys

The OMMP specifies that hydrographic surveys be completed in slope cap areas to monitor cap integrity of subtidal slope cap areas. Hydrographic surveys are to be performed in subtidal slope cap areas in RA 1, RA 3, RA 5, RA 8, RA 14, RA 19A, RA 19B, and RA 20 to provide survey coverage of slopes below elevation 0 feet MLLW. Results of hydrographic surveys in slope areas will be used to identify subtidal shoreline slope features that may require maintenance.

Baseline hydrographic surveys of remedial actions that were completed in the Thea Foss and Wheeler-Osgood Waterways were performed in 2003 (i.e., RA 1 and RA 3), 2005, and 2006. The post-construction hydrographic survey results performed in 2003, 2005, and 2006 are presented in the Remedial Action Construction Reports (RACRs) prepared for the Thea Foss and Wheeler-Osgood Waterways Remediation Project (City of Tacoma 2003 and 2006) and will be used as the baseline bathymetric conditions for slope cap areas. Subsequent hydrographic surveys will be completed in Years 2, 4, 7, and 10, according to the schedule presented in the OMMP. Additionally, hydrographic surveys may be completed after any event that could cause a slope failure, such as an earthquake or storm surge.

Results of future hydrographic survey monitoring events will be compiled and presented in Preliminary Findings Memoranda and annual OMMP monitoring reports. The results will also be used as the basis for identifying maintenance activities that may be required in specific slope areas.

SLOPE AREA MAINTENANCE

All slope area maintenance activities will be completed to satisfy the objectives described in this plan. Construction activities for the purpose of maintenance will be designed and executed in a manner that protects the environment by minimizing the potential transport of contamination to adjacent areas and ultimately containing contaminated material. Maintenance activities will be completed to restore shoreline slope areas to post-remedial construction conditions.

Slope Features Requiring Maintenance

Results of slope monitoring events will be used to identify slope features that may require maintenance. The slope features that may require maintenance include, but are not limited to, the following:

- **Exposed Piling and Debris.** Remnant, treated piling, or contaminated debris that protrudes through an area of slope cap may expose contaminated material and provide a pathway for underlying contamination to migrate to adjacent areas.
- **Cap Material Sloughing.** Sloughing of cap material may expose underlying contaminated sediment, debris, and piling, and provide a pathway for the underlying contamination to migrate to adjacent areas.
- **Outfall Apron/Splash Pad Damage.** Erosion or damage to stormwater outfall aprons or concrete splash pads may promote erosion of slope area material and expose underlying contaminated sediment, debris, and piling.
- **Waterway Activity Damage.** Waterway activities such as commercial or recreational vessel movement, industrial operations, and upland or in-water construction activities may result in damage to slope areas that could affect containment of underlying contaminated material.
- **Other Slope Features.** Unexpected events such as earthquakes or sudden storm surges may generate additional slope features that require slope maintenance.

EPA will be notified of the identification of issues that may require maintenance in Preliminary Findings Memoranda and annual OMMP monitoring reports. The information presented in these reports will be used to identify slope features requiring maintenance and facilitate contracting for maintenance activities.

Objectives of Maintenance Activities

The objectives of slope area maintenance activities include the following:

- **Return Shoreline Slope Areas to Post-Remedial Construction Conditions.** The RACRs present the post-remedial construction conditions for slope areas in the Thea Foss and Wheeler-Osgood Waterways that were performed in accordance with the remedial design. Maintenance activities will be designed to re-establish the post-

remedial construction conditions at all slope areas requiring maintenance identified during slope cap inspections or hydrographic surveys.

- **Provide Containment of Underlying Contaminated Materials.** At a minimum, a three-foot thick slope cap must be present over contaminated materials within the slope areas. Contaminated materials include contaminated sediment and debris and creosote-treated piling. Maintenance activities will be designed to ensure that the minimum cap material thickness is restored upon completion of specific maintenance activities.
- **Minimize the Potential Transport of Contamination.** Best Management Practices (BMP) will be implemented during all maintenance activities to minimize the potential transport of contamination to adjacent areas. The BMPs that will be performed during slope area maintenance are discussed in the BMPs section of this plan.
- **Minimize the Potential for Down-Slope Transport of Slope Material.** Maintenance activities will be performed in a manner that minimizes down-slope movement of slope cap material during construction so that existing water depths required for harbor area and channel use (i.e., vessel navigation and berthing) are not affected.
- **Reuse Existing Slope Cap Materials.** Slope cap filter material and slope armoring will be reused to the extent practicable during completion of maintenance activities.

Maintenance Activities

Maintenance of shoreline slope areas will include one or more of the following construction activities:

- **Capping of Exposed Contaminated Materials.** In areas where contaminated sediment, debris, or remnant treated piling are exposed due to sloughing or otherwise protrude above the surface of a slope cap, maintenance activities will be designed to cap over the contaminated material or protrusion with a minimum thickness of three feet of cap material (i.e., slope cap filter material, armoring, and habitat mix). The area of cap repair will be constructed as described in the remedial design to return the area to post-remedial construction conditions.
- **Remove Contaminated Material.** If capping of contaminated material protruding through a capped area is not feasible or stable slopes cannot be maintained, a portion of the protrusion (i.e., treated piling or debris) may be removed to allow for placement and maintenance of the required thickness of cap material necessary to ensure containment.
- **Contaminated Material Disposal.** Contaminated material removed from shoreline slope areas will be transported to an approved landfill facility for disposal as part of maintenance construction activities.
- **Stabilize Areas of Erosion or Sloughing.** Shoreline slope areas that are identified to have significant erosion or sloughing will be stabilized by placement of additional cap and/or armor material within the slope area to enhance existing slope stability and prevent future erosion or sloughing. If significant erosion is observed at an outfall apron and/or splash pad, additional armor material will be placed to disperse erosive forces associated with high flow events at the outfall.
- **Implement Best Management Practices (BMPs).** BMPs will be implemented during all maintenance activities as described in the BMP section of this plan in order to protect

adjacent remedial areas and prevent transport of contamination as a result of maintenance work.

Methods of Maintenance

Slope area maintenance activities will generally be performed using upland/shoreside equipment (i.e., backhoe/track hoe, crane, vactor truck, etc.) or over-water equipment (i.e., derrick barge, material barge, backhoe/track hoe, etc.) staged adjacent to a specific slope area, depending on site access and construction equipment constraints.

The general approach to performing maintenance of identified slope features (i.e., protruding piling or debris, cap material sloughing, and damaged outfall aprons or splash pads) will involve the following procedures:

- Stage construction equipment and materials in the uplands adjacent to the slope area feature requiring maintenance or on the water if access by water-based equipment facilitates maintenance activities.
- Temporarily relocate armor material as necessary around the slope feature to expose protruding piling or debris, stabilize areas of sloughing, or facilitate access to a damaged stormwater outfall apron or splash pad.
- For slope features where containment is not feasible because treated piling or debris would protrude through the cap surface and direct placement of slope cap materials would not produce a stable slope or would affect site facilities (i.e., marina floats, etc.), remove a portion of the feature so that placement of filter material and slope armoring can be achieved and a stable slope can be constructed.
- Cover remaining piling, debris, or exposed sediment in areas of sloughing with a minimum of 18 inches of filter material. Use sediment stakes or surveying techniques to confirm placement of the 18 inches of filter material. For damaged outfall apron or splash pad slope features, place 18 inches of filter material only in areas where underlying contaminated sediment is exposed at the slope surface.
- Place a minimum of 18 inches of armor material over the filter material so that a stable slope is constructed. Placement of armor material may include reuse of existing armor material temporarily relocated at the slope feature. For damaged outfall apron or splash pad slope features, place additional armor material in a configuration that provides added protection from erosional forces during high flow events at the outfall.
- Verify completed cap thickness meets the previously constructed conditions using sediment stakes or surveying techniques.
- Place habitat mix over the area of slope cap maintenance at the appropriate rate based on the type of armoring material present.

Alternate methods of construction may also be required to complete slope area maintenance activities where equipment access has significant restrictions. These methods may include, but are not limited to, the following;

- Removal of piling or debris from the uplands using crane-based equipment to reach over wharf structures or access slope areas that cannot accommodate upland or water-based excavation equipment;

- Manual removal of piling or debris during low tide periods using shovels, chainsaws, pick axes, etc.;
- Repair of underwater slope cap sloughing features through placement of additional filter and armor material using conventional derrick-barge equipment such as over-water cranes and cable arm material placement buckets; and
- Reforming and construction of new outfall aprons or splash pads to prevent future erosion of slope areas during high flow events at the outfall.

BEST MANAGEMENT PRACTICES

The following Best BMPs will be implemented during slope area maintenance:

- **Work in the Dry.** To the extent possible, maintenance activities will be completed in the dry during periods of low tide to avoid potential impacts to surface water and the potential for transport of contaminated materials.
- **Debris Containment and Sorbent Booms.** Continuous debris containment and/or sorbent booms will be deployed around slope areas undergoing maintenance. When all components of slope maintenance work at a specific location can be performed in the dry in one tidal cycle, continuous sorbent booms will be deployed around the work area at a minimum to contain possible petroleum releases (i.e., creosote from piling, etc.) to surface water. For work that is completed in the dry over multiple tide cycles or is entirely in-water work, slope surfaces undergoing maintenance will be fully enclosed with continuous debris containment and sorbent booms.

  Debris containment booms will be constructed with silt curtains five to six feet in depth attached to contain debris and suspended sediment. Sorbent booms will be continuous within but adjacent to the debris containment boom and will contain petroleum sheens or spills. Booms will be maintained throughout the duration of maintenance activities. Additionally, floating debris will be removed from within all boom areas on a regular basis or as needed, so that debris does not escape containment.
- **Visual Water Quality Monitoring.** Visual water quality monitoring will be performed during all maintenance work to be performed on slope areas to ensure that construction activities do not impact adjacent surface water. Visual water quality monitoring will include the following:
  - Observations of the condition of debris containment and/or sorbent booms;
  - Observations of the presence of debris inside and outside containment boom areas;
  - Observations of persistent turbidity within or outside of a boomed area;
  - Observations of petroleum sheen within or outside of a boomed area; and
  - Observations of the presence of fish or wildlife within the boomed area.

  The following actions will be taken if persistent turbidity or petroleum sheen emanating from the project area is observed outside of the boomed area or fish and wildlife are observed within the boomed area:
  - Maintenance activities will cease;
  - Appropriate measures will be taken to correct the problem or situation; and
  - The EPA project manager will be notified of the occurrence and the measures taken to correct the situation.

Visual water quality observations and any necessary corrective actions will be documented on the water quality monitoring form provided in Appendix C.

- **Fish Window.** All work in slope areas will be completed within agency-defined fish windows to minimize potential impacts to aquatic life.

Additional BMPs may be implemented during maintenance activities, as necessary, to avoid potential impacts to surface water, potential for transport of contaminated materials, and impact on fish and wildlife.

CONSTRUCTION MANAGEMENT

Oversight and inspection of maintenance activities will be performed by a representative of the City of Tacoma. The inspector will be present during all maintenance activities to perform the following activities:

- Document construction progress;
- Verify that construction activities are being performed according to design and that the slope area is returned to post-remedial construction conditions; and
- Ensure that BMPs have been implemented and are performed in accordance with this Slope Area Maintenance Plan.

Construction progress will be documented with photographs and preparation of a daily inspection log.

PEFORMANCE OF WORK

EPA and any affected property owners will be notified 30 days prior to performance of maintenance activities. After completion of construction activities, a memorandum will be prepared and submitted to EPA to document the work performed in each slope area. The memorandum will also be incorporated into the subsequent year's annual OMMP monitoring report. Slope area monitoring will be resumed in accordance with the OMMP to ensure that areas of maintenance are effectively containing contaminated materials.

FIGURES

Figure 1 – Completed Remedial Actions

Legend

- Remedial Areas

Completed Remedial Actions:

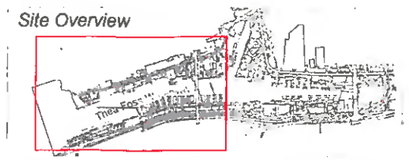
- No Action
- Slope Rehabilitation
- Natural Recovery
- Enhanced Natural Recovery
- Habitat Enhancement
- Backfill
- Channel Sand Cap
- Slope Cap
- Dredge to Clean
- Grout Mat Cap
- Transition Slope
- Quarry Spalls
- 881 City of Tacoma Outfall and Designation
- Private Outfall (No Designation Provided)

NOTES

Base map generated from **CAD** drawings supplied by **Walker and Associates**, **based on a March** 2006 aerial survey

Outfall locations provided by City of Tacoma. Outfall numbers provided by City of Tacoma **or Tacoma-Pierce County Health** Department Figure E-1 (1995). **Note: Outfalls** monitored as part of the City's Thea **Foss stormwater** monitoring program include outfalls 230, **235, 237A**, 2378, 243, **245**, and 254

Site Overview



Match-Line

Cable Crossing Area

Petrich Marine

Totem Marine

207/5

208

214/881

218

Commencement Bay

11th Street Bridge

223

224

222

221

Foss Waterway Marina

Cable Crossing Area

Foss Waterway Marina

Thea's Park

0 300 600

Feet

Match-Line

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Thea Foss and Wheeler-Osgood Waterways
Slope Area Maintenance Plan

Figure 1 (Page 1 of 2)
Completed Remedial Actions

DATE: 2/21/2007 2:51:25 PM
MXD NAME: F:\projects\KPFF Foss\GIS\Revised OMMP\Baseline Report Figures\Slope Area Maintenance Plan Figures\Figure 1 Completed Remedial Actions (1of2) 022107.mxd

Match-Line

Legend

- Remedial Areas

Completed Remedial Actions:

- No Action
- Slope Rehabilitation
- Natural Recovery
- Enhanced Natural Recovery
- Habitat Enhancement
- Backfill
- Channel Sand Cap
- Slope Cap
- Dredge to Clean
- Grout Mat Cap
- Additional Cap Material Placement in Utilities Area
- Transition Slope
- Quarry Spalls
- Cap Placed by the Utilities
- 881 City of Tacoma Outfall and Designation
- Private Outfall (No Designation Provided)

NOTES

- Base map generated from CAD drawings supplied by Walker and Associates, based on a March 2006 aerial survey.
- Outfall locations provided by City of Tacoma. Outfall numbers provided by City of Tacoma or Tacoma-Pierce County Health Department Figure E-1 (1995) Note: Outfalls monitored as part of the City's Thea Foss stormwater monitoring program include outfalls 230, 235, 237A, 237B, 243, 245, and 254

Utilities Project Area
Subject to Long-Term Monitoring Under Separate OMMP. (PacifiCorp, 2003)

Cable Crossing Area
Petrich Marine
Martinac Shipyard
Delin Docks Marina
Johnny's Dock Habitat Enhancement
Johnny's Dock Marina
Head of the Thea Foss Shoreline Habitat
Foss Landing Marina
11th Street Bridge
SR 509 Bridge
Approximate Location of Sheet Pile Wall (Site Boundary)
Dock Street Marina
Log Step Habitat Enhancement
Foss Waterway Marina
Cable Crossing Area
SR 509 Esplanade Riparian Habitat
Match-Line

0 300 600
Feet

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Thea Foss and Wheeler-Osgood Waterways Slope Area Maintenance Plan

Figure 1 (Page 2 of 2) Completed Remedial Actions

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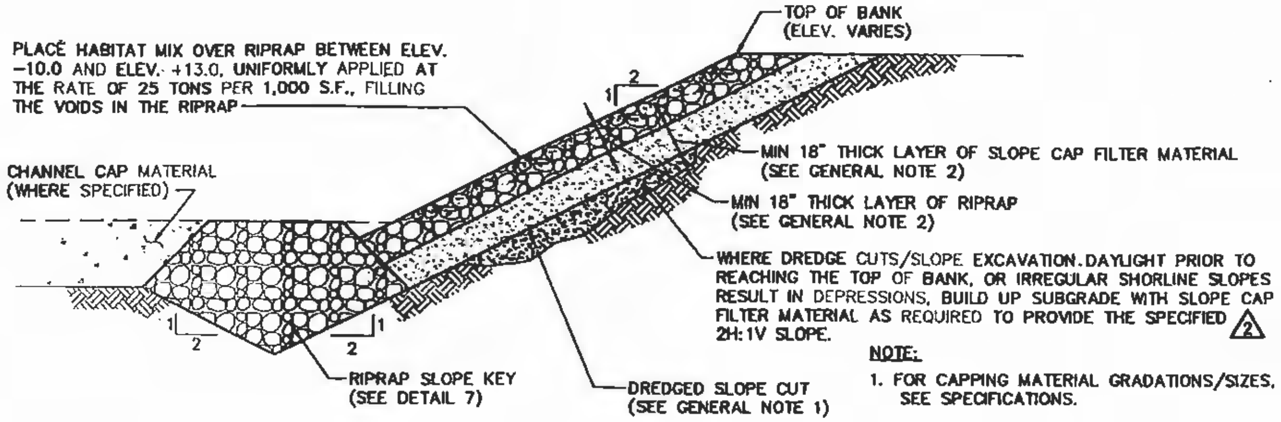
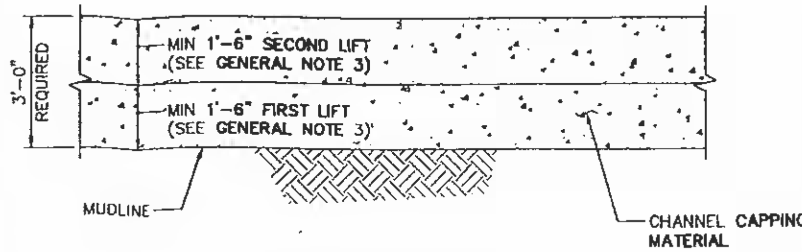
Appendix A

Thick Slope and Quarry Spall Cap Plans and Material Specifications

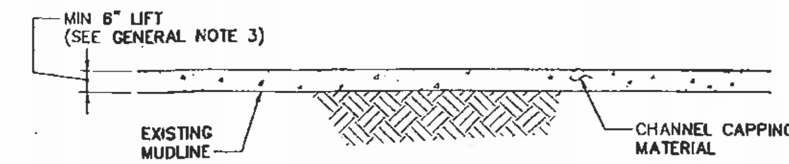


NOTE:
1. FOR CAPPING MATERIAL GRADATIONS/SIZES, SEE SPECIFICATIONS.
2. SEE THE GENERAL NOTES FOR DREDGING AND CAPPING TOLERANCES.

1 SECTION – THICK SLOPE CAP
SCALE: N.T.S.



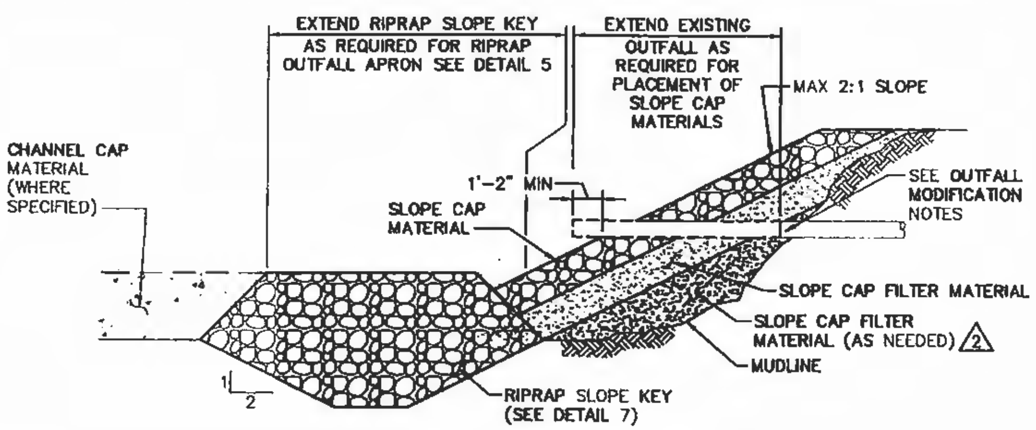
2 SECTION – THICK CHANNEL CAP
SCALE: N.T.S.



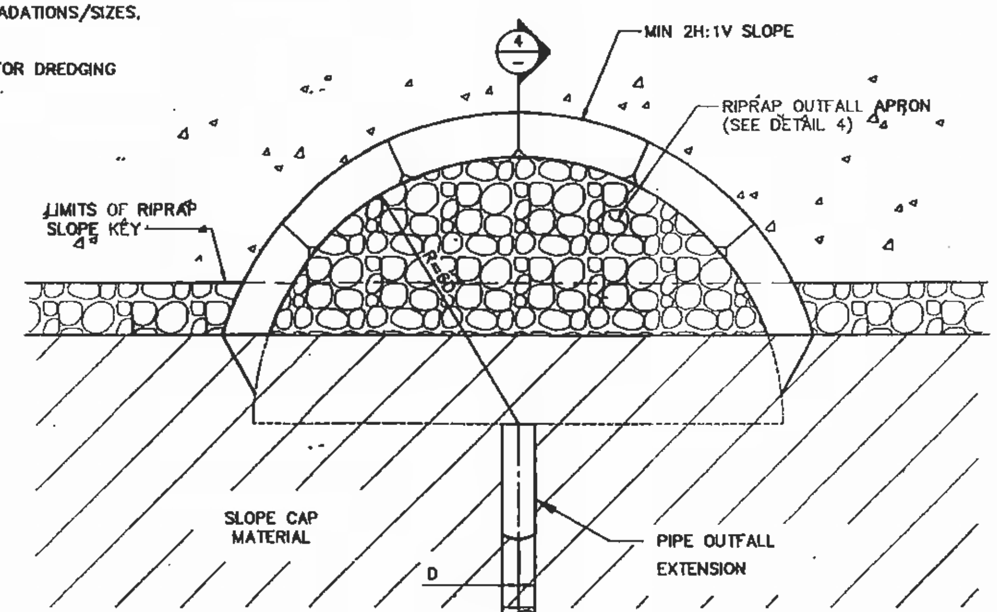
3 SECTION – THIN CAP
SCALE: N.T.S

GENERAL NOTES:

1. DREDGING TOLERANCE: DREDGING DEPTHS SHOWN ON THE PLANS ARE MINIMUM DEPTHS. SLOPE AND CHANNEL DREDGING SHALL BE ACCOMPLISHED WITHIN A TOLERANCE OF +12 INCHES.
2. SLOPE CAPPING TOLERANCE: THE LAYER THICKNESS SHOWN ON THE PLANS FOR FILTER MATERIAL AND RIPRAP SLOPE CAPPING MATERIALS IS A MINIMUM THICKNESS. SLOPE CAPPING MATERIALS SHALL BE PLACED WITHIN A TOLERANCE OF +6 INCHES.
3. CHANNEL CAPPING TOLERANCE: THE LIFT THICKNESS SHOWN ON THE PLANS FOR CHANNEL CAPPING MATERIAL IS A MINIMUM THICKNESS. EACH LIFT OF THICK AND THIN CHANNEL CAP SHALL BE CONSTRUCTED WITH A PLACEMENT TOLERANCE OF +6 INCHES



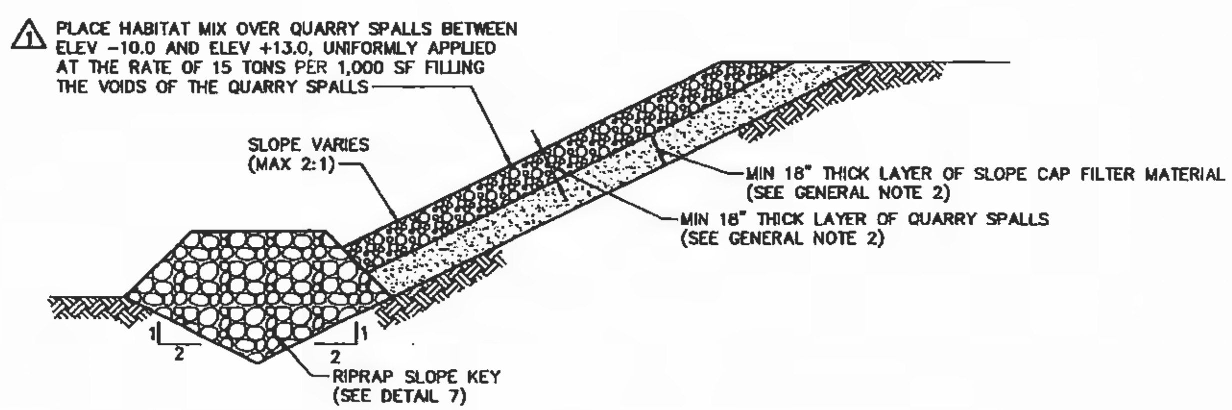
4 DETAIL – OUTFALL MODIFCATION
SCALE: N.T.S.



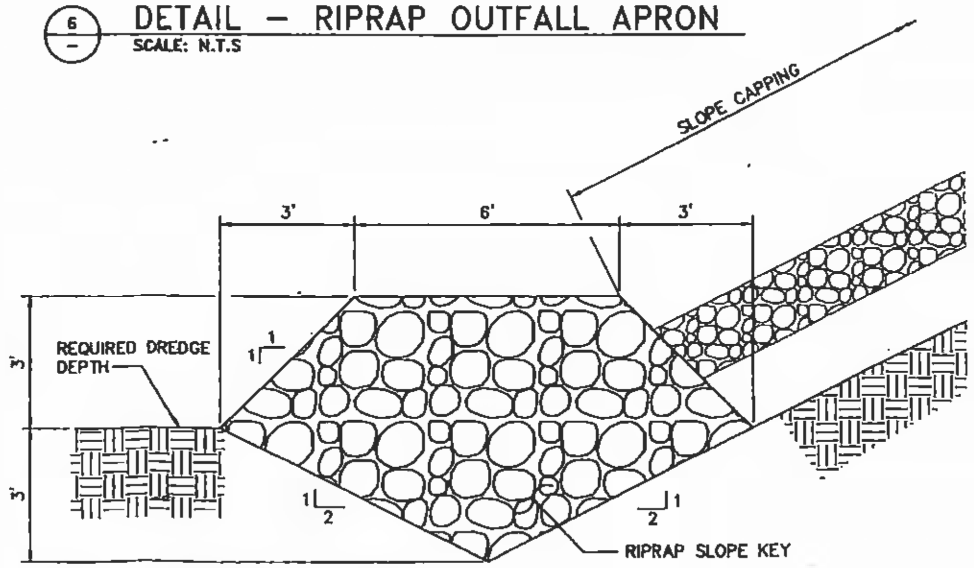
6 DETAIL – RIPRAP OUTFALL APRON
SCALE: N.T.S

OUTFALL MODIFICATION NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE CITY OF ALL MODIFICATIONS TO EXISTING OUTFALLS OR DRAINS PRIOR TO CONSTRUCTION AND PREPARE A PLAN SHOWING THE PROPOSED MODIFICATION. REMOVE ANY SEDIMENT AND DEBRIS FROM THE END OF THE OUTFALL PIPE PRIOR TO PIPE EXTENSION.
2. PIPE EXTENSIONS SHALL BE CONSTRUCTED OF MATERIALS MATCHING THE EXISTING OUTFALL PIPE.
3. OUTFALL EXTENSIONS SHALL HAVE A MINIMUM PIPE LENGTH OF 3 FEET. REMOVE A PORTION OF THE EXISTING OUTFALL PIPE IF NECESSARY TO INSTALL THE MINIMUM LENGTH EXTENSION.
4. CONNECT EXTENSION PIPE TO THE EXISTING OUTFALL PIPE USING A FLEXIBLE PIPE COUPLING OR OTHER CITY APPROVED CONNECTION DEVICE.
5. REMOVE ANY BACKFLOW PREVENTION DEVICES FOUND ON EXISTING OUTFALL PIPES AND REINSTALL ON PIPE EXTENSIONS.
6. PLACE SLOPE CAP MATERIALS AROUND PIPE EXTENSIONS AS REQUIRED TO SUPPORT THE PIPE EXTENSION, ALLOW DRAINAGE AND PROVIDE THE MINIMUM SPECIFIED CAPPING THICKNESS.
7. AN OUTFALL APRON WILL NOT BE REQUIRED WHERE:
   A. OUTFALL PIPES ARE SMALLER THAN 8" INCHES IN DIAMETER.
   B. THE DISTANCE BETWEEN THE END OF THE PIPE OUTFALL EXTENSION AND THE TOE OF THE SLOPE EXCEEDS 6D.
   C. IF THE TOE OF SLOPE IS AT ELEV -10.0 OR LOWER.



5 DETAIL – QUARRY SPALL CAP
SCALE: N.T.S.



7 DETAIL – RIPRAP SLOPE KEY
SCALE: N.T.S

ISSUED FOR CONSTRUCTION

BERGER/ABAM ENGINEERS INC. 33301 9TH AVENUE SOUTH FEDERAL WAY, WASHINGTON 98003-2600 VOICE: (206)431-2300 FAX: (206)431-2250

HARTCROWSER

EXPIRES OCTOBER 3, 2003

APPROVED ____ DATE

MDB	5/16/03	BJC	5/16/03
DRAWN BY	DATE	CHECK BY	DATE
PTL	5/16/03	GEH	5/16/03
DESIGN BY	DATE	PROJ ENGR	DATE

MARK	REVISION	BY	APP.	DATE
1	ADDENDUM #2 REV	BA	HC	3/14/03
2	ADDENDUM #4 REV	BA	HC	4/2/03

THEA FOSS AND WHEELER-OSGOOD WATERWAYS REMEDIATION PROJECT
MISCELLANEOUS WATERWAY REMEDIATION DETAILS

DRAWING NO. C-12.1
WORK ORDER DC 2001
SHEET NO. 25 OF 97

GENERAL

1.01 DESCRIPTION OF WORK

The work described in this specification includes identification, characterization, and approval of materials used for maintenance of slope areas in the Thea Foss and Wheeler-Osgood Waterways. Materials to be used for slope maintenance activities may include the following:

- Slope cap filter material;
- Rip Rap;
- Quarry spalls; and
- Habitat mix.

1.02 QUALITY ASSURANCE

Sampling, testing, and inspection for compliance with this specification shall be in accordance with the requirements specified herein.

1.03 STANDARD SPECIFICATIONS

The Standard Specifications for the work described in this section shall be the Standard Specifications for Road, Bridge, and Municipal Construction as prepared by the Washington Department of Transportation (WSDOT) and the American Public Works Association (APWA), Washington State Chapter, 2006 Edition.

1.04 SUBMITTALS

The following submittals shall be provided for slope maintenance materials:

A. Source Identification (per Paragraph 2.02-A).

B. Material Source Characterization (per Paragraph 2.02).

C. Shipping Receipts and Material Volumes for slope maintenance materials (per Paragraph 3.01).

Test reports shall be provided by a laboratory that is independent of the supplier.

PART 2 - PRODUCTS

2.01 GENERAL

Materials shall be of the quality, size, shape, and gradation or equal to that specified herein. Material sources shall be selected well in advance of the time when the material will be required in the work. Suitable representative samples and test reports, as described below, must be submitted to and approved by the Engineer prior to delivery of materials to the jobsite.

2.02 MATERIAL SOURCE CHARACTERIZATION

Material source characterization shall be performed as specified below to assure that materials used for slope maintenance are natural, native, virgin materials, free of unwanted materials including debris or recycled materials, and meet the requirements of these specifications. Any material that has been determined to be substandard by the City of Tacoma for any reason will be rejected. In the event that a material is rejected, it shall be removed from the site.

Slope cap filter material, rip rap, quarry spalls and habitat mix were placed on shoreline slopes within the Thea Foss and Wheeler-Osgood Waterways as part of Thea Foss and Wheeler-Osgood Waterways Remediation Project. Slope maintenance activities will use materials that meet the specifications for these materials approved for use by the United States Environmental Protection Agency (EPA) as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project.

Each material source shall be approved by EPA, in accordance with these specifications, prior to materials being bought to the area requiring maintenance. Specific sources used to supply these materials as part of the Thea Foss and Wheeler-Osgood Waterway Remediation Project have already been approved by EPA. Where a previously approved borrow source is identified as the source for materials to be used for slope maintenance, the Material Source Characterization will consist of Source Identification (2.02 A), Source Inspection (2.02 B), and Grain Size Distribution (2.02 C. 1). The Material Source Characterization for sources not previously approved by EPA shall include all of the requirements specified below. The Contractor shall submit a characterization of any and all imported material prior to any on-site placement.

A. Source Identification

Prior to material source sampling, documentation of the origin of each type of maintenance material including the names, addresses, and source identification numbers and maps identifying specific location(s) of material source(s).

B. Source Inspection

All material sources shall be inspected at the source by a representative of the City of Tacoma and the supplier(s) of the material. The witnessing of the inspection by a representative of the City shall in no way release the supplier(s) from complying with the Specifications and in no way shall be construed as approval of any particular source of material.

C. Testing, Reporting, and Certification

Samples of the source material comprising slope cap filter material and habitat mix shall undergo all of the following tests. Rip rap and quarry spalls will meet the requirements of 2.03 and 2.04.

1. Grain Size Distribution (ASTM D 422-63).
2. Particle Specific Gravity (ASTM D 854).
3. Weight per unit volume of uncompacted materials.

4. Priority Pollutant Metals (EPA SW 846 6010B/6020/ 7000 Series).
5. Volatile Organic Compounds (EPA SW 846 8260B).
6. Semi-volatile Organic Compounds (EPA SW 846 8270C).
7. Chlorinated Pesticides (EPA Method 8081).
8. Polychlorinated Biphenyls (EPA Method 8082).
9. Total Organic Carbon (EPA Method 9060).

The results of such tests shall be provided at least two weeks before delivery of the materials to the jobsite. The results of each test shall be provided in a report that clearly identifies the following:

1. Source of samples.
2. Sampling dates.
3. Chain of custody.
4. Sampling locations.
5. Supplier's certification that the samples tested and the results provided are representative of materials that shall be delivered to the site.

The supplier shall ensure the chemical nature of the material used for slope maintenance in the Thea Foss and Wheeler-Osgood Waterways does not pose a risk to human health or the environment. As such, imported slope maintenance materials shall be, at a minimum, less than the Sediment Quality Objective (SQO) concentrations for Commencement Bay (EPA 1989) and the Explanation of Significant Differences (EPA 2000).

D. Inspection of Materials at the Jobsite

Slope maintenance materials shall be visually inspected upon delivery. Materials shall be inspected for presence of foreign, recycled, or reprocessed material. Material may be rejected due to identification of any such material or as a result of substandard test results. Materials may be segregated for testing based on appearance or odor. Segregated material may be tested according to procedures at the City of Tacoma's discretion.

2.03 SLOPE CAP FILTER MATERIAL

Slope cap filter material shall be clean, free-draining sand and gravel from a recognized and established borrow site. Individual particles shall be free from all objectionable coating. The material shall contain no organic matter or soft friable particles in quantities considered objectionable. Slope cap filter material shall meet the following gradation requirements:

U.S. Standard Sieve Size	Percent Passing (by weight)
6 inch	100
4 inch	90 to 100
3/4 inch	50 to 90
No. 4	35 to 65
No. 10	15 to 45
No. 40	2 to 10
No. 200	0 to 2 (wet screen)

2.04 RIPRAP

Riprap shall consist of broken stone from an approved source that is hard, sound, dense, and durable. It shall be free from seams, cracks, and other defects tending to destroy its resistance to weather and seawater. Dry unit weight shall not be less than 160 pounds per solid cubic foot. Riprap shall meet the degradation, wear, and specific gravity requirements of Section 9-13 of the Standard Specifications. Rock for Riprap shall be angular, each piece having its greatest dimension not greater than three times its least dimension, and shall meet the following gradation requirements:

Light Riprap:

Light Riprap shall be large rock, 12 to 15 inches in size with up to 25 percent by weight smaller than 12 inches. The portion smaller than 12 inches shall be crushed rock that is greater than the U.S. No. 4 Standard Sieve size.

Heavy Riprap:

Weight In Pounds	Percent Lighter (by weight)
1,000	100
400	55 to 90
50	20 to 50
2	5 to 15

2.05 QUARRY SPALLS

Quarry spalls shall consist of broken stone from an approved source, free from segregation, seams, cracks or other defects and shall conform with the requirements for quality and gradation in Section 9-13.6, QUARRY SPALLS of the Standard Specifications.

2.06 HABITAT MIX

Habitat mix shall consist of 2-inch minus pit-run, rounded material from an approved source, uniform in quality and substantially free from wood, roots, bark and other extraneous materials. The individual particles shall be free from all objectionable coating and shall contain no organic matter or soft friable particles in quantities considered objectionable by the City of Tacoma. The material shall conform to the following gradation:

U.S. Standard Sieve Size	Percent Passing (by weight)
2 inch	100
1/1/2 inch	80 to 95
3/4 inch	60 to 80
No. 4	40 to 60
No.10	30 to 50
No. 40	10 to 20
No. 200	0 to 5 max. (wet screen)

PART 3 - EXECUTION

3.01 GENERAL

Slope maintenance materials shall be provided from a source approved by EPA. The supplier shall provide daily reports of the quantities of slope maintenance materials used. The reports shall include tabulated summaries of volumes placed for each material. Shipping receipts for all materials delivered to the site shall also be submitted on a daily basis.

END OF SECTION

State Environmental Policy Act (SEPA) Checklist and Determination of Non-Significance

City of Tacoma
Public Works Department

Determination of Environmental Nonsignificance (DNS)

SEPA File Number: SEP2013-40000210417
Related File Number: PWK-00552-12

To: All Departments and Agencies with Jurisdiction

Subject: Determination of Environmental Nonsignificance

In accordance with *Washington Administrative Code (WAC)* 197-11-340, a copy of the Determination of Nonsignificance (DNS) for the project described below is transmitted.

Applicant: City of Tacoma Public Works, Tom Rutherford

Proposal: Removal of approximately 300 linear feet of failing esplanade and sea wall, and reconstruction with a sloped armored shoreline and concrete public walkway. Work will include removal of timber pilings and the addition of intertidal habitat. Some work may take place as an emergency action. The site is zoned "S-8" Shoreline District – Thea Foss Waterway. Shoreline Substantial Development and FWHCA Development permits will be applied for as required.

Location: 1117 Dock Street, Parcels 8950001963, 8950001962

Lead Agency: City of Tacoma

City Contact: Tom Rutherford, PE
Tacoma Public Works Department
Engineering Division
747 Market Street, Room 544
Tacoma, WA 98402
253-591-5767 | trutherford@cityoftacoma.org

The City of Tacoma, the lead agency for this proposal, has determined that the requirements for environmental analysis, protection, and mitigation measures have been adequately addressed in the development regulations and comprehensive plan adopted under Chapter 36.70A *RCW*, and in other applicable local, state, or federal laws or rules, as provided by *RCW* 43.21C.240 and *WAC* 198-11-158. The City will not require any additional mitigation measures under SEPA.

Additionally, the City of Tacoma has determined that this project does not have a probable significant adverse impact on the environment. The proposal will have no significant adverse environmental impacts to fish and wildlife, water, noise, transportation, air quality, environmental health, public services and utilities, or land and shoreline use. An environmental impact

statement (EIS) is not required under *RCW* 43.21C.030(2). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public upon request.

Appeals may be filed at the Superior Court of the State of Washington for Pierce County within 21 days after the final determination. Appeals to the Superior court shall be taken in accordance with procedures and limitations set forth in *RCW* 43.21C.075. A copy of the appeal shall be filed with Community and Economic Development – Building and Land Use Services, and with the City Attorney's Office, 747 Market Street, Tacoma, WA 98402.

Responsible Official: Kurtis Kingsolver, P.E.

Position/Title: Interim Director, Public Works Department

Signature: _____

Issue Date: **October 16, 2013**

Last Day to Appeal/Comment: **October 30, 2013**

Final Determination Date: **October 31, 2013**

Last Day to Appeal to Superior Court: **November 21, 2013**

NOTE: The issuance of this *SEPA* Determination does not constitute final project approval. The applicant must comply with all other applicable requirements of the City of Tacoma Departments and other agencies with jurisdiction prior to receiving construction permits.

cc via electronic mail:

Department of Ecology, SEPA Unit, sepaunit@ecy.wa.gov
Tacoma Pierce County Health Department, sepa@tpchd.org
Puyallup tribe of Indians: Andrew Stroebel, Brandon Reynon, Lisa Brautigam
Washington State Office of Archaeology and Historic Preservation, Gretchen Kaehler, Gretchen.kaehler@dahp.wa.gov
City of Tacoma Planning and Development Services, Peter Huffman, Reuben McKnight, Brian Boudet
City of Tacoma SEPA Public Information Center, Shirley Schultz
City of Tacoma Site Development
Foss Waterway Development Authority, Su Dowie, sdowie@theafoss.com
Citizens for a Healthy Bay, Leslie Ann Rose, lrose@healthybay.org

A. BACKGROUND

1. Name of proposed project, if applicable:
Bulkhead Emergency Repair and Esplanade Replacement, Development Site 9, Thea Foss Waterway

2. Name of applicant:
City of Tacoma Public Works Department

3. Address and phone number of applicant and contact person:
Tom Rutherford
747 Market Street, Rm. 544
Tacoma, WA 98402
253-591-5767

4. Date checklist prepared:
October 7, 2013

5. Agency requesting checklist:
City of Tacoma

6. Proposed timing or schedule (including phasing, if applicable):
Phase 1: Emergency removal of failing seawall, esplanade and piling, and slope stabilization: December 2013 - February 2014
Phase 2: Replacement of esplanade: October 2014 – March 2015

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

No.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

JARPA, BE, Shoreline Narrative, Mitigation Sequencing, Legal Test

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

Nationwide Permit 3, Nationwide Permit 27, Hydraulic Project Approval, Section 401 Water Quality Certification, Section 7 ESA Concurrence

10. List any government approvals or permits that will be needed for your proposal, if known.

Same as #9 above.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Work will include emergency removal of a failing timber esplanade, pilings, and bulkhead approximately 300' in length; modification of the shoreline by cutting it back to create a stable slope and new intertidal habitat; and construction of a new esplanade and support pilings. The total area impacted by the project is approximately 13,500 square feet. Approximately 81 treated wood piles will be removed. The new shoreline will be protected in accordance with the Thea Foss Waterway Slope Area Maintenance Plan. The project will not result in an increase of overwater coverage. The new esplanade will be

supported by 16 concrete piles in the waterway and 16 steel piles in the upland area. The new esplanade will provide increased light penetration to the intertidal area. The intertidal zone will be enhanced by removal of existing concrete rubble, addition of habitat mix, and anchoring of 15 pieces of large woody debris.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.
Development Site 9 is located south of the Murray Morgan Bridge between Dock Street and the Thea Foss Waterway. The address of the two parcels impacted by the project are 1117 and 1119 Dock Street (see attached Vicinity Map). The site is located in the NW corner of Section 4, T20R3. The tax parcel numbers for the two parcels impacted by the project are 8950001963 and 8950001962.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, (other). . . . The upland area of the site is flat (parking lot), paved with asphalt. The failing timber bulkhead forms the eastern boundary of the upland area. The intertidal area east of the bulkhead slopes toward the marina and Thea Foss Waterway channel at approximately 3:1.

b. What is the steepest slope on the site (approximate percent slope)?
The existing waterway slope east of the bulkhead is approximately 3:1; the proposed upland slope after removal of the bulkhead is 2:1.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.
Sandy soil with occasional construction debris.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.
There is subsidence directly upland of the bulkhead but no indication of unstable soils elsewhere.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.
The slope cutback behind the bulkhead will result in approximately 378 cubic yards of excavation. The new intertidal area west of the bulkhead will be covered with a cap consisting of 18" of borrow sand and gravel overlain with 18" of riprap. The riprap will be covered by a habitat mix of sand and gravel. The sources of the materials are unknown at this time.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
Cutting back the shoreline and removal of the bulkhead will be conducted in segments with slope protection being installed each day to minimize erosion. The cutback excavation behind the existing bulkhead will be conducted before removal of the bulkhead to minimize exposure of the nearshore to turbidity and other water quality impacts related to excavation.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

The project reduces the amount of impervious surface by removing existing asphalt upland of the bulkhead where new intertidal zone will be created. Impervious surface will be reduced by approximately 4,000 square feet. The existing esplanade will be replaced by a new esplanade that reduces the amount of coverage of the intertidal zone.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:
Preventative measures will be used to minimize erosion as much as possible. Excavated materials will either be trucked off the site or covered and other BMPs will be followed.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.
Short-term emissions from construction equipment.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:
None. The esplanade is intended to encourage alternative modes of transportation (bike and pedestrian).

3. Water

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.
The Thea Foss Waterway is east of the site.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Yes. The project involves removing failing bulkhead, cutting back the slope upland of the bulkhead to provide additional intertidal zone, enhancements to the intertidal zone east of the existing bulkhead, and replacing the existing esplanade. Preliminary plans are attached.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Enhancements to the intertidal zone east of the bulkhead from 4.6 feet MLLW to 0 feet MLLW will involve removing approximately 18" of existing rubble and installing a cap according to the Thea Foss Slope Area Management Plan (see B.1.e above for description of the cap). Source of fill material is unknown at this time.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Yes, however, the esplanade surface will be above the high tide elevation. See attached figure for flood plain.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Runoff from the new esplanade will drain into the Thea Foss Waterway the same as the existing esplanade.

2) Could waste materials enter ground or surface waters? If so, generally describe.

Booms with silt curtains will be installed during existing esplanade demolition to control any material that may fall into the waterway. Removal of debris east of the bulkhead, removal of the bulkhead, and cutting back the slope upland of the bulkhead will be conducted at low tide so that all debris will be removed as part of the demolition.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

Runoff upgradient of the construction area will be diverted to existing storm sewer catch basins that will have socks installed. Also see c.2 above for construction measures to minimize impacts to the Thea Foss Waterway.

4. **Plants**

a. Check or circle types of vegetation found on the site:

__X__ deciduous tree: alder, maple, aspen, other

_____ evergreen tree: fir, cedar, pine, other

_____ shrubs

_____ grass

_____ pasture

_____ crop or grain

_____ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other

_____ water plants: water lily, eelgrass, milfoil, other

_____ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

Two trees will be removed and replaced on another waterway parcel (1147 Dock Street).

c. List threatened or endangered species known to be on or near the site.

None

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

None

5. **Animals**

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other: seagulls, Peregrine Falcon
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site.

May occur within vicinity of project:

Puget Sound Chinook salmon

Puget Sound Steelhead

Coastal-Puget Sound bull trout

Bocaccio

Canary rockfish

Yelloweye rockfish

Leatherback sea turtle

Loggerhead sea turtle

Green sea turtle

Steller sea lion

Humpback whale

Southern resident orca

Marble murrelet

Eulachon

May occur within vicinity of project area:

Peregrine falcon

Big brown bat

c. Is the site part of a migration route? If so, explain.

Nearshore and offshore areas of the Thea Foss Waterway have been documented as being used by juvenile salmonids (especially Chinook) during their outmigration from the Puyallup River into Commencement Bay.

d. Proposed measures to preserve or enhance wildlife, if any:

The project will create over 3,000 square feet of new upper intertidal habitat and enhance over 6,000 square feet of middle to lower intertidal habitat that will provide more suitable natural substrates for juvenile salmonid prey and refuge from predators. The new esplanade overwater footprint is 47.6 percent less than the existing structure.

6. **Energy and natural resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electricity will be used for lighting.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Photo cell lighting control.

7. **Environmental health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

No.

1) Describe special emergency services that might be required.

N/A

2) Proposed measures to reduce or control environmental health hazards, if any:

N/A

b. **Noise**

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

N/A

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Short-term construction equipment. Since work will coincide with low tides, noise may occur 24 hours a day during excavation and slope protection work. Other construction activities will be limited to times dictated by Tacoma's noise ordinance.

3) Proposed measures to reduce or control noise impacts, if any:

Nearby marina liveaboards will be relocated during overnight construction activities.

8. **Land and shoreline use**

a. What is the current use of the site and adjacent properties?

The site is currently a parking lot with an esplanade over the waterway. To the north is the Murray Morgan Bridge ROW, to the west is Dock Street and railroad tracks, to the south is Development Site 8 that houses two vacant buildings, to the east is the Thea Foss Waterway and the Foss Harbor Marina.

b. Has the site been used for agriculture? If so, describe.

No

c. Describe any structures on the site.

There is an existing wood esplanade supported by treated wood pilings.

d. Will any structures be demolished? If so, what?

The existing esplanade will be replaced by a new esplanade supported by concrete (in water) and steel (upland) piles.

e. What is the current zoning classification of the site?

S-8 Thea Foss

f. What is the current comprehensive plan designation of the site?

Shoreline

g. If applicable, what is the current shoreline master program designation of the site?

S-8

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

No

i. Approximately how many people would reside or work in the completed project?

None

j. Approximately how many people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any:

N/A

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Esplanade design to meet Foss Waterway plan and intertidal slope improvement to meet the Foss Waterway Slope Area Maintenance Plan.

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None

c. Proposed measures to reduce or control housing impacts, if any:

N/A

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

New esplanade is same elevation as the upland parking lot. Esplanade will be constructed of concrete and supported by concrete (in water) and steel (upland) piles.

b. What views in the immediate vicinity would be altered or obstructed?

None

c. Proposed measures to reduce or control aesthetic impacts, if any:

N/A

11. **Light and glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Lighting on the esplanade will come on at night for public safety.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No

c. What existing off-site sources of light or glare may affect your proposal?

None

d. Proposed measures to reduce or control light and glare impacts, if any:

N/A

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?

Thea Foss Waterway provides marine recreational opportunities. The esplanade provides nonmotorized access along the waterway.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

N/A

13. **Historic and cultural preservation**

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

Murray Morgan Bridge to the north of the site is on the National and State Registers of Historic Places.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

None

c. Proposed measures to reduce or control impacts, if any:

Bridge rehabilitation was completed in 2013. The esplanade when continued under the bridge will provide platform to view historical displays constructed during the bridge rehabilitation.

14. **Transportation**

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Dock Street is west of the site and can be accessed through the parking lot adjacent to the esplanade. The esplanade links sites on the west side of the Thea Foss Waterway.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The site is not served by public transit. Pierce Transit's hub on Commerce Street is a little over three blocks away via the stairs/elevator located adjacent to the Murray Morgan Bridge.

c. How many parking spaces would the completed project have? How many would the project eliminate?

The adjacent parking lot has over 100 parking places, some of which are reserved for marina parking and the rest are public pay parking. Approximately 15 to 20 parking spaces will be eliminated by the project.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

N/A

g. Proposed measures to reduce or control transportation impacts, if any:

N/A

15. **Public services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No

b. Proposed measures to reduce or control direct impacts on public services, if any.

N/A

16. **Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other (cable).

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Electricity for the esplanade lights will be provided by Tacoma Power.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____

Kurtis D. Kingsolver, P.E.
Interim Public Works Director/ City Engineer

Date Submitted: October 15, 2013

R:\GIS\PROJECTS\12599\05\fig_1-site vicinity.mxd

0 2,550 5,100 10,200 Feet

N

Thea Foss Pedestrian Esplanade
Tacoma, Washington

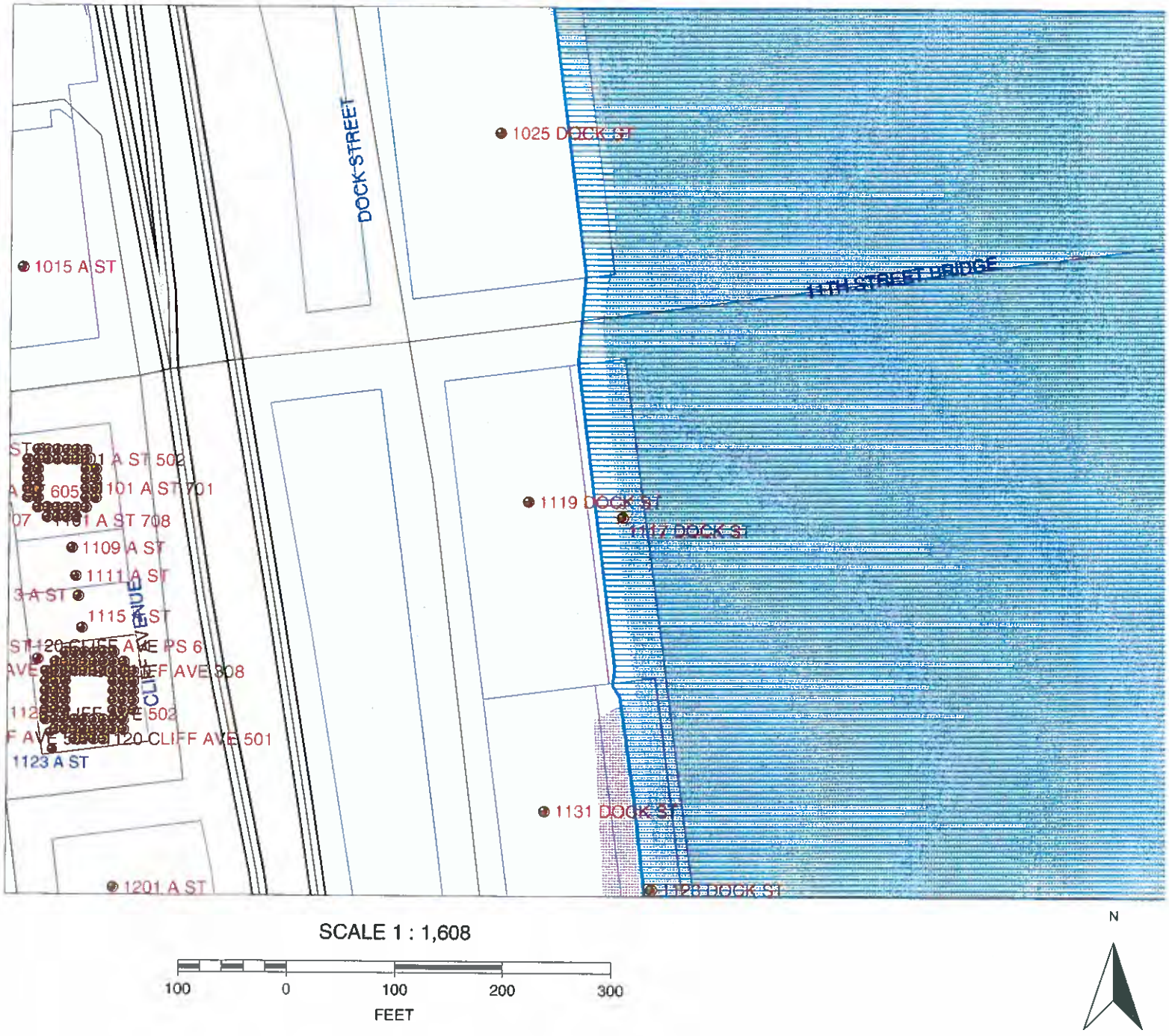
Site Vicinity Map

12733-05 10/13

HARTCROWSER

Figure
01

Flood Map (Hatched)



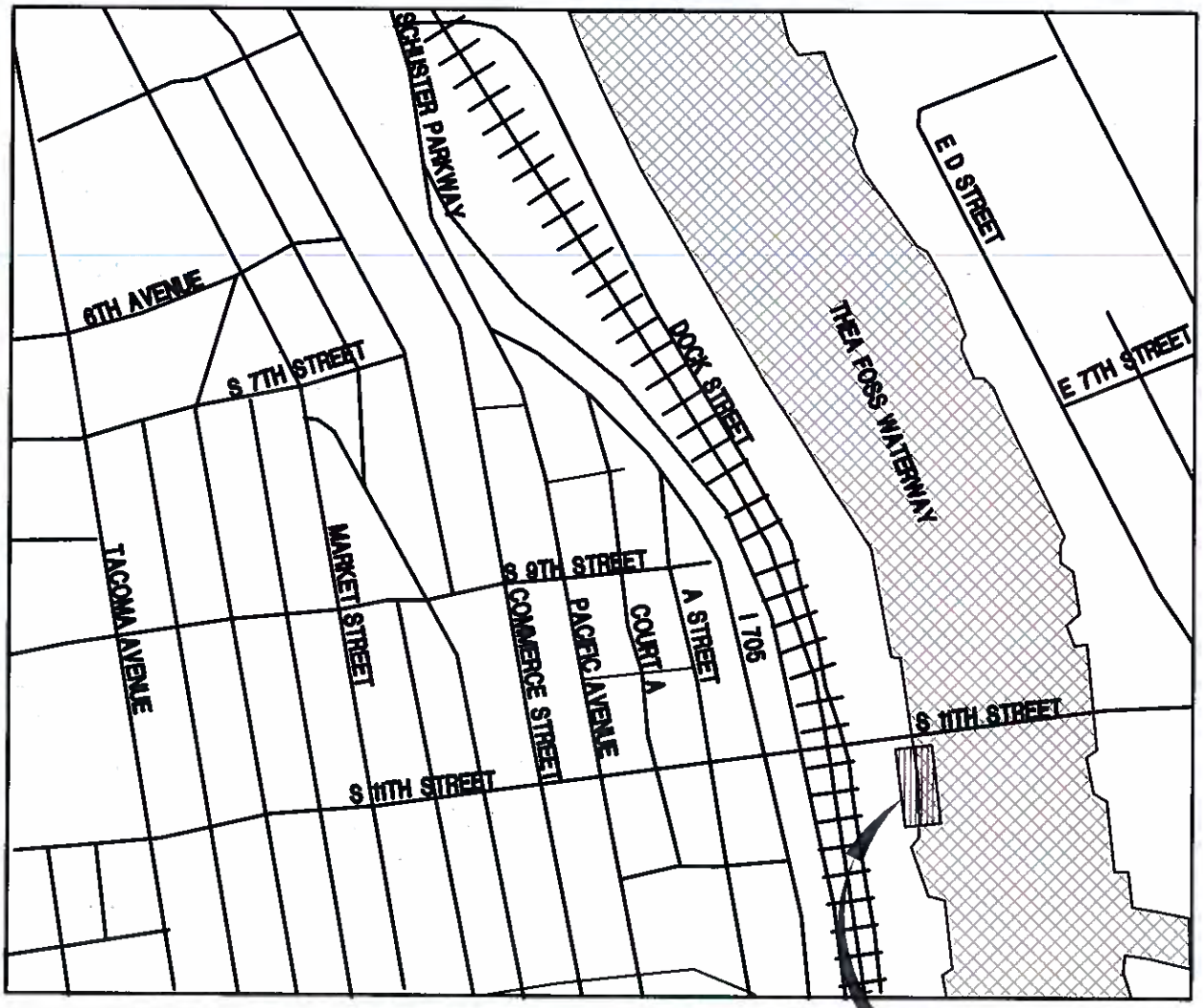
US ARMY CORPS OF ENGINEERING
PERMIT

SITE 9 BULKHEAD REPAIR AND ESPLANADE CONSTRUCTION

SECTION 04, TOWNSHIP 20 NORTH, RANGE 03 EAST

PROJECT LOCATION

STATE MAP
NO SCALE

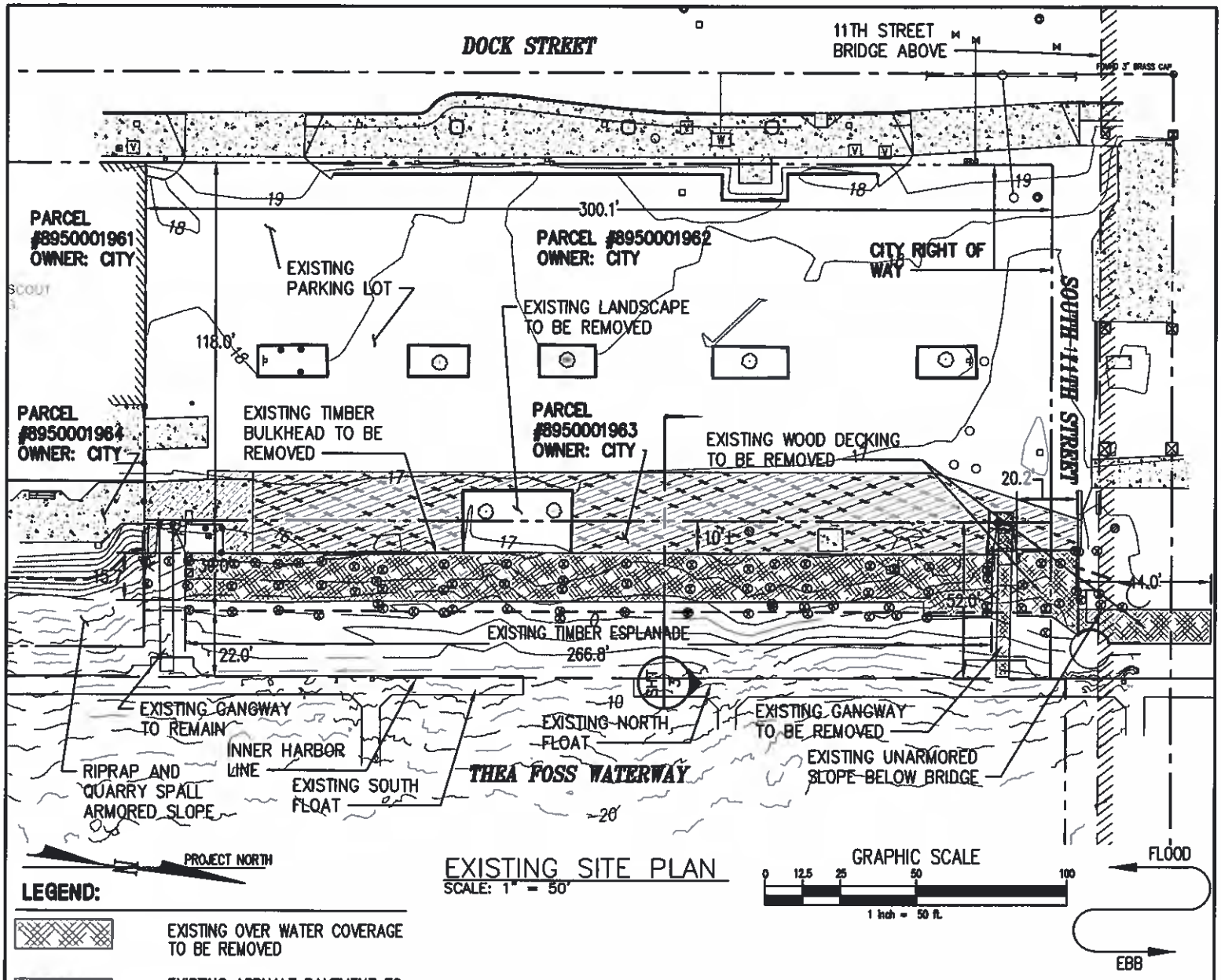


VICINITY MAP
NO SCALE

SITE 9 ESPLANADE SITE

Tacoma

REFERENCE: APPLICANT: CITY OF TACOMA (CITY) ADJACENT PROPERTY OWNERS: 1. CITY/8950001961 2. CITY/8950001964	LOCATION (PARCEL#): 8950001962 & 8950001963 LAT/LONG: 47° 15'11.82"N 122° 26'4.46"W SHEET 1 OF 7 DATE: 10/8/13	PROPOSED PROJECT: BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION IN: THEA FOSS WATERWAY NEAR: TACOMA COUNTY: PIERCE STATE: WASHINGTON



EXISTING SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

LEGEND:

- EXISTING OVER WATER COVERAGE TO BE REMOVED
- EXISTING ASPHALT PAVEMENT TO BE REMOVED
- EXISTING CONCRETE PAVEMENT TO BE REMOVED
- ⊗ TIMBER PILE TO BE REMOVED PILES SHALL BE EXTRACTED INTACT OR BROKEN/CUT AT EXISTING MUDLINE
- MHHW (EL = +11.85)

REMOVAL QUANTITIES

	BELOW MHHW	
	EXIST QUANTITY TO BE REMOVED	EXIST OVER WATER AREA TO BE REMOVED (SF)
PILES	81	
TIMBER ESPLANADE		4,350
GANGWAY		193
WOOD DECK		940
TOTAL	81	5,483

TOTAL EXCAVATION QUANTITIES

	EXCAVATION AREA (SF)	EXCAVATION VOLUME (CY)
BELOW MHHW	10,950	1,434
ABOVE MHHW	3,000	1,112
TOTAL	13,950	2,490

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

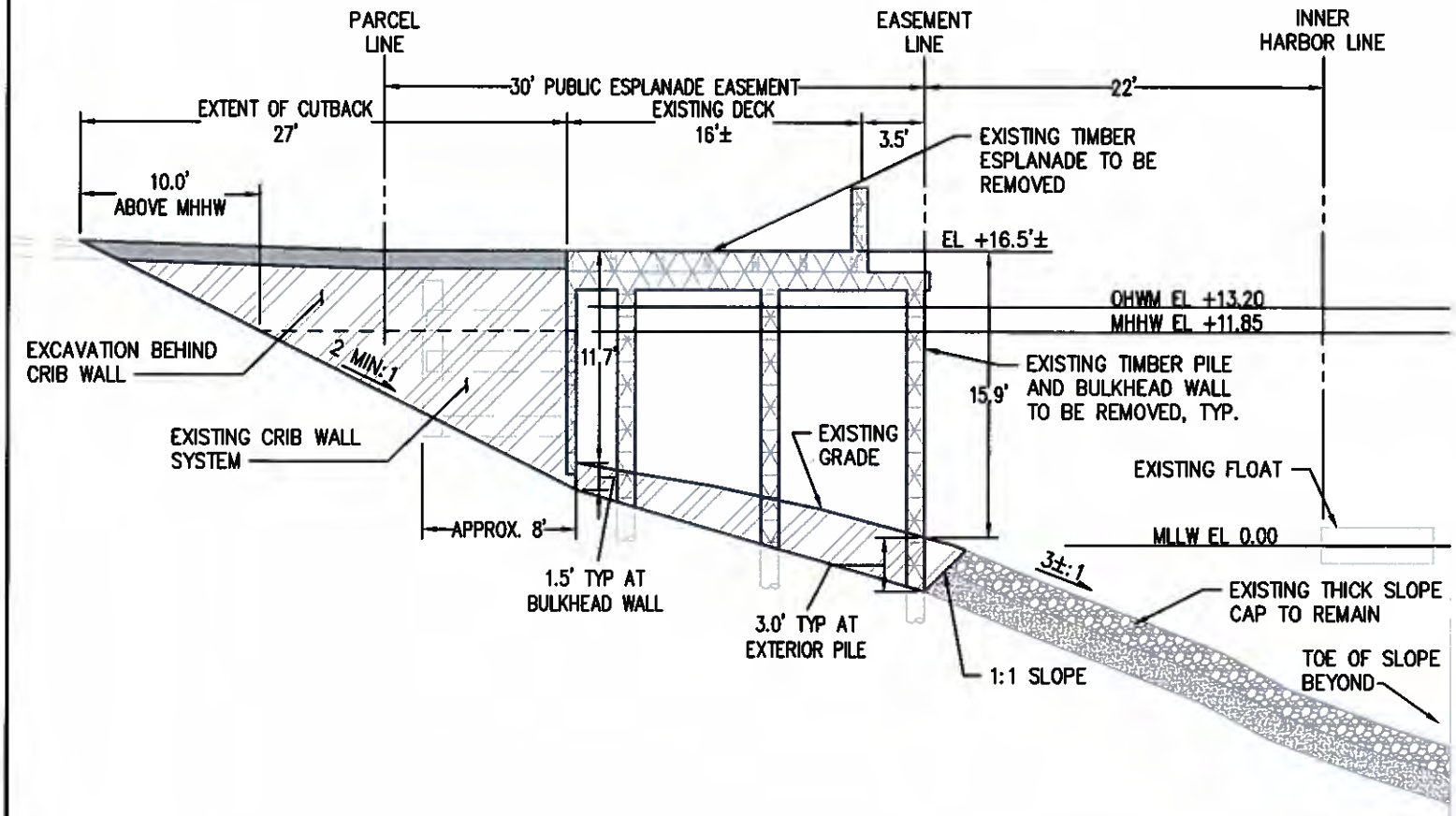
EXISTING SITE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

 DATE: 10/8/13



GRAPHIC SCALE

0 2.5 5 10 20

1 inch = 10 ft.

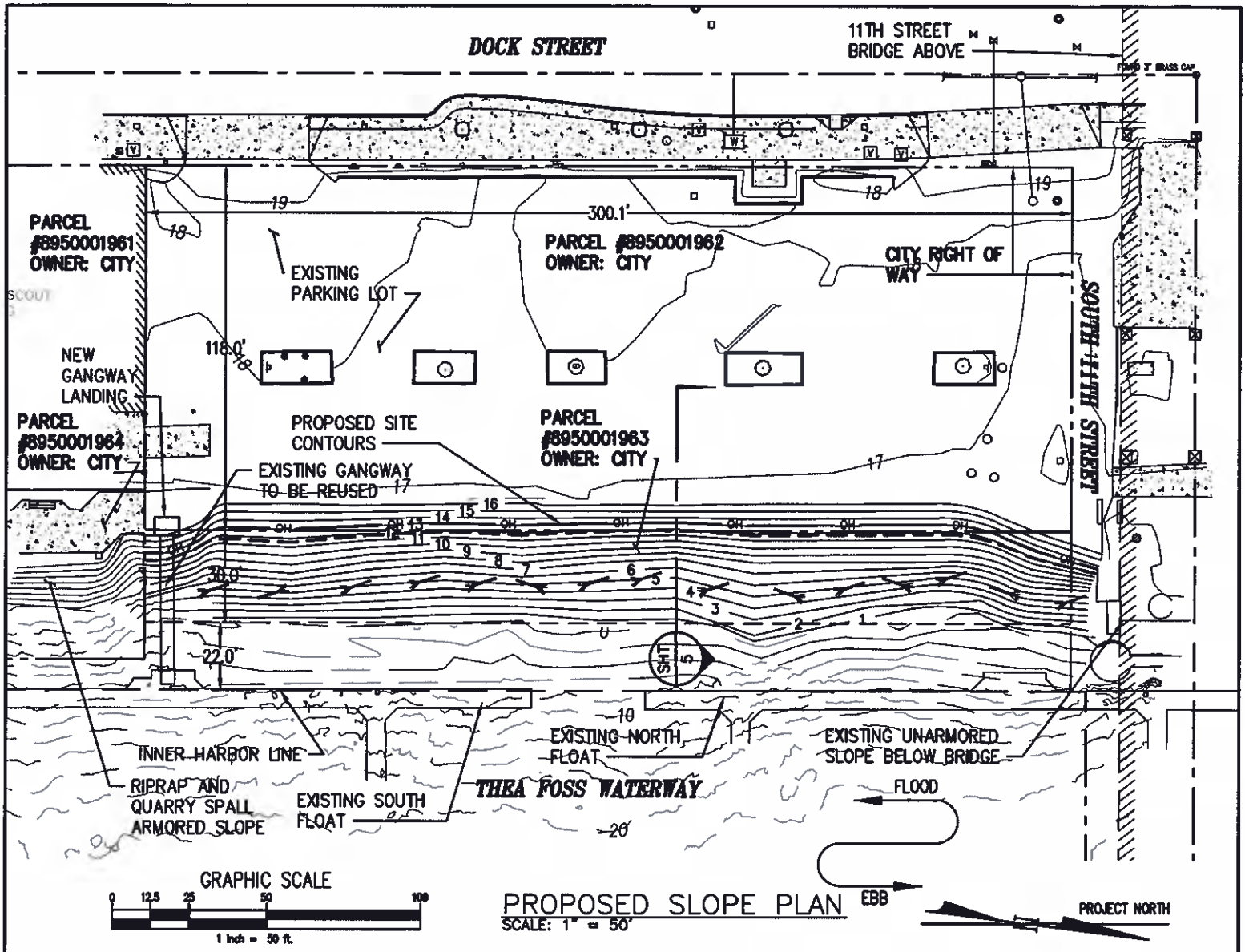
EXISTING SECTION

SCALE: 1" = 10'

LEGEND:

- PAVEMENT REMOVAL
- TIMBER STRUCTURE REMOVAL
- EXCAVATION

US ARMY CORPS OF ENGINEERS PERMIT EXISTING SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 3 **OF** 7 **DATE:** 10/8/13



PROPOSED SLOPE PLAN

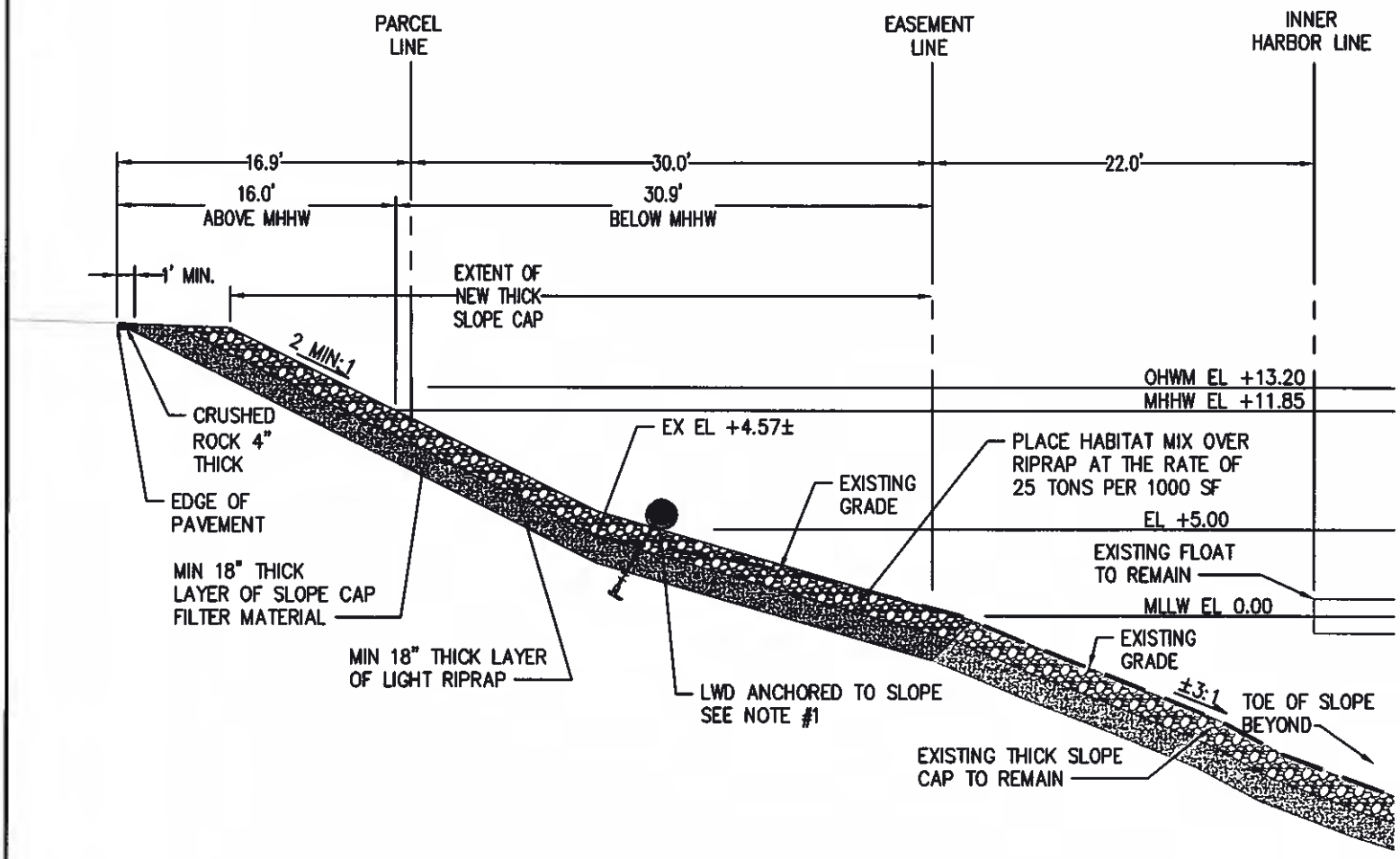
SCALE: 1" = 50'

LEGEND:

- LARGE WOODY DEBRIS (LWD) AT EL +5.0 (15 TOTAL)
- MHHW (EL = +11.85)
- OH — OHWM (EL = +13.20)
- 6 — PROPOSED GRADING CONTOUR

FILL QUANTITIES		
	FILL AREA (SF)	FILL VOLUME (CY)
FILL BELOW MHHW	9,270	1,167
FILL ABOVE MHHW	4,800	334
TOTAL	14,070	1,501

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SLOPE PLAN	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 4 **OF** 7 **DATE:** 10/8/13



GRAPHIC SCALE

0 2.5 5 10 20

1 Inch = 10 ft.

PROPOSED SLOPE SECTION

SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

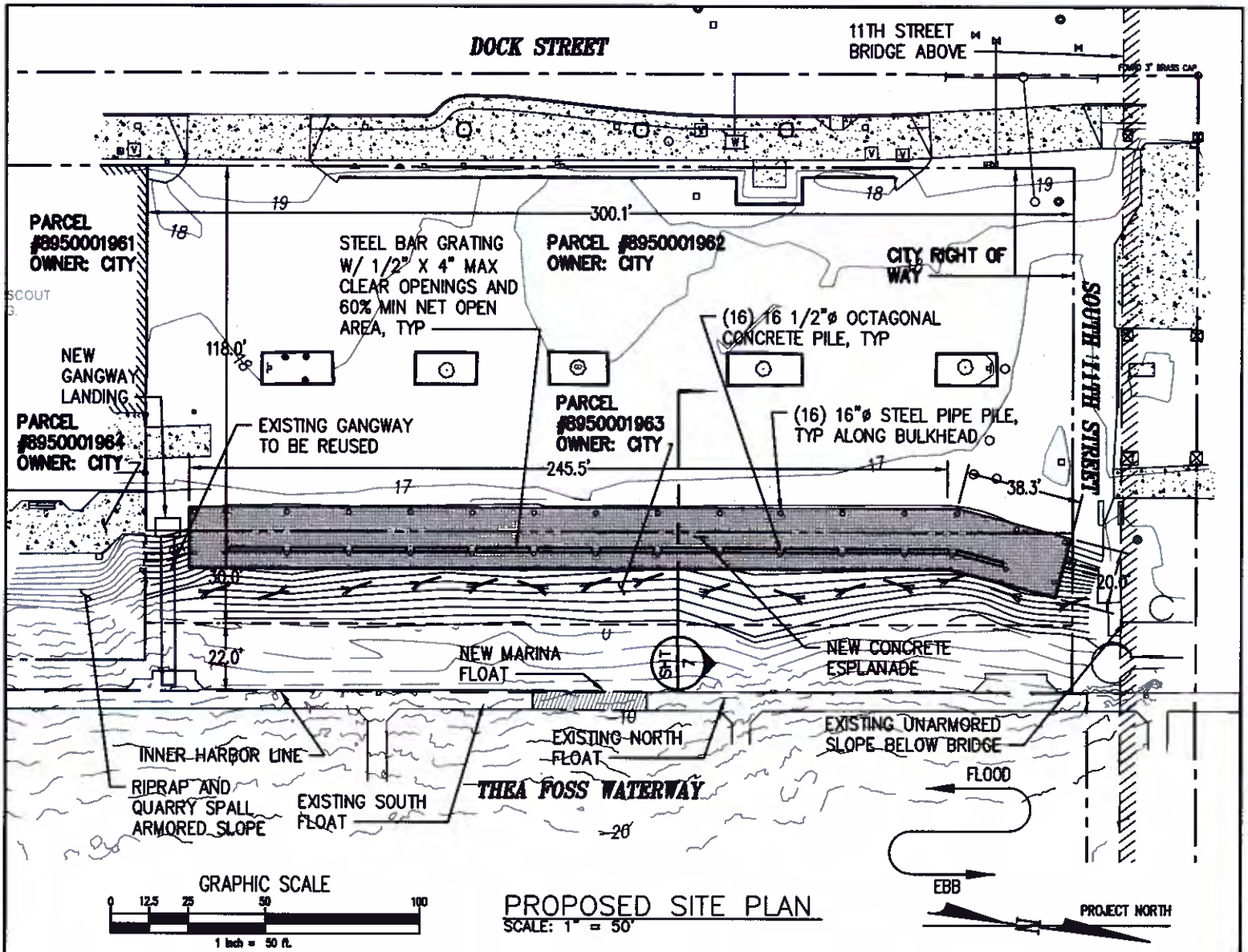
LIGHT RIPRAP FILL MATERIAL

NOTES:

1. LWD SHALL BE DOUGLAS FIR OR CEDAR. LOG DIAMETER SHALL BE NO LESS THAN 12" AND NO MORE THAN 18" UNLESS OTHERWISE APPROVED BY THE ENGINEER. LOG LENGTH SHALL BE NO LESS THAN 15-FEET AND NO MORE THAN 20-FEET. EACH LOG SHALL HAVE EITHER LIMBS OR ROOT WADS. BARK SHALL REMAIN INTACT ON THE LOGS.

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SLOPE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 5 **OF** 7 **DATE:** 10/8/13



PROPOSED SITE PLAN
SCALE: 1" = 50'

LEGEND:

- PROPOSED CONCRETE ESPLANADE
- PROPOSED MARINA FLOAT
- LARGE WOODY DEBRIS (LWD) AT EL +5.0 (15 TOTAL)
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- PROPOSED GRADING CONTOUR

PROPOSED QUANTITIES

	ABOVE MHHW		BELOW MHHW	
	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)
CONCRETE PILES	0		16	
STEEL PILES	16	2,621	0	
GROSS CONCRETE ESPLANADE				3,067
(–) NET OPEN AREA OF GRATES		0		(–)193
NEW MARINA FLOAT				224
TOTAL	16	2,621	16	3,098

US ARMY CORPS OF ENGINEERS PERMIT

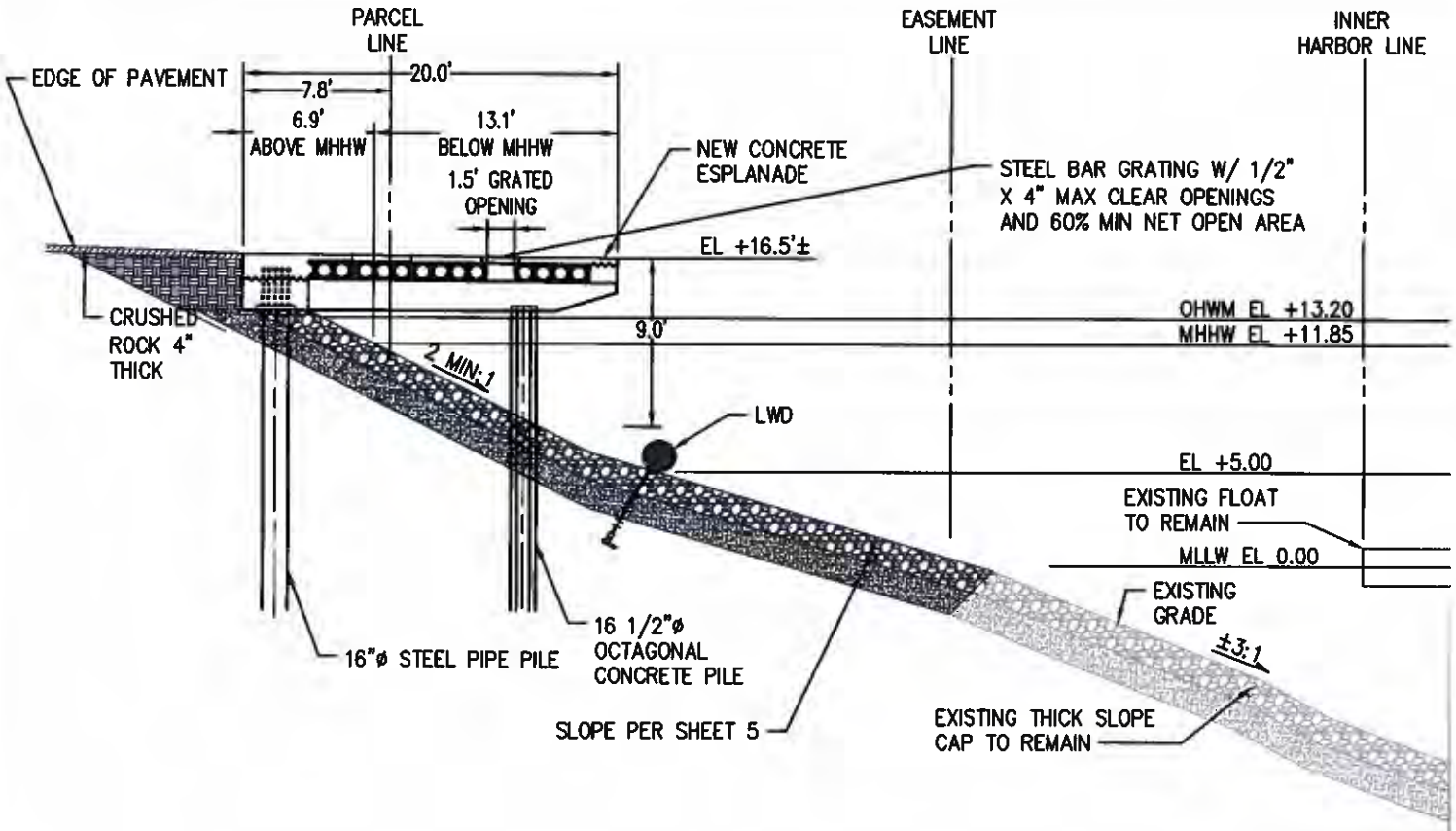
PROPOSED SITE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

 DATE: 10/8/13



GRAPHIC SCALE

0 5 10 20 40

1 Inch = 10 ft.

PROPOSED SECTION

SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

LIGHT RIPRAP FILL MATERIAL

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 7 **OF** 7 **DATE:** 10/8/13

Biological Evaluation

Draft
Emergency Bulkhead Removal and Esplanade Replacement – Development Site 9, Thea Foss Waterway
Biological Evaluation
Tacoma, Washington

Prepared for
Foss Waterway Development Authority

October 29, 2013
12599-05

HARTCROWSER

Draft
Emergency Bulkhead Removal and Esplanade Replacement – Development Site 9, Thea Foss Waterway
Biological Evaluation
Tacoma, Washington

Prepared for
Foss Waterway Development Authority
835 Dock Street
Tacoma, Washington 98402

October 29, 2013
12599-05

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DRAFT
EMERGENCY BULKHEAD REMOVAL AND ESPLANADE REPLACEMENT – DEVELOPMENT SITE 9, THEA FOSS WATERWAY
BIOLOGICAL EVALUATION
TACOMA, WASHINGTON

1.0 INTRODUCTION

The Foss Waterway Development Authority (FWDA) and the City of Tacoma are proposing an emergency removal of a failing bulkhead and replacement of the overwater esplanade at Development Site 9 of the Thea Foss Waterway Commencement Bay, Tacoma, Washington. Since this is an emergency bulkhead replacement with subsequent habitat creation and enhancements, application for Nationwide Permits 3 (Maintenance) and 27 (Aquatic Habitat Restoration) will be undertaken. This project also has the potential to have short-term adverse effects and long-term beneficial effects to anadromous salmonids and other species that are federally protected. The FWDA has therefore prepared this BE to aid in assessing the potential effects of this project on fish and wildlife species listed, or proposed for listing, as threatened or endangered under the Endangered Species Act (ESA).

Section 7 of the ESA requires that any action by a federal agency is "not likely to jeopardize the continued existence of any [listed] species or result in the destruction or adverse modification of habitat of such species…." Issuance of Nationwide Permits for the proposed bulkhead removal and esplanade replacement project within the Thea Foss Waterway qualifies as such an action. Under ESA Section 7(c), the lead federal agency, in this case, the US Army Corps of Engineers (USACE), must prepare a BE of the potential influence of the action on listed species and their critical habitat. Depending on the conclusion of the BE, the Corps may be required to confer formally with National Oceanic and Atmospheric Administration (NOAA) Fisheries or US Fish and Wildlife Service (USFWS) regarding the project.

Because this work will occur in nearshore waters of Commencement Bay, the proposed project has the potential to impact 16 aquatic-dependent species listed as threatened or endangered under the ESA or their critical habitat:

- Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*);
- Coastal-Puget Sound bull trout (*Salvelinus confluentus*);
- Puget Sound steelhead trout (*O. mykiss*);
- Bocaccio (*Sebastes paucispinis*);
- Canary rockfish (*S. pinniger*);

- Yelloweye rockfish (*S. ruberrimus*);
- Eulachon (*Thaleichthys pacificus*)
- Green sturgeon (*Acipenser medirostris*)
- Southern resident orca (*Orcinus orca*);
- Marbled murrelet (*Brachyramphus marmoratus*);
- Steller sea lion (*Eumetopias jubatus*);
- Humpback whale (*Megaptera novaeangliae*);
- Leatherback turtle (*Dermochelys coriacea*);
- Loggerhead sea turtle (*Caretta caretta*);
- Green sea turtle (*Chelonia mydas*); and
- Olive Ridley sea turtle (*Lepidochelys olivacea*).

The ESA status of each of these species is presented in Table 1.

In addition, the USFWS has provided a list of the federally listed species that occur in Pierce County. Additional animal species on this list include the Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), grizzly bear (*Ursus arctos horribilis*), and northern spotted owl (*Strix occidentalis caurina*; Appendix A). If these species are present in Pierce County, they would inhabit areas along the Cascade foothills and mountains (gray wolf, grizzly bear, and Canada lynx) or large tracts of undisturbed old growth forest (northern spotted owl). None of these habitats are present in the highly urbanized waterfront of the City of Tacoma. The proposed project will have no effect on these species and no further mention of them will made in this BE.

USFWS has also provided a list of three plant species that are federally protected under ESA. These species are marsh sandwort (*Arenaria paludicola*), golden paintbrush (*Castilleja levisecta*), and water howellia (*Howellia aquatilis).* Marsh sandwort occupies areas of undisturbed saltmarsh and water howellia occupies areas of undisturbed freshwater wetland habitats. Golden paintbrush occupies areas of undisturbed upland and bluff habitats. None of these habitats are present in the highly urbanized waterfront of the City of Tacoma. The proposed project will have no effect on these species and no further mention of them will made in this BE.

2.0 PROJECT DESCRIPTION

2.1 Project and Action Areas

The "project area," where the work will be performed, is located in Pierce County, City of Tacoma, Washington, along the Thea Foss Waterway of Commencement Bay. The project area is located in Township 20N, Range 3E,

Section 4, in Thea Foss Waterway (Figure 1; Sheet 1). The "action area" where direct and indirect effects of the proposed action may occur is defined as a 100-meter (m) radius waterward of the project area to take into account temporary water quality impacts during construction activities.

2.2 Project Description

2.2.1 Overview

Development Site 9 is an approximate 300-foot reach of the City of Tacoma (City) waterfront located just south of the Murray Morgan Bridge along the west side of the Thea Foss Waterway (Figure 1; Sheet 1). The site is a composed of an upland paved parking area and an adjacent overwater pedestrian esplanade. The esplanade is supported landward by a failing timber bulkhead and waterward by failing timber piles. The esplanade and associated decking to the north occupies an area of 5,290 square feet, all of which is situated over the intertidal zone (Sheets 2 and 3). Site 9 is owned by the City and is currently leased to the Foss Harbor Marina as parking for marina tenants.

In late July, 2011 sinkholes began to develop on the Site 9 property, just behind the failing timber bulkhead (Photographs 1 and 2). At the time, a replacement esplanade structure was in the early design development for the Foss Waterway Development Authority (FWDA). Visual inspections of the pavement surface and structured bulkhead were conducted, and recommendations for repairs were developed. The size of the sinkhole has grown significantly since the summer of 2013, jeopardizing safe access to the Foss Harbor Marina and service of nearby utilities. The portion of the timber esplanade and bulkhead structure immediately in front of the settled area is also near collapse (Photographs 3 and 4).

In recognition of the risk associated with failure of the bulkhead and esplanade structure, the City considers this an emergency repair situation and conducted an evaluation to address the issue. A number of options were considered, including no action, relocation of threatened utilities, removal of the esplanade and timber bulkhead, installation of the new bulkhead structure, and modification of the shoreline. A structural condition assessment of the entire Site 9 esplanade structure was also conducted and recommended that public access to the esplanade deck be restricted. Recent action taken by the City includes the installation of a barrier to restrict public access, engagement of a contractor to reroute threatened utilities that serve the marina, and coordination with local permitting agencies regarding anticipated in-water work.

2.2.2 Project Details

After the evaluation of several alternatives, the City has decided that the entire timber esplanade/bulkhead along Site 9 will be removed and the shoreline modified by cutting it back and creating new intertidal habitat. Enhancement of existing intertidal zone below the bulkhead will also occur. After habitat creation and enhancements, a new esplanade with light penetrating surfaces will be constructed over the cut back intertidal zone. Following are details of the bulkhead removal, cutback, intertidal habitat creation and enhancement, and esplanade replacement.

2.2.2.1 Cutback, Intertidal Creation, and Intertidal Enhancement

A 27-foot cutback behind the bulkhead will be excavated and graded at a 2-to-1 slope for the entire length of Development Site 9 (approximately 300 feet), resulting in the creation of new intertidal habitat of the United States (Sheet 3). Cutback elevations will range from the existing upland parking area to about +4.6 feet mean lower low water (MLLW) at the base of the existing bulkhead. Excavation for the cutback will occur before bulkhead removal to minimize water quality impacts to the marine nearshore. Further enhancements of the intertidal zone will be conducted in front of the former bulkhead to MLLW (0 feet) for the length of Development Site 9 (Sheets 4 and 5). In this area, all existing rubble and debris will be removed.

New substrates will be laid in the newly created and enhanced intertidal areas to stabilize the slope and enhance ecological functions. A 1.5-foot layer of slope cap material composed of clean borrow sand and gravel will be laid to stabilize the slope. On top of the cap, a 1.5-foot layer of light riprap (12- to 15-inch diameter) will be placed and covered with a habitat mix of gravel and sand at an application rate of 25 tons per 1,000 square feet (Sheet 5). The light riprap is necessary to stabilize the habitat mix and the application rate will fill voids and overtop the riprap by a minimum depth of 12 inches.

Habitat mix will consist of a 2-inch-minus pit-run, rounded material from an approved source conforming to the following gradation:

US Standard Sieve Size	Percent Passing (by weight)
6-inch	100
4-inch	90 to 100
0.75-inch	50 to 90
No. 4	35 to 65
No.10	15 to 45
No. 40	2 to 10
No. 200	0 to 2

This habitat mix has been used in several beach restoration and enhancement areas within Commencement Bay.

The cutback and excavation will result in the creation of approximately 3,870 square feet of new intertidal marine waters of the United States behind the bulkhead between MHHW and +4.6 feet MLLW. In front of the bulkhead, approximately 6,030 square feet of intertidal habitat between +4.6 feet and MLLW will be enhanced with rubble removal and habitat mix.

In addition, approximately 15 logs, rootwads intact, will be permanently anchored onto the cap at an elevation between +9 and +10 feet MLLW. Large woody debris (LWD) will be at least 12 inches diameter at breast height (dbh) and 18 feet in length, and anchored along the entire length of the esplanade at Development Site 9 (Sheets 4 and 5).

Bulkhead and esplanade removal will result in the removal of 81 creosote-treated piles. Timber piles will be pulled completely out of the bottom or cut off below the mudline.

2.2.2.2 Sequencing for Habitat Creation and Enhancement

The first order of work will be to remove the damaged timber esplanade. After this work is completed, intertidal restoration will begin at the south end of the project area, moving north. Cutback and enhancement will occur in sections of 25 to 50 feet at a time. The work will follow the tide cycles allowing for most or all of the excavation and backfill to be performed in the dry. Since the project is scheduled for December and January, there will be a considerable amount of work done during the nighttime low tides.

The construction of each section of repair will begin by excavating the existing bank line at the lowest point, near MLLW (0 feet). The rubble will be excavated from this low point up to the waterward edge of the existing bulkhead. Sediment and rubble will either be stockpiled, decanted, and hauled off, or loaded directly into trucks and hauled off. The capping, light riprap and habitat mix will be immediately placed in the area of rubble removal in the lower intertidal zone. The section behind the bulkhead would then be cutback followed by bulkhead removal. The section will then be completed by placing the capping material, light riprap, and habitat mix material on the excavated slope of the cutback area in the newly created upper intertidal zone. Once the current section is completed, the operation will move ahead parallel to the bank line and begin a new section at the next low tide cycle.

Staging areas for all construction activities will be on the existing adjacent parking lot. Machinery to be used during the cutback, rubble removal, and substrate placement include backhoe/track hoes, cranes, and dump trucks. All construction activities will be conducted from upland parking areas, and no heavy machinery will be placed on the existing intertidal zone. During esplanade replacement, all decking will be composed of pre-cast concrete panels that will be laid in place using machinery in the parking area. Pile driving will be conducted in the dry using an impact pile driver.

2.2.2.3 Esplanade Replacement

After emergency repairs and substrate enhancements, a new esplanade will be constructed over the newly created intertidal habitat (Sheets 6, 7, and 8). The esplanade will be composed of pre-cast concrete sections. The length of the new esplanade will be 264.1 feet and occupy approximately 2,028 square feet of overwater coverage below mean higher high water (MHHW), supported by thirty, 16- to 16.5-inch concrete and steel piles (Sheet 6). Only concrete piles (16.5-inch) will be driven into the intertidal zone at an elevation of approximately +7 feet MLLW. Steel piles (16-inch) will support the landward side of the esplanade entirely upland at an elevation of approximately +14 feet MLLW (ordinary high water is at +13.2 feet MLLW; Sheet 7). All pile driving will be conducted with an impact pile driver.

In addition, ten steel 4-inch pin piles will be driven to support the gangway landing on the north side of the site (Sheet 8). Four of the pin piles are at en elevation below MHHW and will be driven in the dry with a vibratory hammer. After driving, an 8-inch steel sleeve will be attached to each pin pile for protection.

The new esplanade will be 20 feet wide, extending waterward to approximately +5.0 feet MLLW (Sheet 7). The middle to lower portions of the intertidal zone will be free of overwater structure. The new esplanade will occupy approximately 61.1 percent less area over the intertidal zone (2,058 square feet for the new esplanade compared with the existing structure of 5,290 square feet). This is because the existing esplanade is entirely over the intertidal zone where as the proposed new esplanade will be moved landward with about 51 percent of it situated above MHHW (Sheet 8)

The new esplanade will be designed with thirty-six, 16.5-foot and six, 6 foot panels of grating extending the length of the structure to allow light penetration to the intertidal zone below (Sheet 7). Panels will be 2.75 feet and 4 feet wide (Sheet 8). The grating will be a minimum of 60 percent open area for a net open area of 923 square feet, further reducing the net overwater coverage to 1,504 square feet (2,058 square feet of esplanade and landing minus 60 percent of 923 square feet of grating; Sheet 6).

2.3 Project Schedule

Construction of the proposed new esplanade will be in two phases. The first is the cutback, bulkhead removal, esplanade removal, and cap and substrate enhancements. These are considered emergency repair activities that need to be conducted before further bulkhead damage occurs, which may be considerable if repair activities are not conducted before the upcoming winter storm and extreme high tide season. The City and FWDA will conduct these emergency activities as soon as permits are received, preferably by early December 2013. If permits are obtained by early December, it is anticipated that all in-water work will be completed by the mid-February agency work window closure.

The second component of the project will be the esplanade replacement, which will be conducted during agency-approved work windows before the permits expire. It is anticipated that this work will be conducted during the winter of 2014/2015.

2.4 Impact Avoidance and Minimization Measures

2.4.1 Best Management Practices

Best management practices (BMPs) will be employed to reduce the potential for construction-related impacts on listed species and their habitats. The following will be incorporated into the design of the bulkhead and esplanade replacement

project:

- All in-water work will be conducted within agency-approved work windows to minimize potential adverse effects to aquatic life, including ESA-listed salmonids (July 16 to February 14).

- All 15 intertidal piles will be driven in the dry at lower tidal elevations to minimize the release of waterborne noise and water quality impacts

- Only concrete piles will be used in the intertidal zone, reducing noise-related impacts.

- Continuous debris containment and/or sorbent booms will be deployed around slope areas during cutback excavation, slope stabilization, substrate enhancement, and pile removal/driving activities. Containment booms will be constructed with silt curtains 10 feet in depth, deployed to contain debris and suspended sediment.

2.4.2 Conservation Measures

Several design attributes of both the emergency bulkhead removal and the esplanade replacement will substantially enhance intertidal habitats over existing conditions.

- Bulkhead removal and cutback/regrade of the slope behind the bulkhead will create 3,870 square feet of additional marine waters of the United States and reestablish ecological functions within the upper intertidal zone.

- Middle to lower reaches of the intertidal zone will be enhanced by removing existing concrete rubble and debris.

- Habitat mix will be laid down both above and below the bulkhead at elevations between MHHW and MLLW.

- Additional enhancement by the anchoring of 15 pieces of LWD will be conducted in the middle intertidal zone.

- The total intertidal area created (3,870 square feet) and enhanced (6,030 square feet) will be approximately 9,900 square feet, substantially exceeding the 2,058 square feet of overwater coverage occupied by the new esplanade (1,504 net square feet after accounting for grating).

- The new esplanade will occupy approximately 61.1 percent less area over the intertidal zone relative to the existing structure.

- Forty-two grated openings will be situated along the entire new esplanade, allowing the penetration of light to the newly created intertidal zone.

- Approximately 81 creosote-treated timber piles, all of which are within the intertidal zone, will be removed and replaced with 15 concrete piles within the intertidal zone. If possible, the entire pile will be removed. If the pile breaks or cannot be removed whole, it will be cut a minimum of 3 feet below the mud line and the hole filled with clean sand to the existing grade. If the hole is not filled right away, an absorbent boom will be placed around the hole to contain any residual creosote from the pile.

- The entire bulkhead and esplanade will be removed so that habitat creation, capping, substrate enhancement, and LWD anchoring can be conducted in advance of construction of the new esplanade.

3.0 DESCRIPTION OF THE SPECIES AND HABITAT

3.1 Species Information

This BE addresses Chinook salmon, steelhead trout, bull trout, bocaccio, canary rockfish, yelloweye rockfish, eulachon, green sturgeon, southern resident orca, marbled murrelet, Steller sea lion, humpback whale, and four species of sea turtle, which have been listed as threatened or endangered under ESA. Humpback whale and the sea turtles have been documented in Puget Sound on very rare occasions and are not likely to be found in the project and action areas.

3.1.1 Chinook Salmon

Similar to other Pacific salmon, Chinook reproduce in fresh water, but most of their growth occurs in marine waters. Chinook juveniles rear in the Puyallup River or its tributaries for periods of a few weeks to more than a year before migrating downstream to Commencement Bay (Figure 2). Chinook juveniles from other systems in the South Sound may also find their way into Commencement Bay and Thea Foss Waterway en route out of the sound.

In watersheds with an unaltered estuary (and historically in the Puyallup estuary), Chinook smolts spend a prolonged period (several days to several weeks) during their spring outmigration feeding in saltmarshes and distributary channels as they

transition gradually into more marine waters (Simenstad, et al. 1982). Chinook fry and subyearlings in saltmarsh and other shallow habitat predominantly prey on emergent insects and epibenthic crustaceans such as gammarid amphipods, mysids, and cumaceans. As Chinook mature and move to neritic habitat, they feed on small nekton (decapod larvae, larval and juvenile fish, and euphausiids) and neustonic drift insects (Simenstad, et al. 1982; see also detailed life history review by Healey 1991). Adult Chinook returning to the Puyallup River may briefly enter Thea Foss Waterway, but no documentation is available of adult salmon presence in the waterway.

Two races, or runs, of Chinook salmon, a spring/summer run and a fall run, are found in the Puyallup River system. Spring Chinook historically spawned primarily in upper tributaries of the White River and perhaps the mainstem of the Puyallup and Carbon Rivers (Williams, et al. 1975). Rearing occurs in the spawning areas and in lower mainstem reaches; most outmigrate as subyearlings (Muckleshoot Indian Tribe et al. 1996) and may rear for a time in Commencement Bay. Historical spring Chinook runs (pre-1950) averaged nearly 3,000 fish, but recent runs have been much reduced, supported primarily by artificial production (WDFW and Western Washington Treaty Indian Tribes [WWTIT] 1994). Fall Chinook spawn throughout larger streams in the Puyallup system, including the mainstem of the Puyallup, the lower White and Carbon Rivers, and Kapowsin, South Prairie, and Voight Creeks. Historical average run size of fall Chinook has been 3,000 to 4,000 fish (Williams et al. 1975). In contrast, according to the Salmonscape GIS database managed by WDFW, the total Puyallup system natural Chinook escapement (both runs) has averaged 1,618 fish over the 2000–2010 period (Table 2; http://wdfw.wa.gov/mapping/salmonscape/index.html).

3.1.2 Bull Trout

Bull trout have a variety of life history types, one of which is anadromous, involving seasonal migrations to marine areas after the juvenile stage. The species spawn in the fall in streams containing clean gravel and cobble substrate and gentle slopes, with cold, unpolluted water. Bull trout require long incubation periods (4 to 5 months) compared with other salmon and trout. Fry hatch in late winter or early spring and remain in the gravel for up to 3 weeks before emerging (Figure 2; USFWS 1998). Newly emergent fry rear near their spawning areas, while growing juveniles adopt a variety of life strategies. A portion of the population remains in headwater areas, adopting a resident life history. The remaining juveniles may move downstream looking for foraging opportunities, and depending on the rearing habitats that they select, are considered fluvial (found in rivers), adfluvial (found in lakes), or anadromous (Kraemer 1999).

Very little is known about the anadromous form of bull trout. Limited data and anecdotal information from larger stocks, such as those found in the Snohomish and Skagit Basins, indicate that bull trout have annual migrations to marine areas beginning in late winter and continuing into spring and mid-summer. It is believed that larger subadult and adult bull trout migrate to marine areas occupying shallow nearshore habitats. (Adults are reproductively mature and subadults are immature fish that have migrated to saltwater.) Anecdotal information in central Puget Sound suggests that bull trout aggregations can be associated with surf smelt spawning beaches, presumably to feed on this forage fish species. Most bull trout move back to fresh water by late summer. Mature adults move back to rivers on their spawning migrations by mid-July, while subadults may remain in marine areas as late as September before migrating back to fresh water, where they overwinter. A few fish have been observed in tidal areas as late as December and January (Goetz et al. 2004).

Small bull trout eat terrestrial and aquatic insects. Large bull trout are primarily fish predators, eating whitefish, sculpins, and other trout (USFWS 1998). Bull trout are more sensitive to changes in temperature, poor water quality, and low-flow conditions in fresh water than many other salmon because of their life history requirements (USFWS 1998). Very little is known about bull trout movements in estuarine waters of Puget Sound (King County DNR and R2 Resource Consultants 2000).

The bull trout population in the Puyallup River has been separated into three stocks: the Puyallup River, White River, and Carbon River stocks, though data are only available for the White River stock (Table 2). Although there are no genetic data available to determine whether these stocks are distinct, WDFW considers them distinct stocks due to the probable geographic isolation of their spawning populations (WDFW 1997). Timing of spawning and specific spawning locations are unknown for these three stocks. Information to determine the status of the three stocks is insufficient, but the three stocks are native and maintained by wild reproduction (WDFW 1997). Historical accounts indicate anadromous bull trout entered the three drainages in "vast numbers" in the mid-1800s (Suckley and Cooper 1860). According to the Salmonscape GIS database managed by WDFW, average counts collected from a fish trap on the upper White River have averaged less than 50 fish per year from 2000 to 2010 (Table 2; see also: http://wdfw.wa.gov/mapping/ salmonscape/index.html).

3.1.3 Steelhead Trout

Steelhead are within the family of Pacific salmonids and the name is commonly applied to the anadromous form of rainbow trout. This species exhibits perhaps the most complex suite of life-history traits of any of the Pacific salmon.

Steelhead can be anadromous or freshwater residents, and in some circumstances yield offspring of the opposite life-history form. The anadromous form can spend up to seven years in fresh water prior to smoltification, although two years is most common, and then spend up to four years in saltwater prior to first spawning. Unlike the other Pacific salmon species, steelhead are iteroparous (individuals can spawn more than once). Within the Puget Sound basins, steelhead can be divided into two basic reproductive ecotypes, based on the state of sexual maturity at the time of river entry. The summer-run steelhead is a stream-maturing fish that enters fresh water in a sexually immature condition between May and October, and requires several months to mature and spawn. The winter-run steelhead is an ocean-maturing fish that enters fresh water between November and April with well-developed gonads and spawns shortly after entrance (Figure 2). In basins with both summer and winter steelhead runs, the summer run generally occurs where habitat is not fully utilized by the winter run, or where an ephemeral hydrologic barrier separates them such as a seasonal velocity barrier or at a waterfall. Summer-run steelhead usually spawn farther upstream than winter run (Behnke 1992).

Wild juvenile steelhead typically spend at least two full years in fresh water before outmigrating during the spring. Because of the larger size at outmigration, steelhead do not typically spend a large amount of time in estuaries and the marine nearshore; rather, they tend to quickly outmigrate to open water (Hart and Dell 1986). The steelhead population in the Puyallup River basin has been separated into three stocks: the Puyallup River, White River, and Carbon River stocks (Table 2). All are native stocks sustained by wild production. According to the Salmonscape GIS database managed by WDFW, all three stocks are considered depressed based on long-term declining escapements (http://wdfw.wa.gov/mapping/salmonscape/index.html).

3.1.4 Rockfish

On April 28, 2010, NOAA Fisheries announced the listing of three species of Georgia Basin rockfish under ESA. Bocaccio is listed as "endangered," and canary rockfish and yelloweye rockfish are listed as "threatened." All three species in the Georgia Basin, which includes both Puget Sound and the Strait of Georgia are considered a distinct population segment (DPS). All three are also listed as species with designated Essential Fish Habitat (EFH) in Puget Sound.

Information and data on the distribution of the three species is based principally on recreational and some commercial harvest; much of which was collected in the 1960s and 1970s when the species were more common. Bocaccio once made up 8 to 9 percent of recreational catch in the late 1970s, with the majority of fish caught in the areas around Point Defiance and the Tacoma Narrows in

south Puget Sound. Bocaccio have always been rare in north Puget Sound. The species is often pelagic so does not have a high affinity for hard or complex bottom structures. The distribution of yelloweye rockfish frequently coincides with areas of high relief and complex rocky habitats. The species is more commonly observed in north Puget Sound and the Strait of Georgia, likely due to the larger amount of rocky habitat present in northern portions of the Georgia Basin. The species is much less common in south Puget Sound. Commercial fisheries data collected in the early 1960s show that canary rockfish were once considered fairly common in the greater Puget Sound area (Palsson et al. 2009)

All three rockfish species are long-lived, with documented life spans ranging from 54 to 118 years. Reproductive maturity occurs relatively late, after 5 years or more before first spawning. Rockfish produce substantial number of eggs, ranging from 20,000 to 2.7 million per female. The three species, as well as most rockfish, give birth to live larval young that reside in surface waters before settling to the bottom. Pelagic larval stages last from 116 to 155 days. Live births occur over an extended period, but generally occur from January through mid-summer, peaking in the spring. Juvenile and subadult rockfishes are often more common than adults in shallow water and are associated with rocky reefs, kelp canopies, and artificial structures such as piers, although this has not necessarily been documented with the three proposed species. Adults generally move into deeper water as they increase in size and age (Palsson, et al. 2009; Drake, et al. 2010).

3.1.5 Eulachon

Pacific eulachon is an anadromous forage fish that can be found from northern California to southwest Alaska. The southern DPS (distinct population segment) was granted ESA-listing as threatened on March 18, 2010 (Federal Register Vol. 75, No. 52, pp. 13012–13024). Critical habitat was designated on October 20, 2011, for sixteen specific areas from California to Washington. Puget Sound was not designated as critical habitat.

Eulachon spawn in rivers during winter and spring months. Eggs develop from 20 to 40 days before hatching. Larvae disperse into estuarine and marine environments within several weeks, and develop in the ocean. Juvenile eulachon migrate into nearshore and deeper waters from 20 to 150 meters. Adult fish return to fresh water to spawn after 2 to 5 years.

There is currently no stock assessment available for Puget Sound, but eulachon are thought to be an important food source for local marine birds and mammals, particularly during migration periods by adults returning to river (Therriault et al. 2009). The Fraser River is thought to be the largest contributor to eulachon that

may be found in Puget Sound. These fish are not expected to be found in the project vicinity in south Puget Sound because of the distance from their spawning habitat, and are not addressed further in this BE.

3.1.6 Green Sturgeon

Green sturgeon and white sturgeon are the two anadromous species of the family Acipenseridae found on the west coast. Green sturgeon range from the Bering Sea, Alaska, to Ensenada, Mexico, occupying nearshore marine and freshwater rivers from California to British Columbia (Federal Register, Vol. 74, No. 195, pp. 52300–52351). Green sturgeon juveniles feed and grow in fresh and estuarine waters for 1 to 4 years before migrating into nearshore marine water, where they spend most of their time as adults, returning to fresh water only to spawn.

Critical habitat designated by the National Marine Fisheries Service (NMFS) includes the Strait of Juan de Fuca, but specifically excludes Puget Sound. Green sturgeon observations east of Rosario Strait are described as relatively rare. As such, they are not expected to be found in the project vicinity and are not addressed further in this BE.

3.1.7 Southern Resident Orca

Two sub-populations of orca are found in Puget Sound: "residents" and "transients." These two groups of orcas have different behavior and movement patterns, but both can be found seasonally in Puget Sound. Transient orcas travel in smaller groups (called "pods") and hunt other marine mammals for food. Southern resident orcas spend more time in Puget Sound, travel in larger pods and eat mostly fish (Krahn, et al. 2004). The Puget Sound southern residents consists of three social groups, identified as the J, K, and L pods, and are most often seen in Puget Sound from late spring to fall (Wiles 2004).

The population of southern resident orcas has gone through several periods of growth and decline since 1974. Between 1974 and 1980, total whale numbers expanded by 19 percent from 70 to 83 animals. This was followed by four consecutive years of decrease from 1981 to 1984, when counts fell by 11 percent (74 whales). Beginning in 1985, the southern residents entered an 11-year growth phase peaking at 98 animals in 1995, representing a population increase of 32 percent during the period. Yet another period of decline began in 1996, declining to 80 whales by 2001, representing an 18 percent decrease. This decline appears to have resulted from an unprecedented 9-year span of relatively poor survival in nearly all age classes, as well as from an extended period of poor reproduction. At present, the southern resident population has

declined to essentially the same size that was estimated during the early 1960s, during the live capture era, when total numbers were considered depleted (Wiles 2004).

3.1.8 Marbled Murrelet

The marbled murrelet, a small seabird that nests in the coastal old-growth forests of the Pacific Northwest, inhabits the Pacific coast of North America from the Bering Sea to central California. In contrast to other seabirds, murrelets do not form dense colonies, and may fly 75 km (46.6 miles) or more inland to nest, generally in older coniferous forests (Rodway, et al. 1995). They are more commonly found inland during the summer breeding season, but make daily trips to the ocean to gather food, primarily fish and invertebrates, and have been detected in forests throughout the year. When not nesting, the birds live at sea, spending their days feeding and then moving several miles offshore at night (SEI 1999).

The breeding season of the marbled murrelet generally begins in April, with most egg laying occurring in late May and early June. Peak hatching occurs in July after a 27- to 30-day incubation. Chicks remain in the nest and are fed by both parents. By the end of August, chicks have fledged and dispersed from nesting areas (Hamer and Nelson 1995). The murrelets typically appear to exhibit high fidelity to their nesting areas and have been observed in forest stands for up to 20 years (Divoky and Horton 1995). Marbled murrelets have not been known to nest in other habitats, such as alpine forests, bog forests, scrub vegetation, or screen slopes (Marks and Bishop 1999).

At sea, foraging murrelets are usually found as widely-spaced pairs. In some instances murrelets form or join flocks that are often associated with river plumes and currents. These flocks may contain sizable portions of local populations (Strachan, et al. 1995).

The total North American population of marbled murrelets is estimated to be 360,000 individuals. Approximately 85 percent of this population breeds along the coast of Alaska. Estimates for Washington, Oregon, and California vary between 16,500 and 35,000 murrelets (Ralph and Miller 1999). In British Columbia, the population was estimated at 55,000 to 78,000 birds (Marbled Murrelet Recovery Team 2003). In recent decades the murrelet population in Alaska and British Columbia has apparently suffered a marked decline, by as much as 50 percent. Between 1973 and 1989, the Prince William Sound, Alaska, murrelet population declined 67 percent. Trends in Washington, Oregon, and California are also down, but the extent of the decrease is

unknown. Current data suggest an annual decline of at least 4 to 6 percent throughout the species' range (Beissinger 1995).

The most serious limiting factor for marbled murrelets is the loss of habitat through the removal of old-growth forests and fragmentation of forests. Forest fragmentation may be making nests near forest edges vulnerable to predation by other birds such as jays, crows, ravens, and great-horned owls (USFWS 1996). Entanglement in fishing nets is also a limiting factor in coastal areas, because the areas of salmon fishing and the breeding areas of marbled murrelets overlap. The marbled murrelet is especially vulnerable to oil pollution; in both Alaska and British Columbia, it is considered the seabird most at risk from oil pollution. In 1989, an estimated 8,400 marbled murrelets were killed as a result of the *Exxon Valdez* oil spill (Marks and Bishop 1999). Marbled murrelets forage in nearshore waters, where recreational boats are most often present. Disturbance by boats may cause them to temporarily leave preferred feeding areas (Environment Canada 1999).

3.1.9 Steller Sea Lion

The eastern US stock of Steller sea lion was listed as a threatened species under emergency rule by the National Marine Fisheries Services (NMFS; now NOAA Fisheries) in April 1990; final listing for the species became effective in December 1990. Steller sea lion habitat includes both marine and terrestrial areas that are used for a variety of purposes. Terrestrial areas (e.g., beaches) are used as rookeries for pupping and breeding. Rookeries usually occur on beaches with substrates that include sand, gravel, cobble, boulder, and bedrock (NMFS 1992). Haul-out areas are used other than during the breeding and pupping season. Sites used as rookeries may be used as haul-out areas during other times of the year. When Steller sea lions are not using rookery or haul-out areas, they occur in nearshore waters and out over the continental shelf.

The breeding range of Steller sea lions extends from southern California to the Bering Sea (Osborne 1988). Breeding colonies consisting of small numbers of sea lions also exist on the outer coasts of Oregon and British Columbia. There are currently no breeding colonies in Washington State (NMFS 1992), although three major haul-out areas exist on the Washington outer coast and one major haul-out area is located at the Columbia River south jetty (NMFS 1992). Jagged Island and Spit Rock are used as summer haul-outs, and Umatilla Reef is used during the winter (National Marine Mammal Laboratory, unpublished data). Other rocks, reefs, and beaches as well as floating docks, navigational aids, jetties, and breakwaters are also used as haul-out areas (NMFS 1992).

3.1.10 Humpback Whale

Humpback whales are commonly found in the North Pacific Ocean. Humpback whales inhabit coastal waters and are typically found within about 50 nautical miles from shore (Evans 1987; Calambokidis and Steiger 1995). The coastal waters that attract the whales represent areas of high productivity in plankton and forage fish that are important food sources for these animals (Evans 1987). They are dependent on these abundant food resources because of their size and metabolic needs for reproduction, nursing, and sustenance during times of the year when food resources are less abundant (i.e., wintering grounds) (Evans 1987).

Humpback whales use coastal habitats because of their productivity. They are not expected to be routinely present in Puget Sound because of the lack of appropriate habitat and food availability for these large mammals. This expectation is based on limited data, because most studies of these animals are focused on the areas the whales frequent, not areas where they are rarely (if ever) seen. The Cascadia Research Institute conducts studies on marine mammals in Puget Sound and throughout the North Pacific Ocean. They reported two humpback whales in central and southern Puget Sound in 1988 (Calambokidis and Steiger 1995), and one humpback in the Strait of Juan de Fuca in June of 1999 (Cascadia Research Institute, personal communication, 1999). No humpback whales were recorded as incidental sightings in Puget Sound during other recent marine mammal surveys (Calambokidis, et al. 1994, 1997, and 2002; Calambokidis and Quan 1997; Calambokidis 1996). Puget Sound is not considered a part of the natural habitat of humpback whales and hence their occurrence in the area is expected to be extremely rare.

3.1.10.1 Preliminary Effects Analysis

Humpback whales are extremely unlikely to occur in the action area of Thea Foss Waterway or lower Commencement Bay. Puget Sound is not considered a part of the natural habitat or distribution of the species and hence their occurrence in the area is expected to be extremely rare. There are no direct, indirect, interrelated, or interdependent action effects that are expected to any humpback whales that may use the action area. Thus, the project will have **no effect** on humpback whales. This species is not addressed further in this BE.

3.1.11 Sea Turtles

The leatherback, loggerhead, green, and Olive Ridley sea turtles are highly pelagic species, generally approaching shores only during the reproductive season (NMFS 1999). The leatherback turtle is most adapted to temperate

climates because of its ability to thermo-regulate; thus it is one of the most widely distributed of all turtles. Their breeding grounds are located in the tropical and subtropical latitudes, although they are regularly seen in more temperate areas (NMFS and USFWS 1998). The leatherback turtle is the most likely species to wander into Puget Sound, but the Washington region is not considered a part of its natural habitat and, hence, occurrence in this region is considered extremely rare.

3.1.11.1 Preliminary Effects Analysis

It is extremely unlikely that leatherback, loggerhead, green, and Olive Ridley sea turtles ever occur in the action area of Thea Foss Waterway and lower Commencement Bay. The Washington region is not part of any of the four species natural habitat or distribution. There are no direct, indirect, interrelated, or interdependent action effects that are expected to leatherback turtles, as they are not expected to use the action area. Thus, the project will have **no effect** on the four species of sea turtles. This species is not addressed further in this BE.

3.1.12 Forage Fish

Pacific sand lance and surf smelt spawn directly onto small gravel (pea gravel), and sand substrates within the upper intertidal zone of natural, low gradient beaches, generally between +5 feet and MHHW. Spawning has generally been associated with these substrates when present in sufficient volume to have soft motile layers of at least 2 inches above harder sand substrates. Sand lance also spawn in substrates dominated with sand, with much less gravel content (D. Pentilla, WDFW, personal communication, April 16, 2010). According to the WDFW Priority Habitats Program, forage fish spawn has not been documented in the project area or in Thea Foss Waterway. Sand lance spawning areas have been documented on isolated natural beaches outside of the waterway along Ruston Way. Surf smelt spawning has been documented outside of the waterway near Browns Point.

Spawning Pacific herring have not been documented in Commencement Bay. Pacific herring are the most widely known and well studied species of forage fish in the state (Bargmann 1998). Herring spawn primarily on macroalgae within the lower intertidal zone and shallow subtidal areas. However, unlike surf smelt and sand lance, it has been determined that herring form discrete stocks that spawn in specific areas. Eighteen discrete spawning stocks and associated spawning grounds are present in Puget Sound. The closest herring spawning ground is in Quartermaster Harbor on Vashon Island, located about 7 miles north of the project area (Lemberg et al. 1997).

3.2 Inventories and Surveys

3.2.1 Salmonids

Weitkamp and Schadt (1981) established a beach-seine site at the junction of Thea Foss and Wheeler-Osgood Waterways, and a purse-seine site in the northern half of Thea Foss Waterway. Repeated sampling was conducted during the spring and early summer of 1980. Catches were dominated by juvenile Chinook salmon; pink and chum salmon were collected in smaller numbers. Relatively few juvenile coho and steelhead trout were also collected. More than 90 percent of the pink and 80 percent of the chum smolts were taken in beach seines, the rest in purse seines, indicating a strong shoreline preference for these species. Seventy percent of Chinook and only 60 percent of coho were taken in the beach seines, indicating less of a shoreline orientation for these species.

Juvenile Chinook were caught in greater numbers than those for all other species of salmon combined. Highest catch per unit effort (CPUE) occurred in late May through June. CPUE for Chinook in Thea Foss Waterway was moderate compared with other sites in Commencement Bay (Weitkamp and Schadt 1981).

Miyamoto et al. (1980) conducted a study for the Puyallup Tribal Fisheries Division on use and residency of juvenile salmon within Commencement Bay. Sampling was conducted weekly at numerous sites around Commencement Bay. Two beach-seine sites were located in Wheeler-Osgood Waterway and one was located near the head of Thea Foss Waterway. Five loop-seining sites were established in Thea Foss Waterway, and one was located at the mouth of Wheeler-Osgood Waterway. Calculated peak migration times based on CPUE for juvenile Chinook salmon occurred from May through June. CPUE for Chinook, coho, and pink salmon was high relative to other sites in Thea Foss and Wheeler-Osgood Waterways.

Miyamoto et al. (1980) reported that juvenile salmonids used nearshore areas significantly more than offshore areas based on the beach-seine/purse-seine collection results. This selection was particularly evident for the age-class 0+ pink, chum, and Chinook. Age 1+ coho used both nearshore and offshore waters. Habitat selection by juvenile salmonids indicated a preference for intertidal areas with a substratum of soft mud with intermixed organic debris.

Data from subsequent beach-seine sampling by the Puyallup Tribe (PIE 1998) showed declining catches from 1980 through 1984 and peak use of Thea Foss Waterway in the months of May and June (Figure 3). No Chinook were taken on five sampling dates from early April through mid-May 1985.

Duker et al. (1989) reported on beach seining and tow netting for juvenile salmonids conducted in Commencement Bay during the spring of 1983. Two beach-seine sites were established within Wheeler-Osgood Waterway, and a tow-netting site was established down the middle of Thea Foss Waterway. Juvenile Chinook, chum, and coho were collected weekly. Chinook were present throughout the sampling season, showing a peak in late May and early June. Both chum and coho juveniles were collected in low numbers. No clear-cut peak in abundance was found for chum salmon; coho showed a peak during the first 3 weeks of May. The study reported that nearshore and offshore areas of Thea Foss Waterway were used by juvenile salmonids (especially Chinook) during their outmigration. Coho juveniles seemed to move offshore more rapidly than either Chinook or chum.

Both Miyamoto et al. (1980) and Duker et al. (1989) found no difference in the numbers of Chinook migrating along the north and south shorelines of Commencement Bay (i.e., toward Browns Point and along Ruston Way, respectively). Duker et al. (1989) also found no preference in coho and chum salmon, but Miyamoto et al. (1980) found a somewhat higher CPUE for coho along the north shoreline.

In summary, the available studies that have sampled juvenile salmon in Commencement Bay have shown that Chinook use of Thea Foss and Wheeler-Osgood Waterways is significant and comparable to the average use of waterways throughout the bay. Peak use is during May and June; considerable use extends into early July, at least in some years.

Bull trout use of Thea Foss Waterway has not been reported. Review of several studies and data sets that collected salmonid data in Commencement Bay found only four bull trout/Dolly Varden char over a 16-year period (1980 to 1995) (PIE 1998; Weitkamp and Schadt 1981; Duker et al. 1989; Ratte and Salo 1985). PIE (1998) reported three adult char at beach-seine stations located along the northern shore of Commencement Bay between the mouth of Hylebos Waterway and Browns Point. One specimen was captured in each of the years 1981, 1982, and 1984. Ratte and Salo (1985) captured one char in Sitcum Waterway in 1985. Weitkamp and Schadt (1981), who sampled 16 sites by beach seine or purse seine in 1980, did not observe any char. Duker et al. (1989), who sampled 14 beach-seine stations and 12 tow-net transects in 1983, also did not observe char in Commencement Bay.

Similarly, juvenile steelhead trout have not been reported in Thea Foss Waterway. Weitkamp and Schadt (1981) reported just 5 steelhead trout, most captured along the northern shore of Commencement Bay, inside of Browns

Point. PIE (1998) and Duker et al. (1989) did not report the presence of juvenile steelhead during sampling activities.

3.2.2 Rockfish

Borton and Miller (1980), which compiled a comprehensive mapping of the distribution of fishes within Puget Sound, documented no bocaccio, canary rockfish, or yelloweye rockfish in Thea Foss Waterway or Commencement Bay. Bocaccio and canary rockfish have been documented west of Commencement Bay within the Tacoma Narrows. Trawl surveys conducted by Weitkamp and Schadt (1981) collected copper rockfish along the east and west shorelines of the bay, but none were collected at two trawl stations within Thea Foss Waterway. Eaton (1997) collected no rockfish in Thea Foss Waterway during trawl surveys conducted in 1994.

3.2.3 Southern Resident Orca

According to The Whale Museum, which manages a database of confirmed orca sightings in Puget Sound, few orca sighting have been documented in Commencement Bay between 1990 and 2008. During this period, 13 sightings have been made, over 90 percent of which occurred between October and January. Over this 19-year period, the average number of sightings per month ranged from 0 to 0.2 whales per month (Figure 4). Substantially more sightings (72) have been documented outside of the bay near southern portions of Vashon and Maury Islands. This indicates that the animals have access to the action area, but the average number of sightings outside of the Bay is less than 1 animal per month with the exception of December (1.6 animals per month; Figure 4). These observations and the general offshore nature of the animals suggest that orca do not frequent Thea Foss Waterway or Commencement Bay for any length of time to gather or feed.

3.2.4 Forage Fish

Forage fish documented in the action area include Pacific herring *(Clupea pallasi)*. No specific fish surveys investigating Pacific herring in Thea Foss Waterway were identified. However, Weitkamp and Schadt (1981) conducted an otter-trawl survey at 22 transects during the spring, summer, fall, and winter in all of the waterways of the inner bay and along the east and west shorelines. More than 80 percent of the herring observed in this study (106 out of 130 individual fish) were collected in Thea Foss Waterway. However, all but one fish were collected during the winter sampling period. No herring were observed in Thea Foss Waterway in trawl surveys conducted in 1994. The

nearest herring spawning ground is outside of the action area, in Quartermaster Harbor, Vashon Island.

Sand lance and surf smelt have not been documented in Thea Foss Waterway. Surf smelt spawning beaches have been documented at Browns Point, at the northern tip of Commencement Bay, outside of the project and action areas. Sand lance spawning beaches have been documented along beaches of Ruston Way north of the waterway outside of the project and action area.

Suitable spawning habitats for surf smelt and Pacific sand lance are not present in the project area. These two species spawn directly onto small gravel (pea gravel), to fine sands within the upper intertidal zone, generally between +5 feet and MHHW (Moulton and Penttila 2001). Within the project area, these elevations are composed entirely of broken concrete and riprap. Similarly, spawning Pacific herring have also not been documented in Commencement Bay. Eighteen discrete spawning stocks and associated spawning grounds are present in Puget Sound, the closest in Quartermaster Harbor on Vashon Island, located about 7 miles north of the project area (Lemberg, et al. 1997).

3.3 Critical Habitat

3.3.1 Chinook Salmon and Steelhead Trout

On September 2, 2005, NOAA Fisheries released the final rule designating critical habitat for Puget Sound Chinook salmon and other populations of federally protected salmon species in Washington, Oregon, and Idaho. On January 14, 2013, NOAA Fisheries released a proposed rule designating critical habitat for steelhead trout. All marine, estuarine, and river reaches accessible to Puget Sound Chinook salmon and steelhead are designated (Chinook) or proposed (steelhead) as critical habitat, save for a number of watersheds, military lands, and tribal lands that are proposed for exclusion. Estuarine and marine areas of Commencement Bay lie within the designated or proposed critical habitat for Puget Sound Chinook salmon.

The project lies within the "Nearshore Marine Areas" critical habitat, which includes most of the marine nearshore of Puget Sound (Federal Register, Vol. 70, No. 170, pp. 52630–52858; Vol. 78, No. 9, pp 2726–2796). Marine nearshore areas of the project area provide important rearing, feeding and migration habitat for Chinook, steelhead, and other salmonids. As a result of these biological functions, this and other nearshore areas of Puget Sound are considered to be primary constituent elements (PCE) essential to the conservation of "Nearshore Marine Areas."

NOAA Fisheries defines the marine nearshore as including marine waters contiguous with the shoreline from the line of extreme high water to a depth of no greater than –30 m relative to MLLW. The specific definition of types of sites and specific features associated with nearshore PCEs is as follows:

"Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels" (Federal Register, Vol. 70, No. 170, p. 52665; Vol. 78, No. 9, p. 2729).

3.3.2 Bull Trout

On October 18, 2010, the USFWS revised the final rule designating critical habitat for coastal Puget Sound bull trout that includes all Puget Sound river basins containing bull trout populations and marine nearshore areas extending from the Canadian border to the Nisqually delta. This area has been designated as critical habitat Unit 28 – Puget Sound (Federal Register, Vol. 75, No. 200, pp. 63898–64070). Estuarine and marine areas of Commencement Bay lie within the designated critical habitat for bull trout.

USFWS identified nine PCEs that are considered to be essential for the conservation of bull trout (Federal Register, Vol. 70, No. 185, p. 56236). While most of these are relevant only to freshwater life history phases of bull trout, those that are, at least in part, relevant to marine areas include:

- Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers;

- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;

- Complex river, stream, lake reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structures;

- Water temperatures ranging from 2 to 15 degrees C, with adequate thermal refugia available for temperatures that exceed the upper end of this range;

- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited; and

- Sufficiently low levels of occurrence of nonnative predatory, interbreeding, or competing species that, if present, are adequately isolated temporally and spatially from bull trout.

3.3.3 Rockfish

3.3.4 Southern Resident Orca

On November 29, 2006, NOAA Fisheries released the final rule designating critical habitat for the southern resident orca. Three specific areas are proposed for designation:

- Summer Core Area, which includes Haro Strait and waters around the San Juan Islands;

- Puget Sound, which includes all of Puget Sound, excluding 18 military sites and Hood Canal; and

- Strait of Juan de Fuca, which includes all waters of the United States within the strait.

Based on the natural history of southern resident orcas and their habitat needs, the following PCEs have been developed by NOAA Fisheries as essential to the conservation of the species:

- Water quality to support growth and development;

- Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and

- Passage conditions to allow for migration, resting, and foraging.

The proposed designation excluded nearshore waters less than 20 feet in depth as critical habitat. The project area is within waters shallower than 20 feet in depth so is not considered critical habitat; however portions of the action area fall within the proposed designation.

3.3.5 Other Species

Critical habitat has not been designated within Puget Sound for marbled murrelet, Steller sea lions, humpback whale, or the four species of sea turtles. Critical habitat has not been designated within the waterways of Commencement Bay, including Thea Foss Waterway, for the three species of rockfish.

3.4 Existing Habitat Conditions in the Project Area

The Thea Foss and Wheeler-Osgood Waterways were largely created by dredging and filling activities that occurred around the turn of the century. Subsequent actions through the 1970s led to the creation of the remaining waterways in the action area. The entrance to the Thea Foss Waterway lies a little more than a mile southwest of the mouth of the Puyallup River. Construction of the two waterways took advantage of existing channels or sloughs in the Puyallup delta, and conversion of these areas for industrial and commercial use served to isolate the remaining channels from direct connection with the river. At present, the waterways contain little habitat that has not either been created or severely altered by human activities. Despite this, they are used by a variety of plant and animal life. Some of the species residing in or migrating through the waterways, including juvenile salmon, are of significant resource value.

Thea Foss and Wheeler-Osgood Waterways provide about 120 acres of tidal surface waters that offer a variety of habitat types which juvenile salmon may encounter soon after their outmigration from the Puyallup River. About 28 percent of the waterways (34 acres) lay in the "littoral zone" between elevations of MHHW and −10 feet MLLW (Hart Crowser 1998). This littoral zone is considered the zone within which juvenile salmonids, including Chinook, may engage in bottom-associated feeding activity, and hence is the zone in which the condition of the benthic habitat is often used as a measure of the ecological value of the area for juvenile salmon and other species. No forage fish spawn in the action area.

In 2006, remediation of contaminated sediments was completed in Thea Foss Waterway and in the vicinity of the project area. The shoreline adjacent to the existing bulkhead and beneath and waterward of the esplanade underwent remediation as part of the City's remedial actions for the Thea Foss Waterway. Remedial actions included dredging and capping the shoreline slope waterward of the face of the esplanade as well as placement of sand and gravel (i.e., habitat mix) beneath the timber esplanade. The shoreline slope from approximately MLLW to –20 feet MLLW was dredged and capped in 2004 and 2005. The cap

that was placed on the shoreline slope consists of an approximate 18-inch layer of sand and gravel that is armored with an approximate 18-inch layer of riprap. Additionally, the voids of the riprap armoring were filled with sand and rounded gravel habitat mix to enhance the habitat at the site. The shoreline slope cap was constructed at an approximate 1.5-to-1 foot slope.

It is expected that the productivity of epibenthic prey for juvenile salmon is comparable to productivity in other, uncontaminated areas of Commencement Bay and Puget Sound. Smaller epibenthic zooplankters, especially harpacticoid copepods, in intertidal and shallow subtidal areas are known to be important prey for outmigrating juvenile salmonids (e.g., Simenstad, et al. 1993) and are, therefore, the focus of this discussion.

Only two epibenthic zooplankton studies have been conducted in Thea Foss Waterway. The studies, both in 1980, used different sampling techniques and were conducted in different portions of the waterway. Blaylock and Houghton (1981) collected intertidal epibenthic samples along a transect at the junction of Wheeler-Osgood and Thea Foss Waterways during April and November 1980. Samples were collected at three intertidal elevations (+6, +3, and 0.0 feet MLLW). Samples were divided into two size fractions; copepods, both harpacticoids and calanoids, dominated the 0.25-mm size fraction. During April, the cumacean *Cumella vulgaris* was found in significant numbers at the MLLW station in both the 0.25- and 0.5-millimeter (mm) size fractions. The amphipod *Corophium* spp. was found at the three intertidal stations during November. Mean abundance for the 0.25-mm size fraction ranged from 352 per square meter (m^2) at +6 feet to 877/m^2 at MLLW. Mean abundance of the 0.25-mm fraction at each intertidal elevation in the Thea Foss Waterway was lower than at any other waterway station with the exception of the MLLW station at the mouth of the Hylebos Waterway. The pooled mean species richness ranged from 4.75 to 7.75 and increased with tidal elevation. The 0.5-mm size fraction had abundances from 2.5 to 42.5/m^2. Pooled mean species richness ranged from 0.25 to 2.25 and decreased at higher elevations. Mean abundance of the 0.5-mm size fraction at each elevation was lower than at any other waterway station with the exception of the MLLW station at the mouth of the Hylebos Waterway and in the Middle Waterway.

Simenstad and Cordell (1980) sampled three locations in the southern end of the Thea Foss Waterway with an epibenthic sled equipped with a 0.25-mm mesh net and propelled by a diver for 1.8 m along the bottom. The sample volume was calculated to be 0.02 cubic meters (m^3). The mean density of animals sampled by the epibenthic sled at the three stations ranged from 356,000 to 2,100,000/m^3. The abundance of true epifaunal animals in the samples ranged from 27,700 to 64,050/m^3. The dominant harpacticoid species were

Bulbamphiascus sp. and *Mesochra lilljeborji*. The mean density of harpacticoids (32,110/m³) fell within the range of density estimates from other areas in Puget Sound.

On June 4, 2001, Pentec Environmental conducted a preliminary eelgrass/macroalgae habitat survey in the Thea Foss Waterway along the western shore between South 21st Street and South 15th Street. No eelgrass was observed by divers during the survey. A patchy band of rockweed (*Fucus gardneri*) was present from 3 to 6 feet down from MHHW along much of the rocky bank in areas not covered by overwater structures. Sporadic algae were observed on piles and included *Ulva* spp., and *Odonthalia washingtoniensis.* The kelp *Laminaria saccharina* was also observed intermittently in much of the project area down to a lower limit of –17 feet MLLW. The most abundant macrovegetation was found on riprap and artificially placed gravels. The maximum depth of macrovegetation was about –17 feet MLLW.

On September 23, 2013, Hart Crowser conducted a site visit at the project area. The intertidal areas down to approximately +4 feet MLLW were examined directly and found to be composed entirely of broken concrete that serve to armor the bank (Appendix C). Given the steep nature of the bank and concrete armoring, the area is considered poor rearing habitat for outmigrating juvenile salmonids. No forage fish spawning habitat was observed within the intertidal zone. Sparse areas of rockweed and sea lettuce were observed, likely limited by the shade produced by the existing esplanade. No kelp was observed, although the existing steep grade and hard substrates that could support kelp drops to about –30 feet MLLW so could not be observed directly.

4.0 EFFECTS OF THE ACTION

4.1 Effects Analysis

The effects of the proposed emergency bulkhead removal, cutback, and esplanade replacement project on listed salmonids, rockfish, eulachon, green sturgeon, southern resident orca, marbled murrelet, and Steller sea lion, and their habitats are described in this section. The discussion encompasses how activities associated with the emergency bulkhead removal, intertidal creation and enhancements, and esplanade replacement will contribute to improvement, maintenance, or degradation of habitats used by listed species. Potential disturbances caused by project activities are presented in Table 3, along with measurable indicators of habitat health.

Presented below is a discussion of short-term and long-term direct and indirect effects of project activities (Section 2.2) in the project area, as well as the net effects of those activities. Net effect is considered to be the overall effect on the species and habitat in the long term. For example, a short-term adverse condition (e.g., loss of epifauna after placement of new beach substrates) may be necessary to achieve a long-term improvement in epibenthic habitat and quality; in such a case, the *net* effect is positive and would contribute toward improvement in the infauna indicator. Moreover, if short-term adverse conditions occur when few or no listed species are present, and if those conditions are no longer present when listed species return to the area, then those conditions do not constitute adverse modification of habitat quality.

A primary factor reducing the risk of impact to juvenile salmonids is the restriction of in-water construction to approved work windows when few juveniles will be present in the work area. There is no record of bull trout ever being caught in Thea Foss Waterway.

4.1.1 Construction Disturbances

4.1.1.1 Short-Term Effects

Direct Effects. Increased noise from pile driving and construction may result in avoidance of the project area by listed salmonids, marine mammals, and marbled murrelet during esplanade replacement activities. Of these activities, pile driving is expected to result in the greatest waterborne noise levels. The waterborne sound pressure levels (SPL) released by impact pile driving have been shown to cause injuries to fish in the immediate vicinity of such activities, with possible behavior-altering sound levels emanating for hundreds of meters. However, the effects of these activities will be substantially reduced by conducting all pile driving activities in the dry during lower tidal elevations. Fourteen, 16.5-inch concrete piles will be driven in the upper intertidal zone at elevations of approximately +7 feet MLLW, allowing these activities to occur in the dry during low tides. Four additional small diameter pin piles (4-inch) will also be driven with a vibratory hammer in the dry during low tides. All remaining piles (4 and 16-inch) will be driven in upland areas at elevation of approximately +14 feet MLLW (Sheet 6).

To further minimize the potential affects of pile driving on listed salmonid species, all in-water activities, including pile driving, will occur during agency-approved work windows (July 16 through February 15), when few juvenile salmonids and bull trout are expected to occur in the nearshore.

No adverse effects are anticipated from other construction activities in the project area. Care will be taken to ensure that no construction debris enters the waterway. No fresh concrete will be exposed to nearshore waters in the project area.

Indirect Effects. The finished project will be an above water pedestrian esplanade and hence post-construction and operational effects will be negligible. Few, if any, juvenile salmonids are expected to be in the action area during construction activities.

4.1.1.2 Long-Term Effects

Long-term effects are expected to be positive. Creation of over 3,000 square feet of new upper intertidal habitat and enhancement of over 6,000 square feet of middle to lower intertidal habitat with a gravel/sand habitat mix and the anchoring of LWD will provide more suitable and natural substrates for juvenile salmonid prey and refuge from predators. The new esplanade will also occupy an overwater footprint that is over 60 percent smaller than the existing structure.

4.1.1.3 Net Effects

Pile driving and construction activities will result in a brief period of increased noise, possibly causing salmonids and other species to avoid the project area during construction period. This possible impact is only temporary and would not persist beyond the construction period. Because construction will be timed to avoid periods of high juvenile salmonid abundance, the net effect will be to maintain (neither improve nor degrade) habitat indicators (Table 3). The long-term effects of intertidal creation and enhancement, a smaller overwater footprint, and grated decking will provide substantial beneficial effects relative to existing conditions.

4.1.2 Water and Sediment Quality

4.1.2.1 Short-Term Effects

Direct Effects. The creation of intertidal habitat behind the existing bulkhead and intertidal enhancement waterward of the bulkhead will likely produce localized impacts to water quality in the form of elevated turbidity plumes that would last a few hours to a few days. Elevated turbidity plumes are likely to occur in the immediate vicinity of intertidal work, though is not expected to appreciably affect dissolved oxygen concentrations in the project area. The removal of rubble and debris and placement of habitat mix and LWD within the intertidal zone may also cause short-term increases in turbidity, but all of this

work will be conducted at lower tidal elevations in the dry; therefore elevations in turbidity will likely be minor. In addition, the cutback and excavation of materials behind the bulkhead will be conducted before the bulkhead is removed to greatly reduce turbidity and discharge of soils into the intertidal zone.

Juvenile salmon have been shown to avoid areas of unacceptably high turbidities (Servizi 1988), although they may seek out areas of moderate turbidity (10 to 80 nephelometric turbidity units [NTU]), presumably as cover against predation (Cyrus and Blaber 1987a and 1987b). Feeding efficiency of juveniles is impaired by turbidities in excess of 70 NTU, well below sublethal stress levels (Bisson and Bilby 1982). Reduced preference by adult salmon homing to spawning areas has been demonstrated where turbidities exceed 30 NTU (20 milligrams per liter (mg/L) suspended sediments). However, Chinook salmon exposed to 650 mg/L of suspended volcanic ash were still able to find their natal water (Whitman, et al. 1982). Based on these data, it is unlikely that the locally elevated turbidities generated by the proposed action would directly affect juvenile or adult salmonids that may be present.

Minor levels of sediment resuspension may occur as the result of rubble and debris removal and potentially cause the release of sediment bound contaminants into the water column. However, sediment remediation has occurred within the waterway and monitoring has shown sediment contaminant levels are below sediment quality standards.

No adverse effects are anticipated from other construction activities in the project area. No heavy equipment will be placed in the intertidal zone. Removal of rubble and debris and placement of habitat mix below the bulkhead will be conducted in the dry at lower tidal elevations to reduce the resuspension of sediments. Work will be conducted using an excavator situated on the shore; no machinery will be placed within the intertidal zone.

Care will be taken to ensure that no construction debris enters the waterway. No fresh concrete will be exposed to nearshore waters in the project area.

Indirect Effects. Few, if any, juvenile salmonids are expected to be in the action area during construction activities; also, few adult Chinook salmon or bull trout are expected in the project area during construction. Short-term and localized increases in turbidity due to construction may result in what few salmonids that are present in the project area to avoid immediate work areas. Should this avoidance occur, it would have only insignificant and unmeasurable effects on salmonids.

4.1.2.2 Long-Term Effects

No long-term direct or indirect effects to water quality are expected for any of the construction activities proposed in the project area.

4.1.2.3 Net Effects

Short-term effects resulting from increased turbidity and sediment resuspension may be expected during pile-driving and habitat creation and enhancement activities, but are expected to be minor and temporary, with no long-term effects. The placement of habitat mix of gravel and sand in both the created upper intertidal habitat and enhanced lower intertidal habitat will have net beneficial effects. Therefore, the net effects of pile driving and other construction activities will be to improve water and sediment quality in the project area (Table 3).

4.1.3 Habitat

4.1.3.1 Short-Term Effects

Direct Effects. Significant short-term direct effects to nearshore habitats associated with pile driving and other construction activities are anticipated to be minimal. Localized, temporary increases in turbidity and sediment resuspension are not expected to adversely affect nearshore habitats for listed salmonids or other aquatic species.

Indirect Effects. No short-term indirect effects to habitat in the project and action areas are anticipated.

4.1.3.2 Long-Term Effects

Direct Effects. Long-term direct effects on habitat will be positive. The proposed project will create 3,870 square feet of new upper intertidal habitat and 6,030 square feet of enhanced lower intertidal habitat. Both new and enhanced intertidal habitat will receive new substrates of sand and gravel. All large rubble and debris will be removed from the lower intertidal zone before substrate and LWD enhancement. LWD will be anchored into the intertidal habitats over the length of the new esplanade.

In addition, the overwater coverage of the new esplanade will be reduced by 61.1 percent and grated panels over its length will allow increased light penetration for increased primary and secondary production over the new substrates.

Indirect Effects. No adverse long-term indirect effects on habitat are expected from the proposed project activities in the action and project areas.

4.1.3.3 Net Effects

Net effects to listed salmonid habitats will be positive. Project components will create sloped upper intertidal habitat where none is present under present conditions. Lower intertidal habitats will be enhanced with both rubble removal and substrate enhancement. The overwater footprint of the new esplanade will be substantially reduced relative to existing conditions. Grating will improve light penetration to newly created upper intertidal habitats, hence increasing primary and secondary productivity. Therefore, the net effects of the project will be to greatly improve habitat quality in the project area (Table 3).

4.1.4 Biota

4.1.4.1 Short-Term Effects

Direct Effects. Significant effects to biota associated with the bulkhead removal and esplanade replacement project will be temporary. The placement of a cap and habitat mix over 6,030 square feet of middle to lower intertidal habitat would temporarily eliminate the existing invertebrate community. The existing community is expected to be somewhat abbreviated and dominated by barnacles, given the prevalence of surface rubble and debris (Photos 3 and 4). Marine macrovegetation that use hard substrates for attachment were also quite sparse, likely because of the lack of light from the existing esplanade. The proposed removal of rubble and debris and replacement with gravel/sand substrates and LWD would attract an epifaunal community similar to those found on natural beaches and would far exceed the production found on the existing rubble.

Indirect Effects. Short-term indirect effects to ESA-listed salmonids in the project and action areas are expected to be limited to a temporary lower amount of epibiotic prey in the new intertidal substrates until the area is colonized. It is expected that lower amounts of prey would be present for the outmigrating cohort of juvenile salmon during the first spring after enhancements are completed. The affect of the initial lower productivity would be unmeasurable considering that only a 300-foot reach of intertidal zone is being enhanced. Colonization with epibiota will occur quickly and the improvements in substrate will produce a more robust community for future juvenile outmigrants.

4.1.4.2 Long-Term Effects

Direct Effects. Significant long-term direct effects to biota associated with bulkhead removal and other construction activities are expected to be positive. The cutback will create 3,870 square feet of new sand/gravel intertidal habitat at a slope of 2-to-1 between elevations of MHHW and +4.6 feet MLLW. This habitat will replace a vertical bulkhead in which most all habitat functions above +4.6 feet MLLW have been lost. An additional 6,030 square feet of intertidal habitat will be enhanced with sand/gravel and LWD between elevations of +4.6 feet and MLLW, replacing rubble and debris strewn habitat. In the long-term, the epifaunal community that colonizes these habitats will far exceed the existing community in abundance and diversity. Enhancements will also replace 81 creosote-treated wood piles with 14 concrete piles and 4, small diameter steel pin piles.

Light penetrating surfaces in the new esplanade will allow more light penetration to the intertidal zone to increase primary and secondary productivity. The proposed esplanade will also be set back farther then the existing structure, making the overwater footprint smaller. The proposed project will leave intertidal areas below +5.0 feet MLLW free of overwater coverage, while the existing esplanade shades intertidal habitats from +4.6 feet MLLW (the elevation of the existing bulkhead) to about MLLW. Increased light and fewer impediments will provide a more natural and productive nearshore corridor for juvenile salmon migration.

Indirect Effects. No long-term indirect effects to salmonids or other biota in the project or action areas are expected from the proposed project.

4.1.4.3 Net Effects

Net effects to listed salmonids and other biota will be positive. In the long-term, the creation of new upper intertidal habitat and enhancement of the middle to lower intertidal zone will increase ecological functions far exceeding those provided by the existing vertical bulkhead. Therefore, the net effects of the proposed esplanade project will be to improve biota in the project area (Table 3).

4.2 Net Effects of Action

The net effect of the proposed actions in the project area will be to greatly improve overall intertidal habitat quality for listed salmonids, rockfish, marbled murrelet, and southern resident orca relative to current conditions (Table 3). Short-term localized water quality degradation during construction will not

impact habitat for juvenile salmonids because of the short-term nature of the effects on water quality and because of seasonal work restrictions; thus, current water quality conditions will be maintained in the long term.

Sediment quality, shoreline conditions, benthos, and overall fish habitat conditions will be both increased and improved in the project area. The smaller footprint of the new esplanade, in addition to light penetrating surfaces, will also improve light penetration to the intertidal zone and improve habitat conditions. The placement of gravel, sand, and LWD within the lower intertidal zone will greatly improve habitat conditions over the existing concrete rubble that exists. No net long-term degradation of any of the habitat indicators will result from the proposed actions in the project area.

4.3 Critical Habitat

As reported, critical habitat has been designated for the Puget Sound Chinook salmon, the coastal-Puget Sound bull trout DPS, and the southern resident orca. Critical habitat has been proposed for Puget Sound steelhead trout. Following is a specific analysis of the proposed bulkhead removal and esplanade replacement project on the critical habitat of these species.

4.3.1 Chinook Salmon and Steelhead Trout

The PCE for the critical habitat of Chinook salmon and proposed critical habitat for steelhead trout is defined as:

"Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and sidechannels sound" (Federal Register, Vol. 70, No. 170, p. 52665; Vol 78, No. 9, p. 2729).

Within the project and action areas of Thea Foss Waterway, physical and biological features that contribute to the PCE functions for Chinook salmon and steelhead include:

- A middle intertidal zone containing a vertical timber pile bulkhead, below which a moderately sloping lower intertidal zone composed primarily of rubble and debris;

- Class A waters, as designated by the Washington State Department of Ecology (Ecology), that provides adequate water quality for migrating and rearing juvenile salmonids; and

- Some epibenthic zooplankton and pelagic plankton production for rearing salmonids.

Significant amounts of LWD, overhanging vegetation, and side channels are not present within the project area. Recent enhancement activities within the intertidal zone outside of the action area have created gravel/sand beaches anchored with LWD, but the immediate project area consists of a vertical bulkhead with substantial amounts of overwater structure.

4.3.2 Bull Trout

USFWS identified nine PCEs that are considered to be essential for the conservation of bull trout (Federal Register, Vol. 75, No. 200, p. 63931). While most of these are relevant only to freshwater life history phases of bull trout, those that are, at least in part, relevant to marine areas include:

- Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers;

- An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;

- Complex river, stream, lake reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels, pools undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structures;

- Water temperatures ranging from 2 to 15 degrees C, with adequate thermal refugia available for temperatures that exceed the upper end of this range;

- Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited; and

- Sufficiently low levels of occurrence of nonnative predatory, interbreeding, or competing species that, if present, are adequately isolated temporally and spatially from bull trout.

Physical and biological features that contribute to the PCE functions for bull trout include:

- Extensive areas below MHHW with water temperatures generally below 15 degrees C;

- A highly modified nearshore migration corridor, but generally free of physical, biological, or water quality impediments to bull trout migration;

- A modest food source of forage fish species since spawning populations are present within the outer bay;

- No nonnative fish species that could compete with bull trout; and

- Class A waters, as designated by the Washington State Department of Ecology (Ecology), that provides adequate water quality for migrating and rearing salmonids.

4.3.3 Southern Resident Orca

The following PCEs have been designated by NOAA Fisheries as essential to the conservation of the species:

- Water quality to support growth and development;

- Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction, and development, as well as overall population growth; and

- Passage conditions to allow for migration, resting, and foraging.

Physical and biological features that contribute to the PCE functions for bull trout include:

- The project area is near the Puyallup River watershed, a salmon-bearing stream within lower Puget Sound; and

- Class A waters, as designated by the Washington State Department of Ecology (Ecology), that provides adequate water quality for marine life.

4.3.4 Critical Habitat Analysis

Short-term direct effects to proposed nearshore critical habitats are expected to be limited to temporary increases in noise and turbidity caused by excavation, grading, rubble removal, and pile driving, as discussed in Sections 4.1.1 and 4.1.2. All such in-water activities will occur during approved work windows when few juvenile Chinook salmon, bull trout, or steelhead trout are expected in the nearshore. Potential impacts can be summarized as follows:

- Construction noise and habitat enhancement actions could cause salmonids that are present, including Chinook, bull trout, and steelhead, to leave the immediate work area. In-water construction will be timed during periods when few if any of these species are present in the area. Thus, construction activity will not obstruct or impede migratory corridors, and so will not degrade existing critical habitat for Chinook salmon, steelhead, or bull trout.

- Project construction will be accomplished with multiple measures in place to minimize the risk of spills of any toxics into the water column. Thus, project construction will not degrade water quality over the long-term, and so will not degrade existing critical habitat for Chinook salmon, steelhead, or bull trout in the project area.

- Water quality effects will be limited to temporary increases in turbidity that will not leave the Thea Foss Waterway; therefore, it is not likely that water quality PCEs for southern resident orca will be degraded.

Long-term effects of the proposed project are expected to be minimal and positive:

- The project will have no measurable long-term adverse effect on water quality or quantity. The proposed project is a pedestrian esplanade that replaces an existing esplanade.

- The proposed number of piles will be substantially reduced relative to the existing esplanade and bulkhead and will not provide a significant barrier or obstruction to the migratory movements of Chinook salmon, steelhead, or bull trout so will not degrade PCEs of critical habitat for these species. Proposed new intertidal habitats that will replace the vertical bulkhead and placement of LWD will increase and enhance critical habitat for the three salmonids.

- New substrates (habitat mix and LWD) and newly created intertidal habitat will enhance habitat conditions for an epifaunal community, including those

species preyed upon by juvenile salmonids and forage fish, compared with the existing rubble and vertical bulkhead present within the intertidal zone. Thus, project actions will not degrade and likely improve this aspect (PCE) of bull trout critical habitat. Intertidal habitat improvements will not degrade and may ultimately improve food resources for southern resident orca (adult salmonids).

4.3.5 Summary of Potential Effects on Critical habitat

Based on the analyses provided above and in the BE, it can be seen that the proposed project has the potential to affect only 1 of the 6 PCEs for Chinook salmon: nearshore marine habitat. As many as 6 of the 9 PCEs for bull trout could be affected. Two proposed PCE for southern resident orca could be affected.

The analyses provided above lead to the conclusion that the proposed bulkhead removal and esplanade replacement project will result in no net degradation of these PCEs, and therefore existing critical habitat for Chinook salmon, bull trout, and southern resident orca, and proposed critical habitat for steelhead trout will remain fully functional to serve the conservation needs of the species. Accordingly, the project will not result in any destruction or adverse modification of proposed critical habitat.

4.4 Interdependent, Interrelated, and Cumulative Effects

A number of active programs have had or will have cumulative positive effects on the status of salmon in Commencement Bay and in the Puyallup River and Hylebos Creek drainages. First and foremost is the in-water cleanup, which is intended to result in the entire area of marine sediments within Thea Foss and Wheeler-Osgood Waterways meeting the biologically-based sediment quality objectives in ten years (Hart Crowser 1999).

Several mitigation/restoration efforts have been recently completed within Commencement Bay to mitigate for short-term loss of function resulting from waterway remediation, to fully compensate for losses of shallow intertidal and subtidal habitat acreage resulting from sediment disposal, and to provide affirmative conservation measures that will contribute to restoration of habitat for listed species. These include the following habitat restoration/enhancement projects:

- North Beach Habitat Areas;
- Middle Waterway Restoration Projects;
- Puyallup River Side Channel;

- Picks Cove Marina Habitat;
- Foss Waterway Marina Habitat;
- Albers Mill Marina Habitat;
- Head of Thea Foss Waterway Habitat;
- Johnny's Seafood Habitat;
- Removal and Reinstallation of Pilings; and
- Removal and Reconstruction of Overwater Structures with Light Penetrating Surfaces and Intertidal Substrate Enhancement.

5.0 TAKE ANALYSIS

Section 3 of the ESA defines "take" as "to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect, or attempt to engage in any such conduct." The USFWS further defines "harm" as "significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavior patterns such as breeding, feeding, or sheltering," and "harass" as "actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering."

The net effect of the proposed project will be to improve overall habitat quality compared with existing conditions. Short-term localized water quality degradation during bulkhead removal, habitat creation, and habitat enhancement activities is not likely to impact for juvenile salmonids because of the timing of these activities. Long-term benefits include creation of functional upper intertidal habitat where none existed before and enhancement of middle to lower intertidal habitat. The smaller footprint and use of light penetrating surfaces within the new esplanade may improve habitat conditions by increasing the amount of light that can penetrate to the intertidal zone. Therefore, no incidental take is anticipated.

6.0 DETERMINATION OF EFFECT

NOAA Fisheries/USFWS guidelines for the preparation of biological assessments state that a conclusion of "may affect, but is not likely to adversely affect" is the "…appropriate conclusion when the effects on the species or critical habitat are expected to be beneficial, discountable, or insignificant. Beneficial effects have contemporaneous positive effects without any adverse effects…." Insignificant effects, in the NOAA Fisheries/USFWS definition, "…relate to the size of the impacts and should never reach the size where take occurs…[One would not expect to]…be able to meaningfully measure, detect, or evaluate insignificant

effects." Based on the analyses in this BE, the expected nature and level of the impacts of the proposed project are presented below.

6.1 Salmonids

All bulkhead removal, habitat improvements, and pile driving for the esplanade will occur during approved periods when few salmonids are present in the nearshore. Habitat creation and enhancements in the intertidal zone will substantially increase both ecological functions and total habitat in the project area and more than offset the replacement of the esplanade. The new esplanade will also be constructed on a smaller overwater footprint. Therefore, the proposed action **may affect, but is not likely to adversely affect**, Chinook salmon, steelhead trout, or bull trout.

For the same reasons, the proposed action **may affect, but is not likely to adversely affect** designated critical habitat for Chinook salmon or bull trout. Because the proposed PCEs for steelhead trout are the same as for Chinook salmon, project actions **will not destroy or adversely modify** proposed critical habitat for this species. If steelhead trout are designated prior to the completion of this project, the project **may affect, but is not likely to adversely affect** critical habitat for this species.

6.2 Georgia Basin Rockfish

Habitat creation and enhancements in the intertidal zone will substantially increase both ecological functions and total habitat in the project area and more than offset the replacement of the esplanade. The new esplanade will also be constructed on a smaller overwater footprint. For these reasons, the project action **may affect, but is not likely to adversely affect** bocaccio, yelloweye rockfish, or canary rockfish.

6.3 Pacific Eulachon

Pacific eulachon are anadromous fish that spawn in freshwater streams, but are not documented in the Puyallup River or any South Puget Sound watersheds so are highly unlikely to be present within the project or action areas. The conclusion of this BE is that the proposed action will have **no effect** on Pacific eulachon.

6.4 Green Sturgeon

Green sturgeon are documented along the Washington coast and Straits of Juan de Fuca, but are rarely seen east of Port Townsend, and are highly unlikely to

enter the in-water action area. The conclusion of this BE is that the proposed action will have **no effect** on green sturgeon.

6.5 Southern Resident Orca

The proposed action is located in a highly urbanized waterway where whales have not been documented. All pile driving will be conducted in the dry and is not expected to exceed the injury and disturbance thresholds for marine mammals; therefore, the proposed action **may affect, but is not likely to adversely affect,** southern resident orca.

6.6 Steller Sea Lion

The proposed action is located in a highly urbanized waterway in South Puget Sound where Steller sea lions have not been documented. All pile driving will be conducted in the dry and is not expected to exceed the injury and disturbance thresholds for marine mammals; therefore, the proposed action **may affect, but is not likely to adversely affect,** Steller sea lion.

6.7 Birds

The proposed action is located in a highly urbanized waterway where marbled murrelet have not been documented. Waterborne noise will be minimized by conducting all intertidal pile driving in the dry so is not expected to exceed any injury thresholds for marbled murrelets; therefore, the proposed action **may affect, but is not likely to adversely affect,** marbled murrelet.

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TABLES

Table 1 – ESA-Listed Species Documented in Puget Sound

Species	Listing Status	ESA Agency	Date of Listing	Critical Habitat in Puget Sound
Puget Sound Chinook salmon (*Oncorhynchus tshawytscha)*	Threatened	NOAA	March 24, 1999	Yes, designated September 2, 2005
Coastal-Puget Sound Bull trout (*Salvelinus confluentus*)	Threatened	USFWS	December 1, 1999	Yes, revised designation October 18, 2010
Puget Sound Steelhead Trout (*O. mykiss*)	Threatened	NOAA	May 11, 2007	Proposed on January 14, 2013
Bocaccio (*Sebastes paucispinis)*	Endangered	NOAA	April 28, 2010	Proposed on August 6, 2013
Yelloweye rockfish *(S. ruberrimus)*	Threatened	NOAA	April 28, 2010	No
Canary rockfish *(S. pinniger)*	Threatened	NOAA	April 28, 2010	No
Eulachon (*Thaleichthys pacificus*)	Threatened	NOAA	March 18, 2010	No
Green sturgeon (*Acipenser medirostris*)	Threatened	NOAA	April 17, 2006	No
Southern resident Orca (*Orcinus orca*)	Endangered	NOAA	November 18, 2005	Yes, designated November 29, 2006
Marbled murrelet *(Brachyramphus marmoratus)*	Threatened	USFWS	October 1 1992	No
Steller sea lion *(Eumetopias jubatus)*	Threatened	NOAA	April 5, 10090	No
Humpback whale *(Megaptera novaeangliae)*	Threatened	NOAA	June 2, 1970	No
Leatherback turtle *(Dermochelys coriacea)*	Threatened	NOAA	June 2, 1970	No
Loggerhead sea turtle *(Caretta caretta)*	Threatened	NOAA	June 2, 1970	No
Green sea turtle *(Chelonia mydas)*	Threatened	NOAA	June 2, 1970	No
Olive Ridley sea turtle *(Lepidochelys olivacea)*	Threatened	NOAA	June 2, 1970	No

Table 2 - Puyallup River Basin Escapement Estimates for Naturally Reproducing ESA-Listed Salmonids

Year	Puyallup R. Fall Chinook	White R. Spring Chinook	Puyallup R. Winter Steelhead	White R. Steelhead	Carbon R. Steelhead	White R. Bull Trout
1978	407	98				
1979	2,405	57				
1980	2,109	57		263		
1981	111	177		234		
1982	925	17		263		
1983	666	21	239	239	1,653	
1984	1,073	6	292	794	927	
1985	703	20	276	855	1,156	
1986	148	6	626	621	2,254	
1987	925	117	344	561	1,259	17
1988	1,295	127	494	1,390	1,140	8
1989	2,442	111	610	1,123	1,320	14
1990	3,515	275	285	545	957	19
1991	1,702	195	235	593	895	39
1992	3,034	406	175	837	1,105	38
1993	1,961	401	140	420	882	24
1994	2,479	385	190	349	934	46
1995	2,590	605	289	313	1,220	15
1996	1,924	619	172	364	656	15
1997	1,258	402	290	314	702	16
1998	3,071	249	115	322	648	44
1999	1,988	455	174	252	902	24
2000	1,193	1,516	155	382	496	48
2001	1,915	2,002	119	420	358	39
2002	1,807	496	78	519	248	41
2003	1,547	1,173	52	162	235	49
2004	1,843	1,247	91	184	410	45
2005	1,064	1,312	64	153	98	34
2006	2,232	1,443	139	163	323	38
2007	2,932	2,832	91	303	418	44
2008	2,725	1,329	133	207	367	14
2009	1,526	868	51	205	190	90
2010	1,563	1,024	74	629	398	84

Thea Foss BE 10-07-2013\Tables\Table 2.xls

Salmonscape GIS database

Table 3 – Effects of Project Activities on Habitats Used by Salmonids in the Project and Action Areas

Project Activities	Habitat Indicator	Effects of Action		
		Improve[1]	Maintain[2]	Degrade[3]
Construction Disturbance	Noise		X	
	Entrainment		X	
	Stranding		X	
Water Quality Disturbance	Turbidity		X	
	Chemical contamination/nutrients		X	
	Temperature		X	
	Dissolved oxygen		X	
Stormwater Generation	Stormwater quality/quantity		X	
Sediment Disturbance	Sedimentation sources/rates	X		
	Sediment quality	X		
Habitat Disturbance	Fish access/refugia	X		
	Depth		X	
	Substrate	X	X	
	Slope	X	X	
	Shoreline	X	X	
	Riparian conditions		X	
	Flow and hydrology/current patterns/ saltwater–freshwater mixing patterns		X	
	Overwater structures	X		
	Disturbance		X	
Biota Disturbance	Prey—epibenthic and pelagic zooplankton	X		
	Infauna	X		
	Prey—forage fish	X		
	Aquatic vegetation	X		
	Nonindigenous species			
	Ecological diversity	X		

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Notes:

1 Action will contribute to long-term improvement, over existing conditions, of the habitat indicator.

2 Action will maintain existing conditions.

3 Action will contribute to long-term degradation, over existing conditions, of the habitat indicator.

FIGURES

0 2,500 5,000 10,000 Feet

N

Thea Foss Pedestrian Esplanade
Tacoma, Washington

Site Vicinity Map

12599-05 10/13

HARTCROWSER

Figure
1

R:\GIS\PROJECTS\12599\05\fig_1-site vicinity.mxd

Species	Freshwater Life Phase	Month											
		J	F	M	A	M	J	J	A	S	O	N	D
Spring	Upstream migration												
Chinook	Spawning												
	Intragravel develop.												
	Juvenile rearing												
	Juv. outmigration												
Summer/	Upstream migration												
Fall	Spawning												
Chinook	Intragravel develop.												
	Juvenile rearing												
	Juv. outmigration												
Steelhead	Upstream migration												
Trout	Spawning												
	Intragravel develop.												
	Juvenile rearing												
	Juv. outmigration												
Bull trout	Upstream migration												
	Spawning												
	Intragravel develop.												
	Juvenile rearing												
	Juv. outmigration												

Source: PNRBC 1970; WDFW and WWTIT 1994; City of Tacoma 1999.

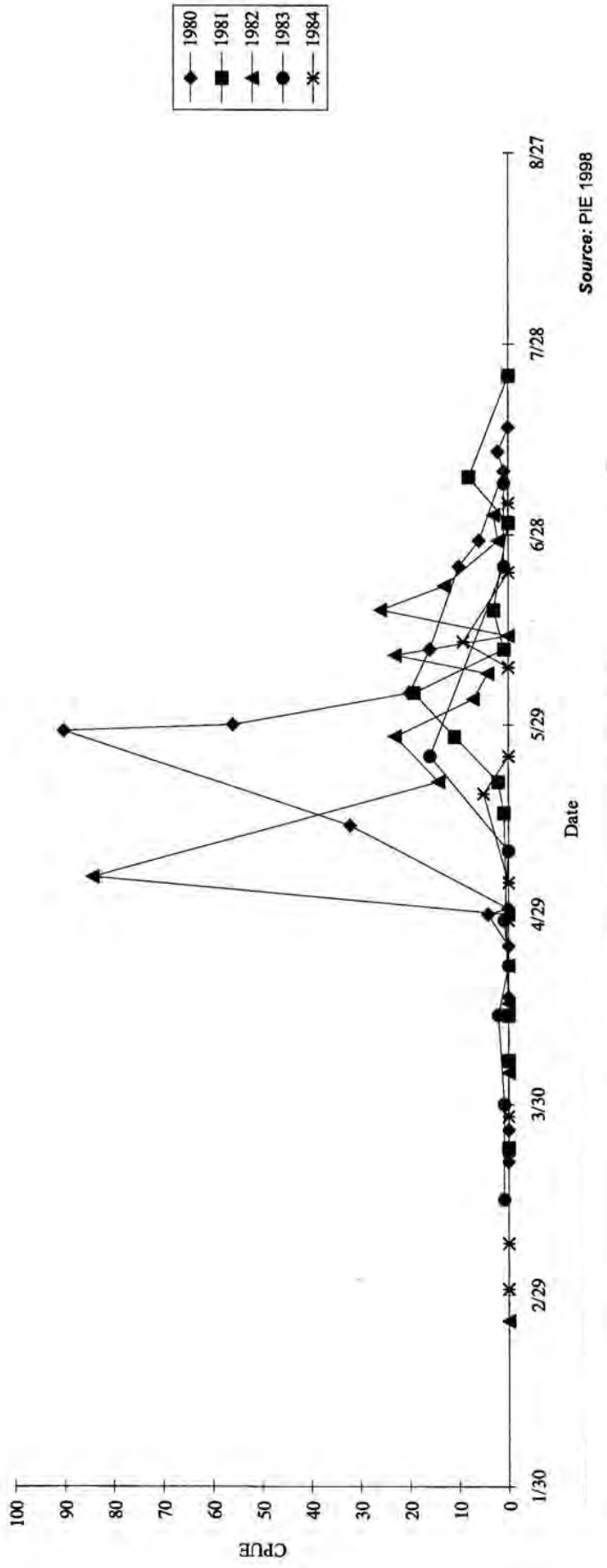
Thea Foss Pedestrian Esplanade
Tacoma, Washington

Puyallup River Salmonid Life History Stages

12599-05 10/13

HARTCROWSER

Figure **2**



Thea Foss Pedestrian Esplanade
Tacoma, Washington

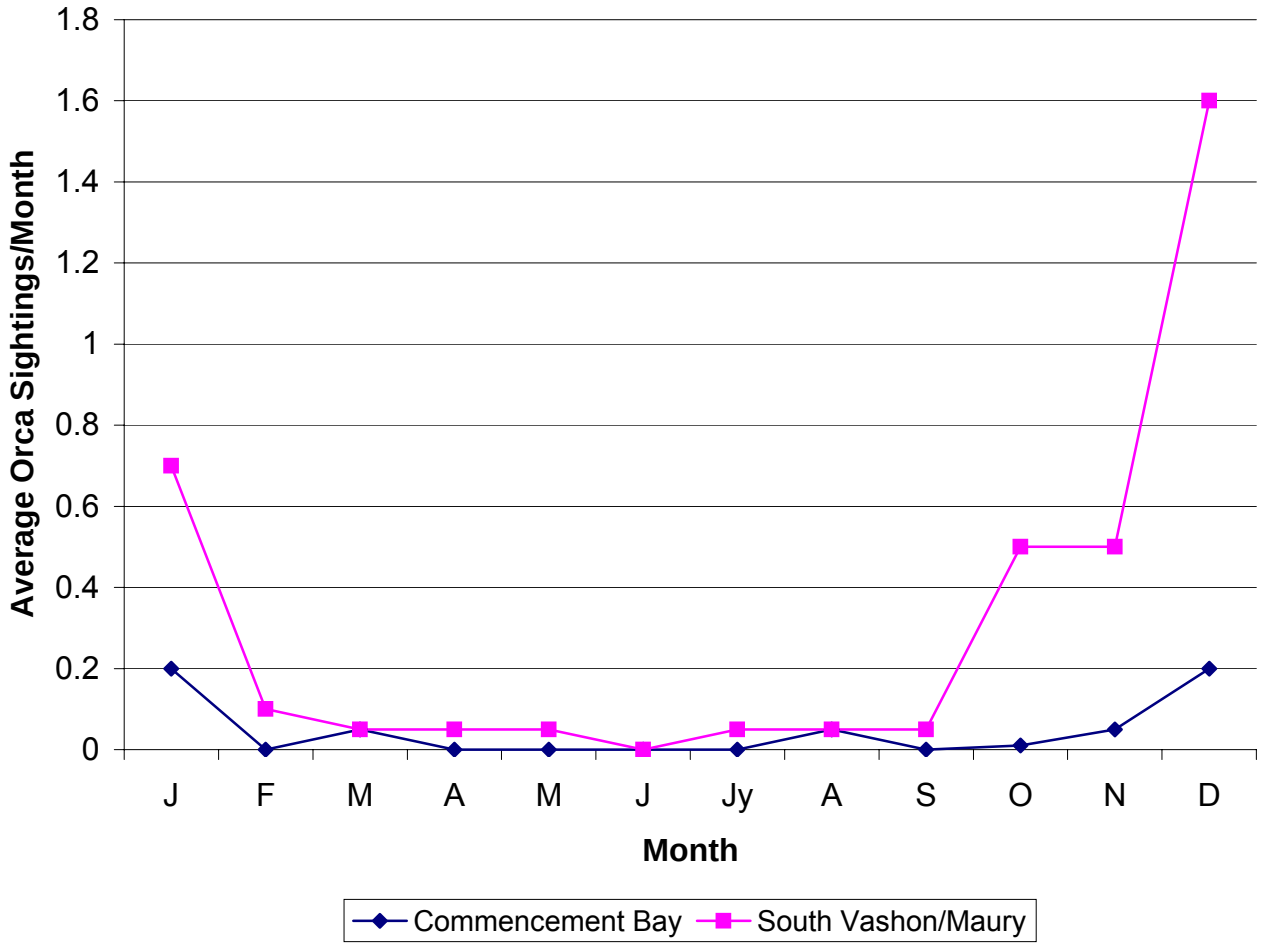
Juvenile Chinook Salmon Catch in Beach Seines at the Mouth of Wheeler-Osgood Waterway, 1980–1984

12599-05 10/13

HARTCROWSER

Figure
3

00599-05\Thea Foss BE 10-07-2013\Figures\Figure 3.xls



Source: NOAA Fisheries (http://www.nwr.noaa.gov/Marine-Mammals/upload/MM-KW-map.pdf)

Thea Foss Pedestrian Esplanade
Tacoma, Washington

Average Number of Orcas Sightings per Month in Commencement Bay and South Vashon/Maury Island Area, 1990–2008

12599-05 10/13

HARTCROWSER

Figure
4

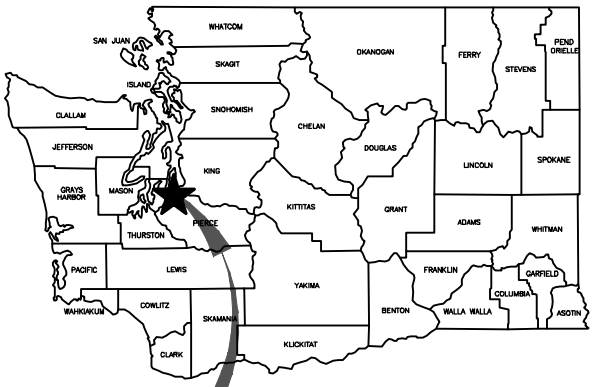
00599-05\Thea Foss BE 05\10-07-2013\Figures\Figure 4.xls

SHEETS

US ARMY CORPS OF ENGINEERING
PERMIT

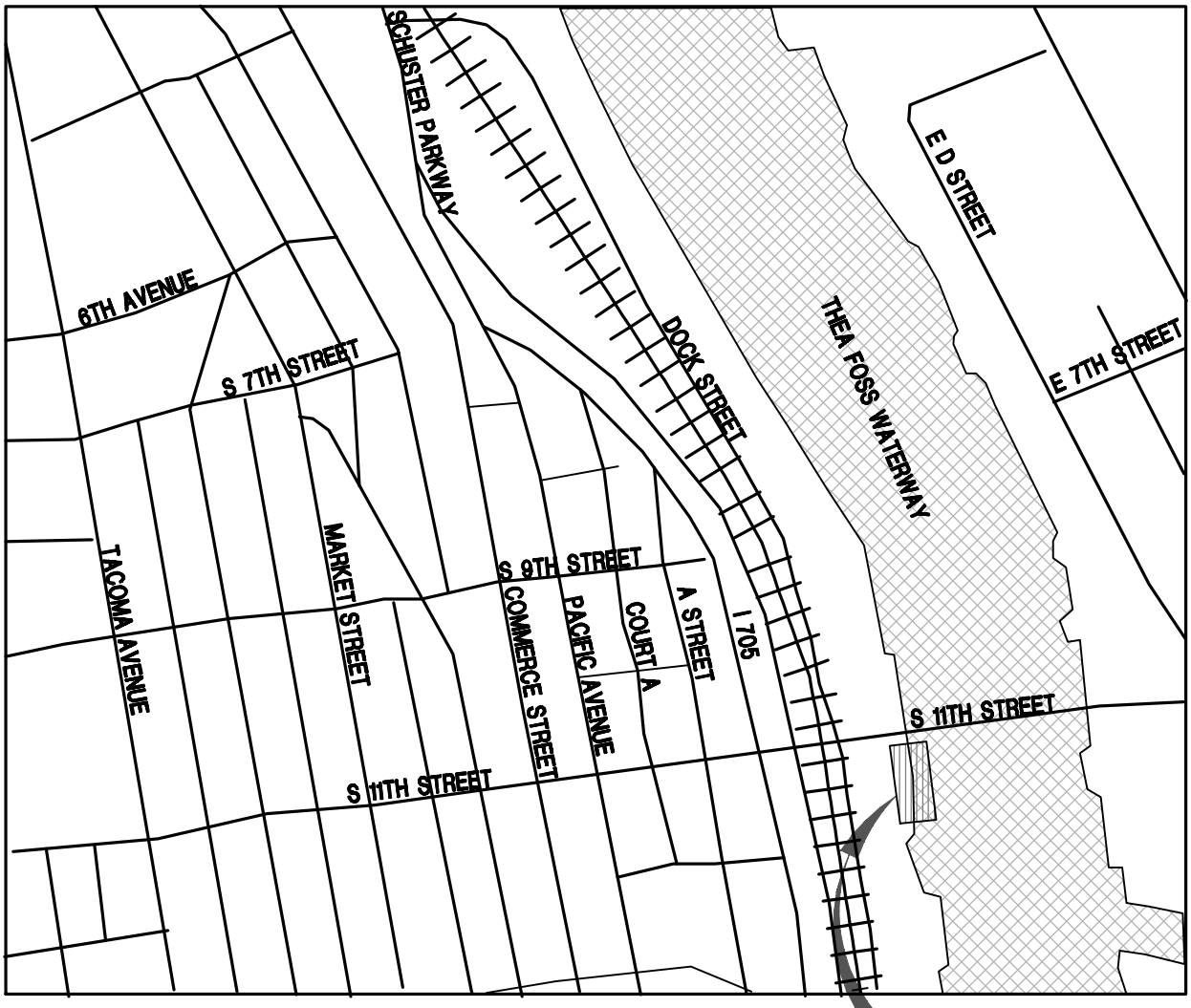
SITE 9 BULKHEAD REPAIR AND ESPLANADE CONSTRUCTION

SECTION 04, TOWNSHIP 20 NORTH, RANGE 03 EAST



PROJECT LOCATION

STATE MAP
NO SCALE



VICINITY MAP
NO SCALE

SITE 9
ESPLANADE
SITE

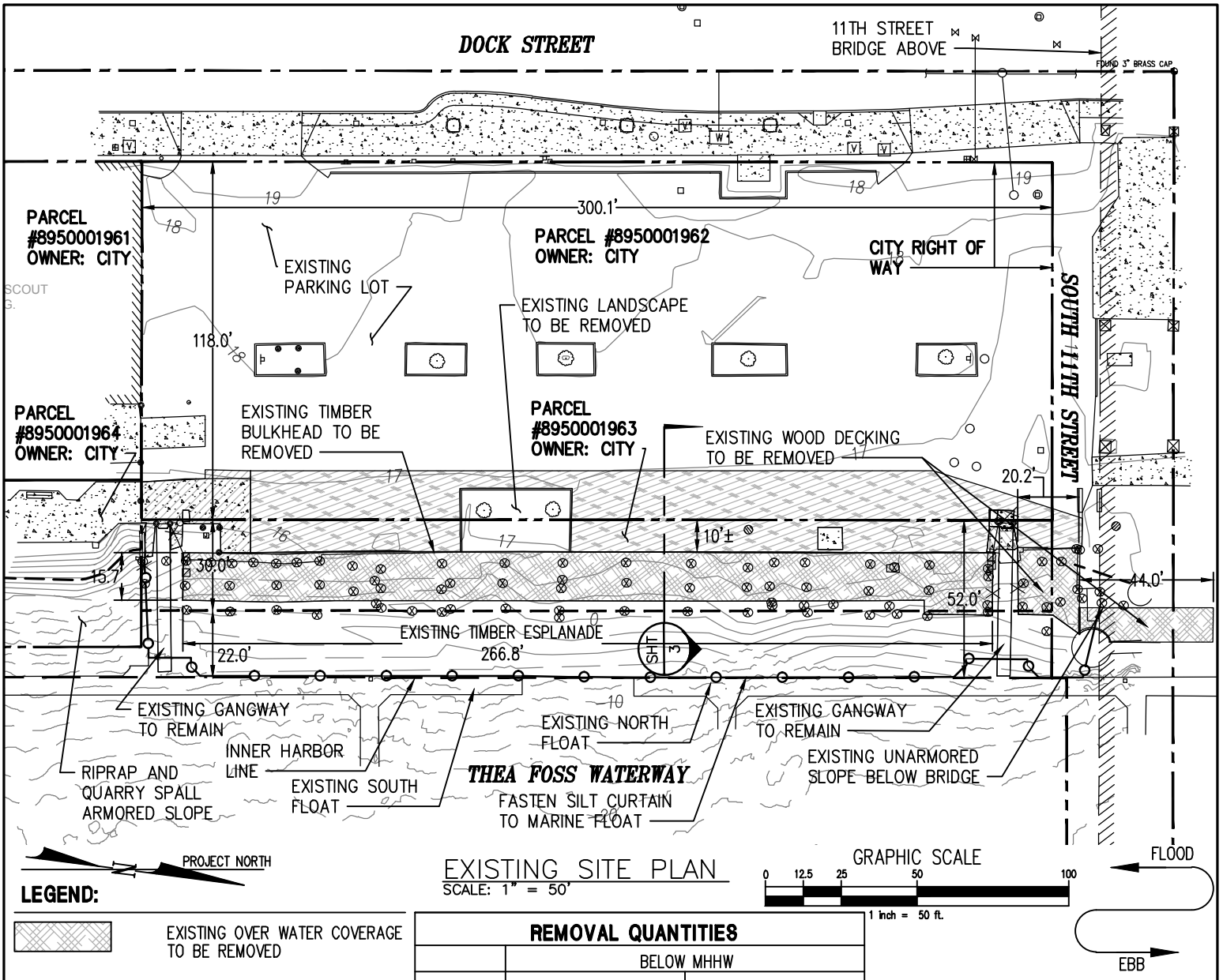
Tacoma

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

ADJACENT PROPERTY OWNERS:
1. CITY/8950001961
2. CITY/8950001964

LOCATION (PARCEL#):
8950001962 & 8950001963
LAT/LONG:
47° 15'11.82"N
122° 26'4.46"W
SHEET 1 OF 8 DATE: 10/29/13

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION
IN: THEA FOSS WATERWAY
NEAR: TACOMA
COUNTY: PIERCE
STATE: WASHINGTON



EXISTING SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

LEGEND:

- EXISTING OVER WATER COVERAGE TO BE REMOVED
- EXISTING ASPHALT PAVEMENT TO BE REMOVED
- EXISTING CONCRETE PAVEMENT TO BE REMOVED
- ⊗ TIMBER PILE TO BE REMOVED SEE NOTE 1 & 2.
- MHHW (EL = +11.85)
- SILT CURTAIN

REMOVAL QUANTITIES

	BELOW MHHW	
	EXIST QUANTITY TO BE REMOVED	EXIST OVER WATER AREA TO BE REMOVED (SF)
PILES	81	
TIMBER ESPLANADE		4,350
WOOD DECK		940
TOTAL	81	5,290

TOTAL EXCAVATION QUANTITIES

	EXCAVATION AREA (SF)	EXCAVATION VOLUME (CY)
BELOW MHHW	10,950	1,434
ABOVE MHHW	3,000	1,112
TOTAL	13,950	2,490

NOTES:

1. COMPLETE PILE EXTRACTION SHALL ALWAYS BE THE FIRST METHOD OF PILE REMOVAL. IF PILE BREAKS DURING FIRST EXTRACTION ATTEMPT, CUT THE PILE, EXCAVATE 1' AND ATTEMPT PILE EXTRACTION A SECOND TIME. IF PILE BREAKS THE SECOND TIME, CUT PILE AT THE BASE OF THE EXCAVATION. ALL CREOSOTE REMNANTS MUST BE AT LEAST 2' BELOW FINISHED GRADE.

2. ABSORBENT BOOMS SHALL BE USED DURING ALL PILE EXTRACTION AND SHALL REMAIN IN PLACE UNTIL HOLES CREATED BY PILE EXTRACTION ARE FILLED.

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

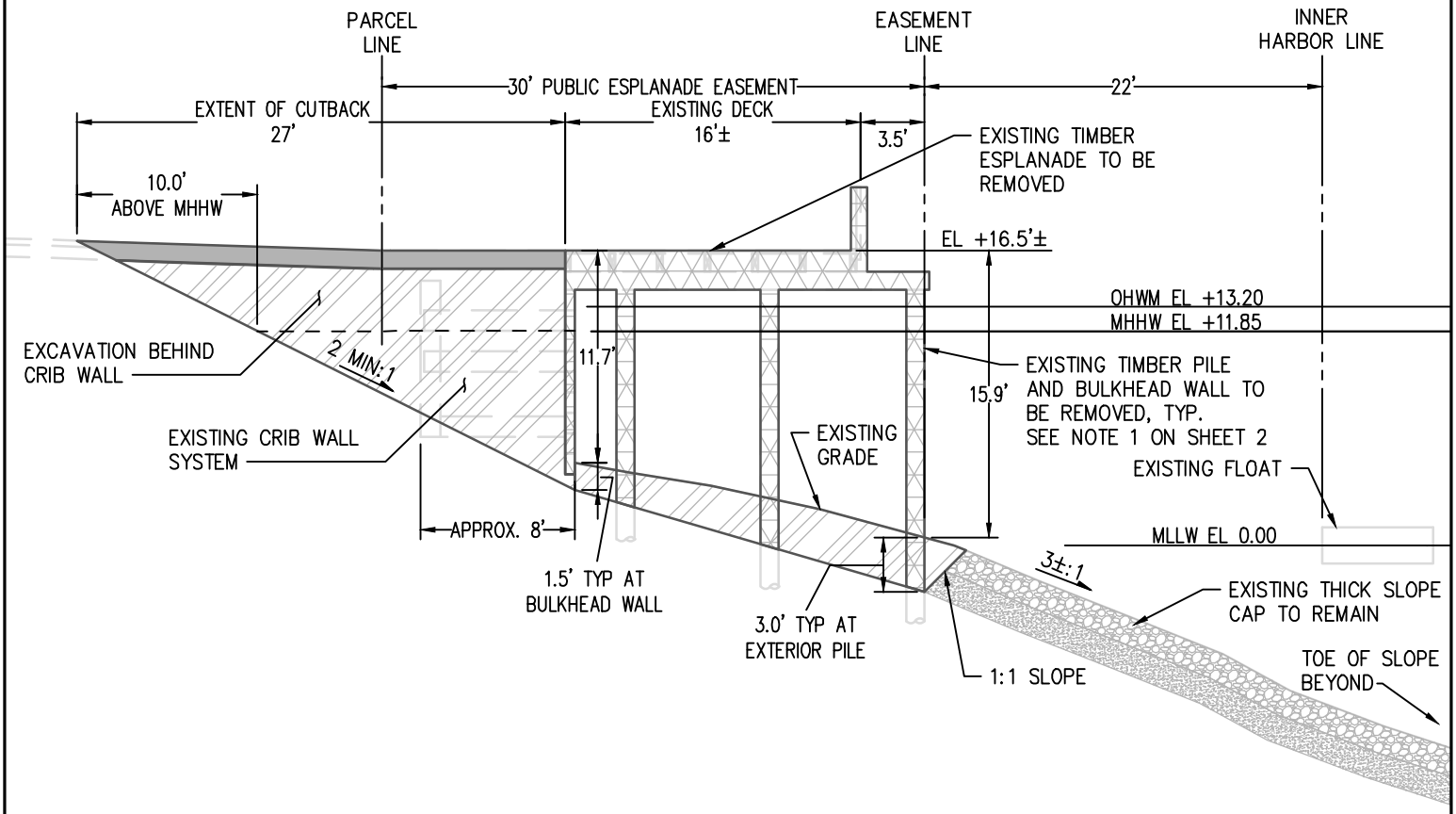
EXISTING SITE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 2 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 2.5 5 10 20

1 inch = 10 ft.

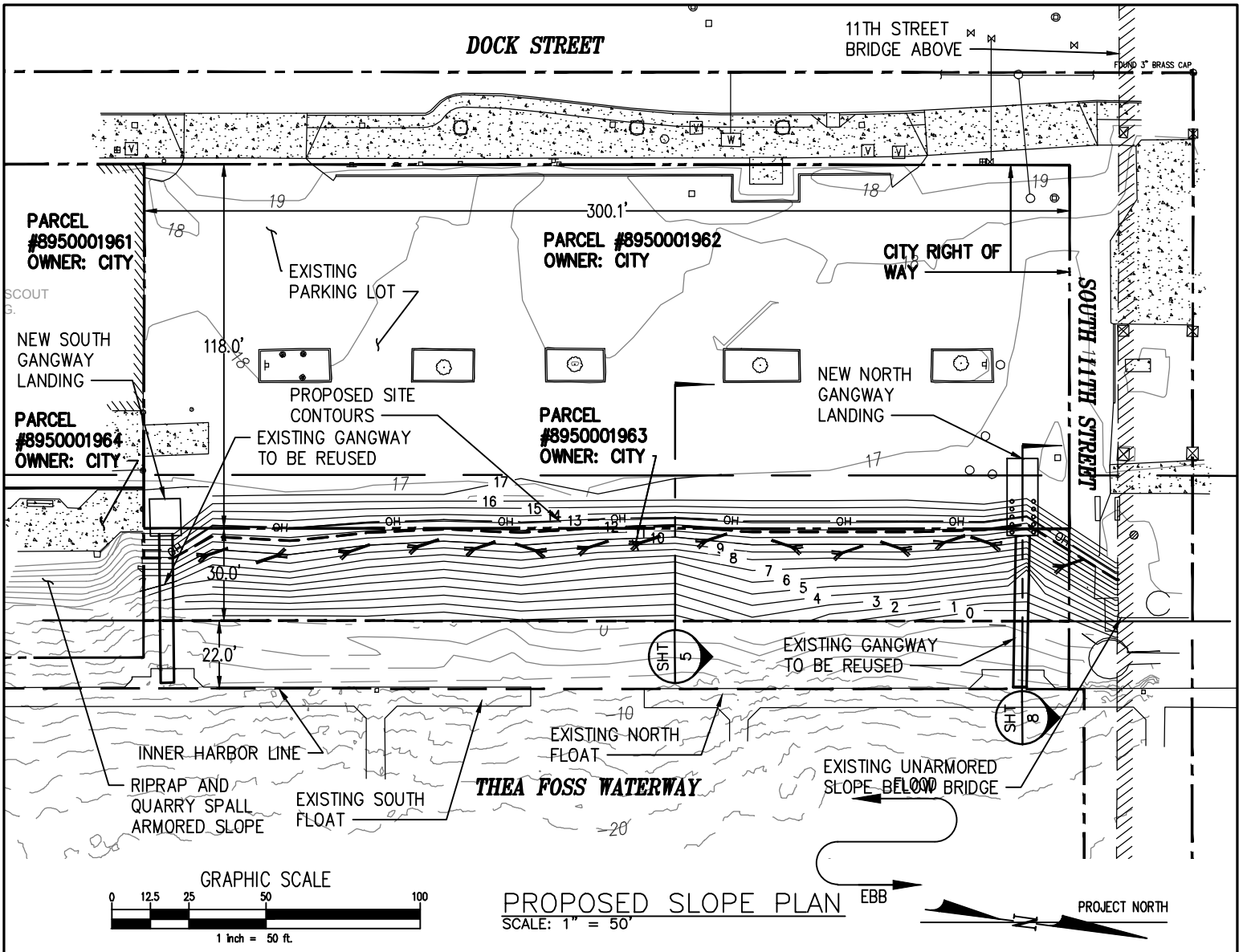
EXISTING SECTION

SCALE: 1" = 10'

LEGEND:

- PAVEMENT REMOVAL
- TIMBER STRUCTURE REMOVAL
- EXCAVATION

US ARMY CORPS OF ENGINEERS PERMIT EXISTING SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 3 **OF** 8 **DATE:** 10/29/13



PROPOSED SLOPE PLAN

SCALE: 1" = 50'

LEGEND:

- LARGE WOODY DEBRIS (LWD) AT EL +10.0 (15 TOTAL)
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- PROPOSED GRADING CONTOUR

FILL QUANTITIES		
	FILL AREA (SF)	FILL VOLUME (CY)
FILL BELOW MHHW	9,270	1,167
FILL ABOVE MHHW	4,800	334
TOTAL	14,070	1,501

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

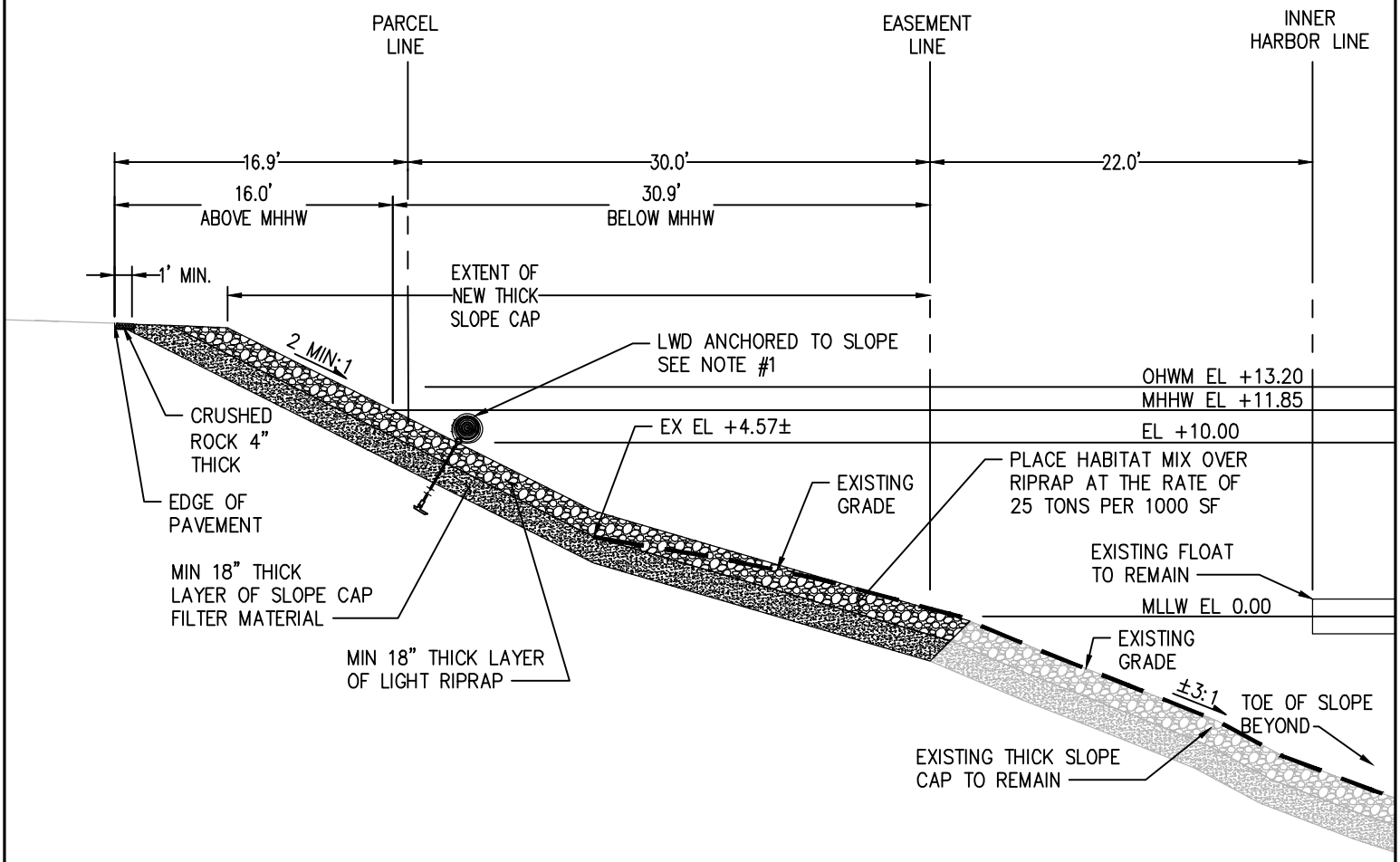
PROPOSED SLOPE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 4 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 2.5 5 10 20

1 inch = 10 ft.

PROPOSED SLOPE SECTION

SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

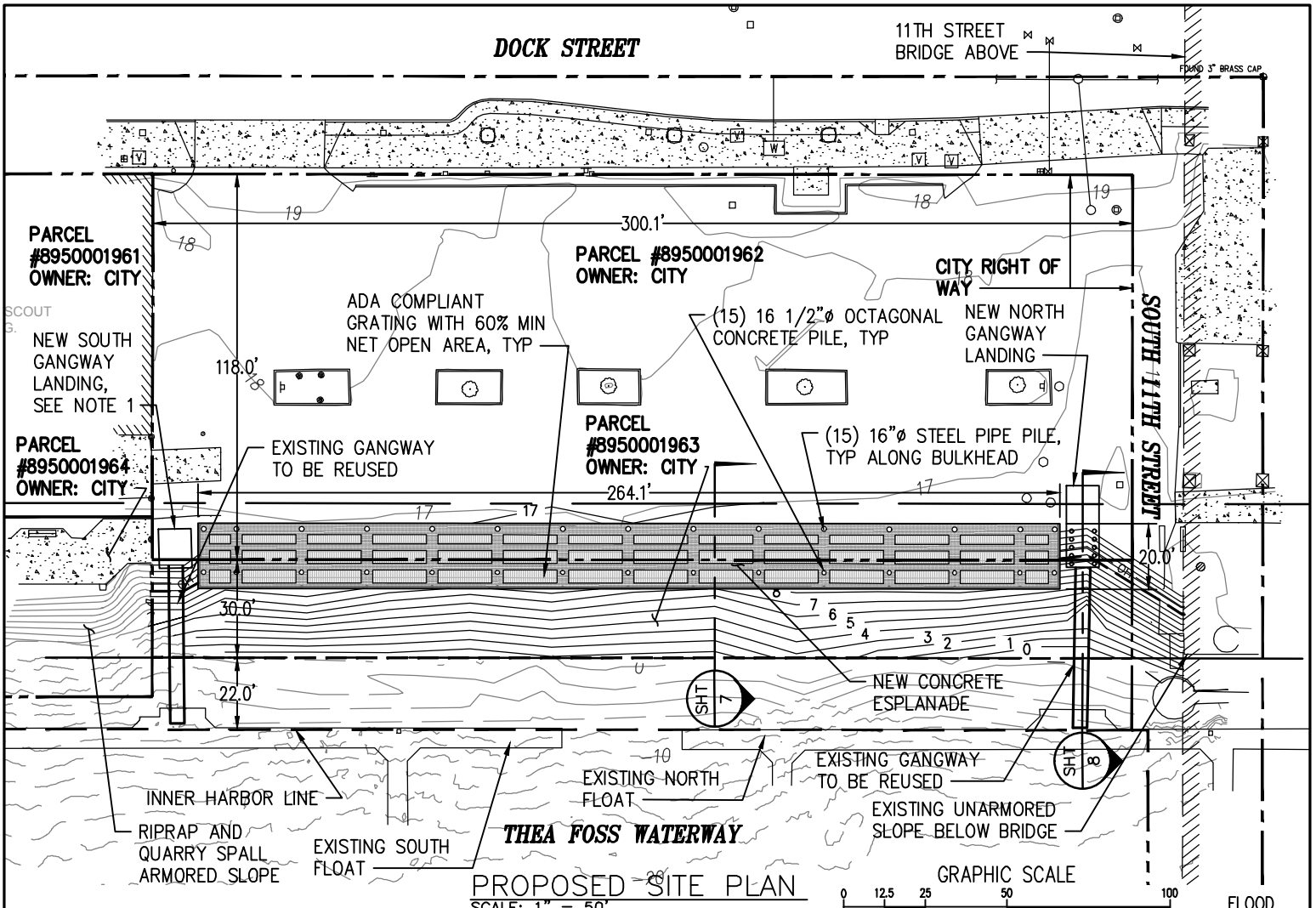
LIGHT RIPRAP FILL MATERIAL

NOTES:

1. LWD SHALL BE DOUGLAS FIR OR CEDAR. LOG DIAMETER SHALL BE NO LESS THAN 18" UNLESS OTHERWISE APPROVED BY THE ENGINEER. LOG LENGTH SHALL BE NO LESS THAN 15-FEET AND NO MORE THAN 20-FEET. EACH LOG SHALL HAVE EITHER LIMBS OR ROOT WADS. BARK SHALL REMAIN INTACT ON THE LOGS.

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SLOPE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 5 **OF** 8 **DATE:** 10/29/13



PROPOSED SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

FLOOD

EBB

PROJECT NORTH

LEGEND:

- PROPOSED CONCRETE ESPLANADE
- PROPOSED MARINA FLOAT
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- PROPOSED GRADING CONTOUR

NOTES:

1. THE NEW SOUTH GANGWAY LANDING IS POSITIONED ABOVE THE TOP OF THE SLOPE AND THEREFORE NOT CONSIDERED IN OVER WATER COVERAGE CALCULATIONS.

PROPOSED QUANTITIES

	ABOVE MHHW		BELOW MHHW		ABOVE OHWM		BELOW OHWM	
	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)
CONCRETE PILES	1		14		0		15	
STEEL PILES	15		0		15		0	
STEEL PIN PILES	6		4		4		6	
NORTH LANDING		220		30		193		57
GROSS CONCRETE ESPLANADE AREA		3,253		2,028		2,377		2,904
GRATED AREA		1,351		923		742		1,532
TOTAL (SEE NOTE 1)	22	2,662*	18	1,504*	19	2,125*	21	2,042*

*TOTAL AREA = (GROSS AREA) – 0.6(GRATED AREA) + NORTH LANDING AREA

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

PROPOSED SITE PLAN

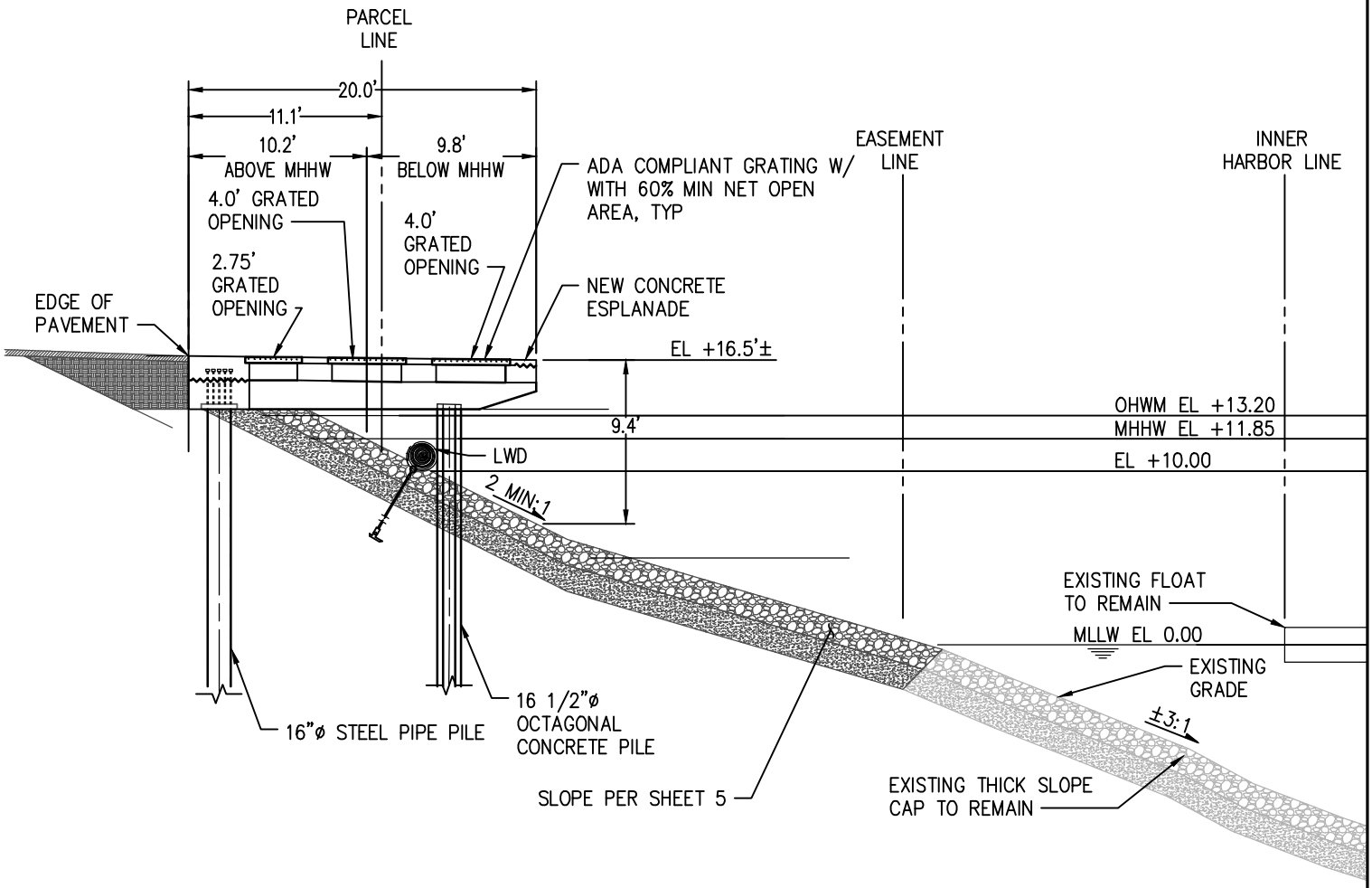
REFERENCE:

APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 6 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 5 10 20 40

1 inch = 10 ft.

PROPOSED SECTION

SCALE: 1" = 10'

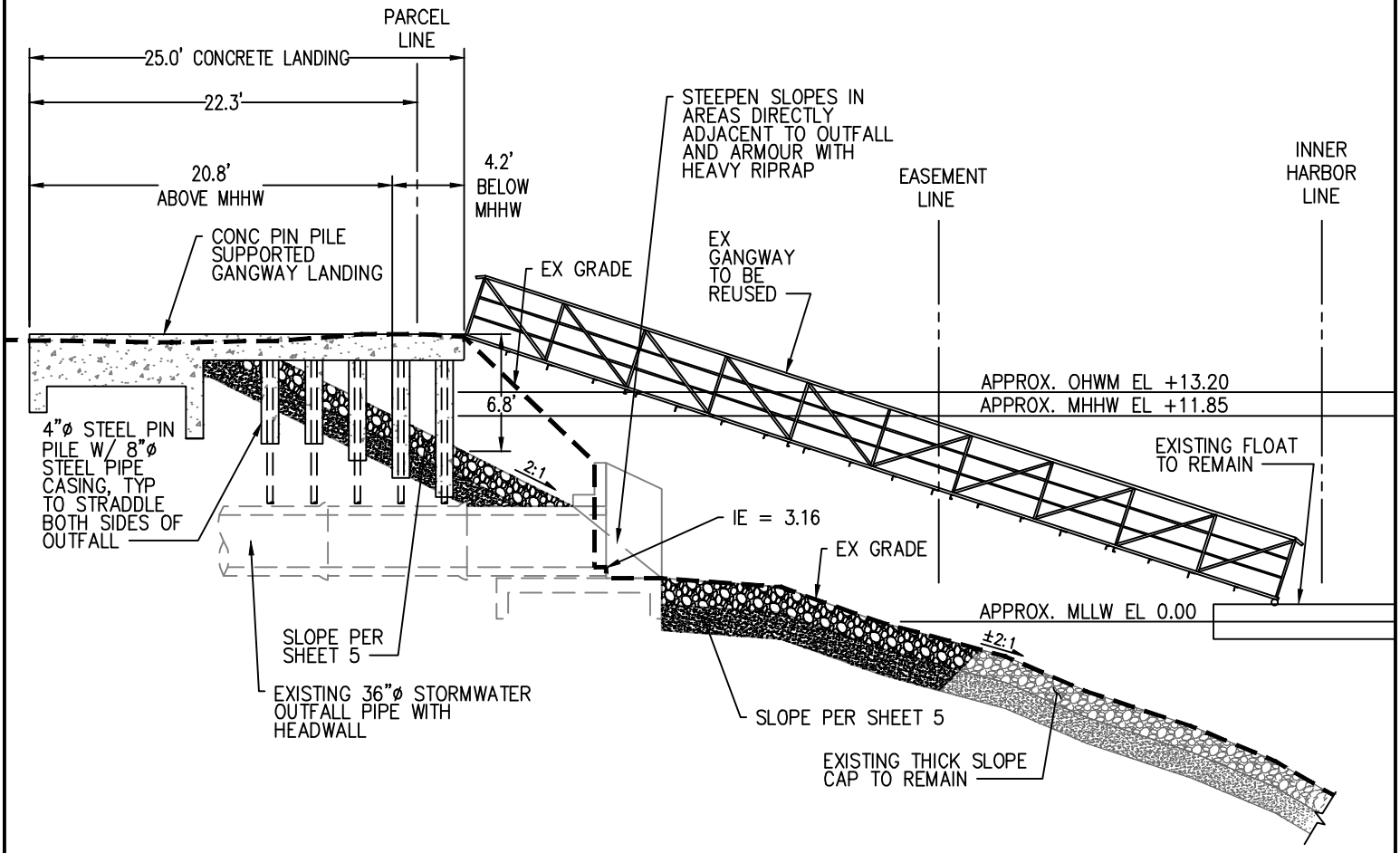
LEGEND:

CAP FILTER FILL MATERIAL

LIGHT RIPRAP FILL MATERIAL

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 7 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 5 10 20 40

1 inch = 10 ft.

PROPOSED SECTION AT NORTH GANGWAY LANDING

SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

LIGHT RIPRAP FILL MATERIAL

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED GANGWAY LANDING SECTION	REFERENCE: APPLICANT: CITY OF TACOMA (CITY)	PROPOSED PROJECT: BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION LOCATION (PARCEL#): 8950001962 & 8950001963 SHEET 8 OF 8 DATE: 10/29/13

APPENDIX A
AGENCY CORRESPONDENCE

Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated July 1, 2009)

Species[1]			Current Endangered Species Act Listing Status[2]	ESA Listing Actions Under Review
Sockeye Salmon (*Oncorhynchus nerka*)	1	Snake River	Endangered	
	2	Ozette Lake	Threatened	
	3	Baker River	Not Warranted	
	4	Okanogan River	Not Warranted	
	5	Lake Wenatchee	Not Warranted	
	6	Quinalt Lake	Not Warranted	
	7	Lake Pleasant	Not Warranted	
Chinook Salmon (*O. tshawytscha*)	8	Sacramento River Winter-run	Endangered	
	9	Upper Columbia River Spring-run	Endangered	
	10	Snake River Spring/Summer-run	Threatened	
	11	Snake River Fall-run	Threatened	
	12	Puget Sound	Threatened	
	13	Lower Columbia River	Threatened	
	14	Upper Willamette River	Threatened	
	15	Central Valley Spring-run	Threatened	
	16	California Coastal	Threatened	
	17	Central Valley Fall and Late Fall-run	Species of Concern	
	18	Upper Klamath-Trinity Rivers	Not Warranted	
	19	Oregon Coast	Not Warranted	
	20	Washington Coast	Not Warranted	
	21	Middle Columbia River spring-run	Not Warranted	
	22	Upper Columbia River summer/fall-run	Not Warranted	
	23	Southern Oregon and Northern California Coast	Not Warranted	
	24	Deschutes River summer/fall-run	Not Warranted	
Coho Salmon (*O. kisutch*)	25	Central California Coast	Endangered	
	26	Southern Oregon/Northern California	Threatened	
	27	Lower Columbia River	Threatened	• Critical habitat
	28	Oregon Coast	Threatened	
	29	Southwest Washington	Undetermined	
	30	Puget Sound/Strait of Georgia	Species of Concern	
	31	Olympic Peninsula	Not Warranted	
Chum Salmon (*O. keta*)	32	Hood Canal Summer-run	Threatened	
	33	Columbia River	Threatened	
	34	Puget Sound/Strait of Georgia	Not Warranted	
	35	Pacific Coast	Not Warranted	
Steelhead (*O. mykiss*)	36	Southern California	Endangered	
	37	Upper Columbia River	Threatened	
	38	Central California Coast	Threatened	
	39	South Central California Coast	Threatened	
	40	Snake River Basin	Threatened	
	41	Lower Columbia River	Threatened	
	42	California Central Valley	Threatened	
	43	Upper Willamette River	Threatened	
	44	Middle Columbia River	Threatened	
	45	Northern California	Threatened	
	46	Oregon Coast	Species of Concern	
	47	Southwest Washington	Not Warranted	
	48	Olympic Peninsula	Not Warranted	
	49	Puget Sound	Threatened	• Critical habitat
	50	Klamath Mountains Province	Not Warranted	
Pink Salmon (*O. gorbuscha*)	51	Even-year	Not Warranted	
	52	Odd-year	Not Warranted	

1 The ESA defines a "species" to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or "ESU," a "species" under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated distinct population segments (DPSs) for consideration as "species" under the ESA.

Page Title: ESA MM List

URL: http://www.nwr.noaa.gov/Marine-Mammals/ESA-MM-List.cfmhttp://www.nwr.noaa.gov/Marine-Mammals/ESA-MM-List.cfm

ESA-Listed Marine Mammals

Under the jurisdiction of NOAA Fisheries that may occur:

off Washington & Oregon

- Southern Resident killer whale (*Orcinus orca*) (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- blue whale *(Balaenoptera musculus)* (E)
- fin whale (*Balaenoptera physalus)* (E)
- sei whale (*Balaenoptera borealis)* (E)
- sperm whale (*Physeter macrocephalus)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

in Puget Sound

- Southern Resident killer whale *(Orcinus orca)* (E); critical habitat
- humpback whale *(Megaptera novaeangliae)* (E)
- Steller sea lion *(Eumetopias jubatus)* (T); critical habitat

(E) = Endangered
(T) = Threatened

Page last updated: 2010-06-15 11:08:13

Page Title: ESA Other List

URL: http://www.nwr.noaa.gov/Other-Marine-Species/ESA-Other-List.cfmhttp://www.nwr.noaa.gov/Other-Marine-Species/ESA-Other-List.cfm

Other ESA-Listed Species

Under the jurisdiction of NOAA Fisheries that may occur off Washington & Oregon:

- distinct population segment, or DPS, of bocaccio *(Sebastes paucispinis)* (E) in Puget Sound
- distinct population segment, or DPS, of canary rockfish *(Sebastes pinniger)* (T) in Puget Sound
- distinct population segment, or DPS, of yelloweye rockfish *(Sebastes ruberrimus)* (T) in Puget Sound
- southern distinct population segment, or DPS, of eulachon (Columbia River smelt) *(Thaleichthys pacificus)* (T)
- southern distinct population segment, or DPS, of north American green sturgeon (*Acipenser medirostris*) (T), listed in the NOAA Fisheries Southwest Region

(E) = Endangered
(T) = Threatened

Page last updated: 2010-06-15 10:22:36

Page Title: ESA Turtle List

URL: http://www.nwr.noaa.gov/Other-Marine-Species/ESA-Turtle-List.cfmhttp://www.nwr.noaa.gov/Other-Marine-Species/ESA-Turtle-List.cfm

ESA-Listed Marine Turtles

Under the jurisdiction of NOAA Fisheries that may occur off Washington & Oregon:

- leatherback sea turtle *(Dermochelys coriacea)* (E)
- green sea turtle (*Chelonia mydas)* (E)
- olive ridley sea turtle (*Lepidochelys olivacea)* (E)
- loggerhead sea turtle *(Caretta caretta)* (T)

Sightings and strandings of these animals are very rare, and there are no breeding beaches in the Northwest Region.

(E) = Endangered
(T) = Threatened

Feb. 19, 2010: NOAA Fisheries extended the comment period on the proposed revision to existing critical habitat for the leatherback turtle under the Endangered Species Act. See the *Federal Register* notice *(PDF 49KB)* for details.

Jan. 5, 2010: NOAA Fisheries proposed to revise and expand critical habitat for the leatherback turtle under the Endangered Species Act. Additional information about this proposal can be found in the links below and on NOAA Fisheries' Office of Protected Resources Website.

- News Release *(PDF 73KB -- links to NOAA Fisheries Website)*
- *Federal Register* notice *(PDF 711KB)*

Page last updated: 2011-03-03 08:35:19

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN IN PIERCE COUNTY AS PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE WASHINGTON FISH AND WILDLIFE OFFICE

(Revised December 15, 2010)

LISTED

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS
Canada lynx (*Lynx canadensis*)
Gray wolf (*Canis lupus*)
Grizzly bear (*Ursus arctos = U. a. horribilis*)
Marbled murrelet (*Brachyramphus marmoratus*)
Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

Arenaria paludicola (marsh sandwort) [historic]
Castilleja levisecta (golden paintbrush) [historic]
Howellia aquatilis (water howellia)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.

2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.

3. Changes in hydrology where taxon is found.

DESIGNATED

Critical habitat for bull trout
Critical habitat for the marbled murrelet
Critical habitat for the northern spotted owl

PROPOSED

Revised critical habitat for bull trout

CANDIDATE

Fisher *(Martes pennanti)* – West Coast DPS
Mardon skipper (*Polites mardon*)
(Roy Prairie and Tacoma) Mazama pocket gopher (*Thomomys mazama* ssp. *glacialis* and *tacomensis* [historic])
North American wolverine *(Gulo gulo luteus)* – contiguous U.S. DPS
Oregon spotted frog (*Rana pretiosa*)
Streaked horned lark (*Eremophila alpestris strigata*)
Taylor's checkerspot (*Euphydryas editha taylori*)
Yellow-billed cuckoo (*Coccyzus americanus*)

SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)
Cascades frog (*Rana cascadae*)
Fender's soliperlan stonefly (*Soliperla fenderi*)
Larch Mountain salamander (*Plethodon larselli*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Northern goshawk (*Accipiter gentilis*)
Northern sea otter (*Enhydra lutris kenyoni*)
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)
Olive-sided flycatcher (*Contopus cooperi*)
Oregon vesper sparrow (*Pooectetes gramineus affinis*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
Peregrine falcon (*Falco peregrinus*)
River lamprey (*Lampetra ayresi*)
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)
Tailed frog (*Ascaphus truei*)

Valley silverspot butterfly (*Speyeria zerene bremeri*)
Western gray squirrel (*Scirius griseus griseus*)
Van Dyke's salamander (*Plethodon vandykei*)
Aster curtus (white-top aster)
Botrychium ascendens (triangular-lobed moonwort)
Castilleja cryptantha (obscure paintbrush)
Cimicifuga elata (tall bugbane)
Cypripedium fasiculatum (clustered lady's slipper)
Lathyrus torreyi (Torrey's peavine)

APPENDIX B
ESSENTIAL FISH HABITAT

APPENDIX B
ESSENTIAL FISH HABITAT
BULKHEAD EMERGENCY REMOVAL AND ESPLANADE REPLACEMENT – DEVELOPMENT SITE 9 THEA FOSS WATERWAY
BIOLOGICAL EVALUATION
TACOMA, WASHINGTON

ACTION AGENCY

U.S. Army Corps of Engineers, Seattle District

PROJECT NAME

Essential Fish Habitat – Thea Foss Waterway Development Site 2—Esplanade Boardwalk Replacement

PROJECT LOCATION

The proposed project area is located in Tacoma, Pierce County, Washington (Township 20 North, Range 03 East, Section 4) along Thea Foss Waterway within Commencement Bay (Figure 1).

ESSENTIAL FISH HABITAT BACKGROUND

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act set forth the essential fish habitat (EFH) provision to identify and protect important habitats of federally managed marine and anadromous fish species. Federal agencies, such as the Corps, which fund, permit, or undertake activities that may adversely affect EFH, are required to consult with NOAA Fisheries (formerly NMFS) regarding the potential effects of their actions on EFH, and respond in writing to NOAA Fisheries' recommendations.

Essential fish habitat is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate. "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities (NMFS 1999).

IDENTIFICATION OF EFH

Groundfish, coastal pelagic, and salmonid fish species that have designated EFH in Puget Sound are listed in Table B-1. Some or all of these species may occur in

the project area. Refer to the relevant EFH designations (Casillas et al. 1998; PFMC 1998a, 1998b, and 1999) for life history stages of these species that may occur in the project vicinity. Assessment of the impacts to these species' EFH from the proposed project is based on this information.

PROJECT DESCRIPTION

Project and Action Areas

The "project area," where the work will be performed, is located in Pierce County, City of Tacoma, Washington, along the Thea Foss Waterway of Commencement Bay. The project area is located in Township 20N, Range 3E, Section 4, in Thea Foss Waterway (Figure 1; Sheet 1). The "action area" where direct and indirect effects of the proposed action may occur is defined as a 100-meter (m) radius waterward of the project area to take into account temporary water quality impacts during construction activities.

Project Description

Overview

Development Site 9 is an approximate 300-foot reach of the City of Tacoma (City) waterfront located just south of the Murray Morgan Bridge along the west side of the Thea Foss Waterway (Figure 1; Sheet 1). The site is a composed of an upland paved parking area and an adjacent overwater pedestrian esplanade. The esplanade is supported landward by a failing timber bulkhead and waterward by failing timber piles. The esplanade and associated decking to the north occupies an area of 5,290 square feet, all of which is situated over the intertidal zone (Sheets 2 and 3). Site 9 is owned by the City and is currently leased to the Foss Harbor Marina as parking for marina tenants.

In late July, 2011 sinkholes began to develop on the Site 9 property, just behind the failing timber bulkhead (Photographs 1 and 2). At the time, a replacement esplanade structure was in the early design development for the Foss Waterway Development Authority (FWDA). Visual inspections of the pavement surface and structured bulkhead were conducted, and recommendations for repairs were developed. The size of the sinkhole has grown significantly since the summer of 2013, jeopardizing safe access to the Foss Harbor Marina and service of nearby utilities. The portion of the timber esplanade and bulkhead structure immediately in front of the settled area is also near collapse (Photographs 3 and 4).

In recognition of the risk associated with failure of the bulkhead and esplanade structure, the City considers this an emergency repair situation and conducted an evaluation to address the issue. A number of options were considered, including no action, relocation of threatened utilities, removal of the esplanade and timber bulkhead, installation of the new bulkhead structure, and modification of the shoreline. A structural condition assessment of the entire Site 9 esplanade structure was also conducted and recommended that public access to the esplanade deck be restricted. Recent action taken by the City includes the installation of a barrier to restrict public access, engagement of a contractor to reroute threatened utilities that serve the marina, and coordination with local permitting agencies regarding anticipated in-water work.

Project Details

After the evaluation of several alternatives, the City has decided that the entire timber esplanade/bulkhead along Site 9 will be removed and the shoreline modified by cutting it back and creating new intertidal habitat. Enhancement of existing intertidal zone below the bulkhead will also occur. After habitat creation and enhancements, a new esplanade with light penetrating surfaces will be constructed over the cut back intertidal zone. Following are details of the bulkhead removal, cutback, intertidal habitat creation and enhancement, and esplanade replacement.

Cutback, Intertidal Creation, and Intertidal Enhancement

A 27-foot cutback behind the bulkhead will be excavated and graded at a 2-to-1 slope for the entire length of Development Site 9 (approximately 300 feet), resulting in the creation of new intertidal habitat of the United States (Sheet 3). Cutback elevations will range from the existing upland parking area to about +4.6 feet mean lower low water (MLLW) at the base of the existing bulkhead. Excavation for the cutback will occur before bulkhead removal to minimize water quality impacts to the marine nearshore. Further enhancements of the intertidal zone will be conducted in front of the former bulkhead to MLLW (0 feet) for the length of Development Site 9 (Sheets 4 and 5). In this area, all existing rubble and debris will be removed.

New substrates will be laid in the newly created and enhanced intertidal areas to stabilize the slope and enhance ecological functions. A 1.5-foot layer of slope cap material composed of clean borrow sand and gravel will be laid to stabilize the slope. On top of the cap, a 1.5-foot layer of light riprap (12- to 15-inch diameter) will be placed and covered with a habitat mix of gravel and sand at an application rate of 25 tons per 1,000 square feet (Sheet 5). The light riprap is

necessary to stabilize the habitat mix and the application rate will fill voids and overtop the riprap by a minimum depth of 12 inches.

Habitat mix will consist of a 2-inch-minus pit-run, rounded material from an approved source conforming to the following gradation:

US Standard Sieve Size	Percent Passing (by weight)
6-inch	100
4-inch	90 to 100
0.75-inch	50 to 90
No. 4	35 to 65
No.10	15 to 45
No. 40	2 to 10
No. 200	0 to 2

This habitat mix has been used in several beach restoration and enhancement areas within Commencement Bay.

The cutback and excavation will result in the creation of approximately 3,870 square feet of new intertidal marine waters of the United States behind the bulkhead between MHHW and +4.6 feet MLLW. In front of the bulkhead, approximately 6,030 square feet of intertidal habitat between +4.6 feet and MLLW will be enhanced with rubble removal and habitat mix.

In addition, approximately 15 logs, rootwads intact, will be permanently anchored onto the cap at an elevation between +9 and +10 feet MLLW. Large woody debris (LWD) will be at least 12 inches diameter at breast height (dbh) and 18 feet in length, and anchored along the entire length of the esplanade at Development Site 9 (Sheets 4 and 5).

Bulkhead and esplanade removal will result in the removal of 81 creosote-treated piles. Timber piles will be pulled completely out of the bottom or cut off below the mudline.

Sequencing for Habitat Creation and Enhancement

The first order of work will be to remove the damaged timber esplanade. After this work is completed, intertidal restoration will begin at the south end of the project area, moving north. Cutback and enhancement will occur in sections of 25 to 50 feet at a time. The work will follow the tide cycles allowing for most or all of the excavation and backfill to be performed in the dry. Since the project is

scheduled for December and January, there will be a considerable amount of work done during the nighttime low tides.

The construction of each section of repair will begin by excavating the existing bank line at the lowest point, near MLLW (0 feet). The rubble will be excavated from this low point up to the waterward edge of the existing bulkhead. Sediment and rubble will either be stockpiled, decanted, and hauled off, or loaded directly into trucks and hauled off. The capping, light riprap and habitat mix will be immediately placed in the area of rubble removal in the lower intertidal zone. The section behind the bulkhead would then be cutback followed by bulkhead removal. The section will then be completed by placing the capping material, light riprap, and habitat mix material on the excavated slope of the cutback area in the newly created upper intertidal zone. Once the current section is completed, the operation will move ahead parallel to the bank line and begin a new section at the next low tide cycle.

Staging areas for all construction activities will be on the existing adjacent parking lot. Machinery to be used during the cutback, rubble removal, and substrate placement include backhoe/track hoes, cranes, and dump trucks. All construction activities will be conducted from upland parking areas, and no heavy machinery will be placed on the existing intertidal zone. During esplanade replacement, all decking will be composed of pre-cast concrete panels that will be laid in place using machinery in the parking area. Pile driving will be conducted in the dry using an impact pile driver.

Esplanade Replacement

After emergency repairs and substrate enhancements, a new esplanade will be constructed over the newly created intertidal habitat (Sheets 6, 7, and 8). The esplanade will be composed of pre-cast concrete sections. The length of the new esplanade will be 264.1 feet and occupy approximately 2,028 square feet of overwater coverage below mean higher high water (MHHW), supported by thirty, 16- to 16.5-inch concrete and steel piles (Sheet 6). Only concrete piles (16.5-inch) will be driven into the intertidal zone at an elevation of approximately +7 feet MLLW. Steel piles (16-inch) will support the landward side of the esplanade entirely upland at an elevation of approximately +14 feet MLLW (ordinary high water is at +13.2 feet MLLW; Sheet 7). All pile driving will be conducted with an impact pile driver.

In addition, ten steel 4-inch pin piles will be driven to support the gangway landing on the north side of the site (Sheet 8). Pin piles will be driven in the dry with a vibratory hammer. After driving, a 12-inch steel sleeve will be attached to each pin pile for protection.

The new esplanade will be 20 feet wide, extending waterward to approximately +5.0 feet MLLW (Sheet 7). The middle to lower portions of the intertidal zone will be free of overwater structure. The new esplanade will occupy approximately 61.1 percent less area over the intertidal zone (2,058 square feet for the new esplanade compared with the existing structure of 5,290 square feet). This is because the existing esplanade is entirely over the intertidal zone where as the proposed new esplanade will be moved landward with about 51 percent of it situated above MHHW (Sheet 8)

The new esplanade will be designed with thirty-six, 16.5-foot and six, 6 foot panels of grating extending the length of the structure to allow light penetration to the intertidal zone below (Sheet 7). Panels will be 2.75 feet and 4 feet wide (Sheet 8). The grating will be a minimum of 60 percent open area for a net open area of 923 square feet, further reducing the net overwater coverage to 1,504 square feet (2,058 square feet of esplanade and landing minus 60 percent of 923 square feet of grating; Sheet 6).

Project Schedule

Construction of the proposed new esplanade will be in two phases. The first is the cutback, bulkhead removal, esplanade removal, and cap and substrate enhancements. These are considered emergency repair activities that need to be conducted before further bulkhead damage occurs, which may be considerable if repair activities are not conducted before the upcoming winter storm and extreme high tide season. The City and FWDA will conduct these emergency activities as soon as permits are received, preferably by early December 2013. If permits are obtained by early December, it is anticipated that all in-water work will be completed by the mid-February agency work window closure.

The second component of the project will be the esplanade replacement, which will be conducted during agency-approved work windows before the permits expire. It is anticipated that this work will be conducted during the winter of 2014/2015.

Impact Avoidance and Minimization Measures

Best Management Practices

Best management practices (BMPs) will be employed to reduce the potential for construction-related impacts on listed species and their habitats. The following will be incorporated into the design of the bulkhead and esplanade replacement

project:

- All in-water work will be conducted within agency-approved work windows to minimize potential adverse effects to aquatic life, including ESA-listed salmonids (July 16 to February 14).

- All 15 intertidal piles will be driven in the dry at lower tidal elevations to minimize the release of waterborne noise and water quality impacts

- Only concrete piles will be used in the intertidal zone, reducing noise-related impacts.

- Continuous debris containment and/or sorbent booms will be deployed around slope areas during cutback excavation, slope stabilization, substrate enhancement, and pile removal/driving activities. Containment booms will be constructed with silt curtains 10 feet in depth, deployed to contain debris and suspended sediment.

Conservation Measures

Several design attributes of both the emergency bulkhead removal and the esplanade replacement will substantially enhance intertidal habitats over existing conditions.

- Bulkhead removal and cutback/regrade of the slope behind the bulkhead will create 3,870 square feet of additional marine waters of the United States and reestablish ecological functions within the upper intertidal zone.

- Middle to lower reaches of the intertidal zone will be enhanced by removing existing concrete rubble and debris.

- Habitat mix will be laid down both above and below the bulkhead at elevations between MHHW and MLLW.

- Additional enhancement by the anchoring of 15 pieces of LWD will be conducted in the middle intertidal zone.

- The total intertidal area created (3,870 square feet) and enhanced (6,030 square feet) will be approximately 9,900 square feet, substantially exceeding the 2,058 square feet of overwater coverage occupied by the new esplanade (1,504 net square feet after accounting for grating).

- The new esplanade will occupy approximately 61.1 percent less area over the intertidal zone relative to the existing structure.

- Forty-two grated openings will be situated along the entire new esplanade, allowing the penetration of light to the newly created intertidal zone.

- Approximately 81 creosote-treated timber piles, all of which are within the intertidal zone, will be removed and replaced with 15 concrete piles within the intertidal zone. If possible, the entire pile will be removed. If the pile breaks or cannot be removed whole, it will be cut a minimum of 3 feet below the mud line and the hole filled with clean sand to the existing grade. If the hole is not filled right away, an absorbent boom will be placed around the hole to contain any residual creosote from the pile.

- The entire bulkhead and esplanade will be removed so that habitat creation, capping, substrate enhancement, and LWD anchoring can be conducted in advance of construction of the new esplanade.

POTENTIAL ADVERSE EFFECTS OF PROPOSED PROJECT

The project could potentially adversely affect EFH for groundfish, coastal pelagic, and salmonid species by bulkhead removal, habitat creation and habitat enhancement, all of which will likely create temporary periods of turbidity within the nearshore. However, these temporary effects would be offset by the long-term benefits of increasing the total amount of EFH in the upper intertidal zone and having natural beach substrates and wood within the middle to lower intertidal zone.

Substrate enhancement will temporarily eliminate the existing epifaunal and benthic community within the middle to lower intertidal zone. However, colonization of the new substrates is expected to occur quickly and at higher abundances and diversity than the existing habitats of rubble and debris. Productivity associated with the habitat mix and LWD would far exceed that found on existing concrete rubble.

The project will also create an additional 3,870 square feet of new EFH within the upper intertidal zone of the project area.

Groundfish, coastal pelagic, and salmonid species may occur in the project area or immediately offshore at any time of the year. Direct adverse effects to juvenile salmonids are not expected, however, because all inwater would occur during prescribed work windows (July 16 to February 14) to avoid outmigratory periods when large numbers of juvenile salmon are expected to be present.

Long-term effects are expected to be positive since the area of created habitat and enhanced habitat exceeds the overwater coverage of the proposed pedestrian esplanade.

From this analysis, it can be concluded that the Thea Foss Esplanade Replacement project will not result in a loss of marine habitats or ecological functions. Project actions **will not adversely affect** EFH at the site.

REFERENCES

Casillas, E., L. Crockett, Y. deReynier, J. Glock, M. Helvey, B. Meyer, C. Schmitt, M. Yoklavich, A. Bailey, B. Chao, B. Johnson, and T. Pepperell, 1998. Essential Fish Habitat, West Coast Groundfish, Appendix. National Marine Fisheries Service, Seattle, Washington.

NMFS (National Marine Fisheries Service), 1999. Essential Fish Habitat Consultation Guidance. Office of Habitat Conservation, National Marine Fisheries Service, Silver Spring, Maryland.

Pentec, 2002. Foss Waterway Marina Modification Biological Evaluation. Prepared for Sound Engineering, Inc., by Pentec Environmental, Edmonds, Washington.

Pentec, 2003. Thea Foss Waterway North Esplanade Development Site 2 (Parcels 10 and 11) Biological Evaluation. Draft. Prepared for Foss Waterway Development Authority by Pentec Environmental, Edmonds, Washington.

PFMC (Pacific Fishery Management Council), 1998a. Final Environmental Assessment/Regulatory Review for Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan (October 1998). PFMC, Portland, Oregon.

PFMC, 1998b. The Coastal Pelagic Species Fishery Management Plan: Amendment 8 (December 1998). PFMC, Portland, Oregon.

PFMC, 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon (August 1999). PFMC, Portland, Oregon.

Table B-1 – Species of Fish With Designated EFH in the Project Area

Groundfish Species
spiny dogfish, *Squalus acanthias*
big skate, *Raja binoculata*
California skate, *R. inornata*
longnose skate, *R. rhina*
spotted ratfish, *Hydrolagus colliei*
Pacific cod, *Gadus macrocephalus*
Pacific hake, *Merluccius productus*
black rockfish, *Sebastes melanops*
bocaccio, *S. paucispinis*
brown rockfish, *S. auriculatus*
canary rockfish, *S. pinniger*
China rockfish, *S. nebulosus*
copper rockfish, *S. caurinus*
darkblotched rockfish, *S. crameri*
greenstriped rockfish, *S. elongatus*
Pacific ocean perch, *S. alutus*
quillback rockfish, *S. maliger*
redbanded rockfish, *S. babcocki*
redstripe rockfish, *S. proriger*
rosethorn rockfish, *S. helvomaculatus*
rosy rockfish, *S. rosaceus*
rougheye rockfish, *S. aleutianus*
sharpchin rockfish, *S. zacentrus*
splitnose rockfish, *S. diploproa*
stripetail rockfish, *S. saxicola*
tiger rockfish, *S. nigrocinctus*
vermilion rockfish, *S. miniatus*
yelloweye rockfish, *S. ruberrimus*
yellowtail rockfish, *S. flavidus*
shortspine thornyhead, *Sebastolobus alascanus*
cabezon, *Scorpaenichthys marmoratus*
lingcod, *Ophiodon elongatus*
kelp greenling, *Hexagrammos decagrammus*
sablefish, *Anoplopoma fimbria*
jack mackerel, *Trachurus symmetricus*
Pacific sanddab, *Citharichthys sordidus*
butter sole, *Pleuronectes isolepis*
curlfin sole, *Pleuronichthys decurrens*
Dover sole, *Microstomus pacificus*
English sole, *Pleuronectes vetulus*
flathead sole, *Hippoglossoides elassodon*
petrale sole, *Eopsetta jordani*
rex sole, *Errex zachirus*
rock sole, *Pleuronectes bilineata*
sand sole, *Psettichthys melanostictus*
starry flounder, *Platichthys stellatus*
arrowtooth flounder, *Atheresthes stomias*

Coastal Pelagic Species
northern anchovy, *Engraulis mordax*
Pacific sardine, *Sardinops sagax*
chub mackerel, *Scomber japonicus*
market squid, *Loligo opalescens*

Salmonid Species
chinook salmon, *Oncorhynchus tshawytscha*
coho salmon, *O. kisutch*
Puget Sound pink salmon, *O. gorbuscha*

APPENDIX C
PHOTOGRAPHS

Photograph 1 – Settlement of the upland parking area resulting from bulkhead failure

Photograph 2 – Settlement of the upland parking area resulting from bulkhead failure

Photograph 3 – Bulkhead failure

Photograph 4 – Deteriorated bulkhead wall

USACE Nation Wide Permit 3 Maintenance

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

REPLY TO
ATTENTION OF

DEC 24 2013

Regulatory Branch

Mr. Tom Rutherford
City of Tacoma
747 Market Street, Room 544
Tacoma, Washington 98402

Reference: NWS-2013-1124
Tacoma, City of

Dear Mr. Rutherford:

We have reviewed your application to remove a failing bulkhead, cut back the shoreline, place bank stabilization materials, replace a pedestrian boardwalk, and do mitigation measures in the Thea Foss Waterway at Tacoma, Washington. Based on the information you provided to us, Nationwide Permit (NWP) 3, *Maintenance* (Federal Register February 21, 2012, Vol. 77, No. 34), authorizes your proposal as depicted on the enclosed drawings dated October 29, 2013.

In order for this authorization to be valid, you must ensure the work is performed in accordance with the enclosed *NWP 3, Terms and Conditions* and the following special conditions:

a. You must implement and abide by the Endangered Species Act (ESA) requirements and/or agreements set forth in the Biological Evaluation entitled *Draft Emergency Bulkhead Removal and Esplanade Replacement-Development Site 9*, dated October 29, 2013. The National Marine Fisheries Service (NMFS) concurred with a finding of "may affect, not likely to adversely affect" based on this document on December 2, 2013 (NMFS Reference Number WCR-2013-120). The U.S. Fish and Wildlife Service (USFWS) concurred with a finding of "may affect, not likely to adversely affect" based on this document on December 6, 2013 (USFWS Reference Number 01EWFW00-2014-I-0067). Both agencies will be informed of this permit issuance. Failure to comply with the commitments made in this document constitutes non-compliance with the ESA and your U.S. Army Corps of Engineers permit. The USFWS/NMFS is the appropriate authority to determine compliance with ESA.

b. In order to meet the requirements of the Endangered Species Act and protect Puget Sound Chinook, Puget Sound steelhead, and Coastal-Puget Sound bull trout, the permittee may conduct the authorized activities from July 16 through February 15 in any year this permit is valid. The

permittee shall not conduct work authorized by this permit from February 16 through July 15 in any year this permit is valid.

c. By accepting this permit, the permittee agrees to accept such potential liability for response costs, response activity and natural resource damages as the permittee would have under Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq. (CERCLA), or the Model Toxics Control Act, R.C.W. 70.105 (MTCA) absent the issuance of this permit. Further, the permittee agrees that this permit does not provide the permittee with any defense from liability under the CERCLA or MTCA. Additionally, the permittee shall be financially responsible for any incremental response costs attributable under CERCLA or MTCA to the permittee's activities under this permit at the project site.

We have reviewed your project pursuant to the requirements of the ESA, the Magnuson-Stevens Fishery Conservation and Management Act and the National Historic Preservation Act. We have determined this project complies with the requirements of these laws provided you comply with all of the permit general and special conditions.

The authorized work complies with the Washington State Department of Ecology's (Ecology) Water Quality Certification and the Coastal Zone Management Act requirements for this NWP. No further coordination with Ecology is required.

The Thea Foss Waterway is a water of the U.S. If you believe this is inaccurate, you may request a preliminary or approved jurisdictional determination (JD). If one is requested, please be aware that we may require the submittal of additional information to complete the JD and work authorized in this letter may not occur until the JD has been completed.

Our verification of this NWP authorization is valid until March 18, 2017, unless the NWP is modified, reissued, or revoked prior to that date. If the authorized work has not been completed by that date and you have commenced or are under contract to commence this activity before March 18, 2017, you will have until March 18, 2018, to complete the activity under the enclosed terms and conditions of this NWP. Failure to comply with all terms and conditions of this NWP verification invalidates this authorization and could result in a violation of Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act. You must also obtain all State and local permits that apply to this project.

Upon completing the authorized work, you must fill out and return the enclosed *Certificate of Compliance with Department of the Army Permit* form. Thank you for your cooperation during the permitting process. We are interested in your experience with our Regulatory Program and encourage you to complete a customer service survey form. This form and information about our program is available on our website at www.nws.usace.army.mil select

"Regulatory Branch, Permit Information" and then "Contact Us." A copy of this letter without enclosures will be furnished to Mr. Jim Starkes, Hart Crowser, 120 Third Avenue South, Suite 110, Edmonds, Washington 98020-8411. If you have any questions, please contact me at james.d.green@usace.army.mil or (206) 316-3156.

Sincerely,

Jim Green, Project Manager
Regulatory Branch

Enclosures

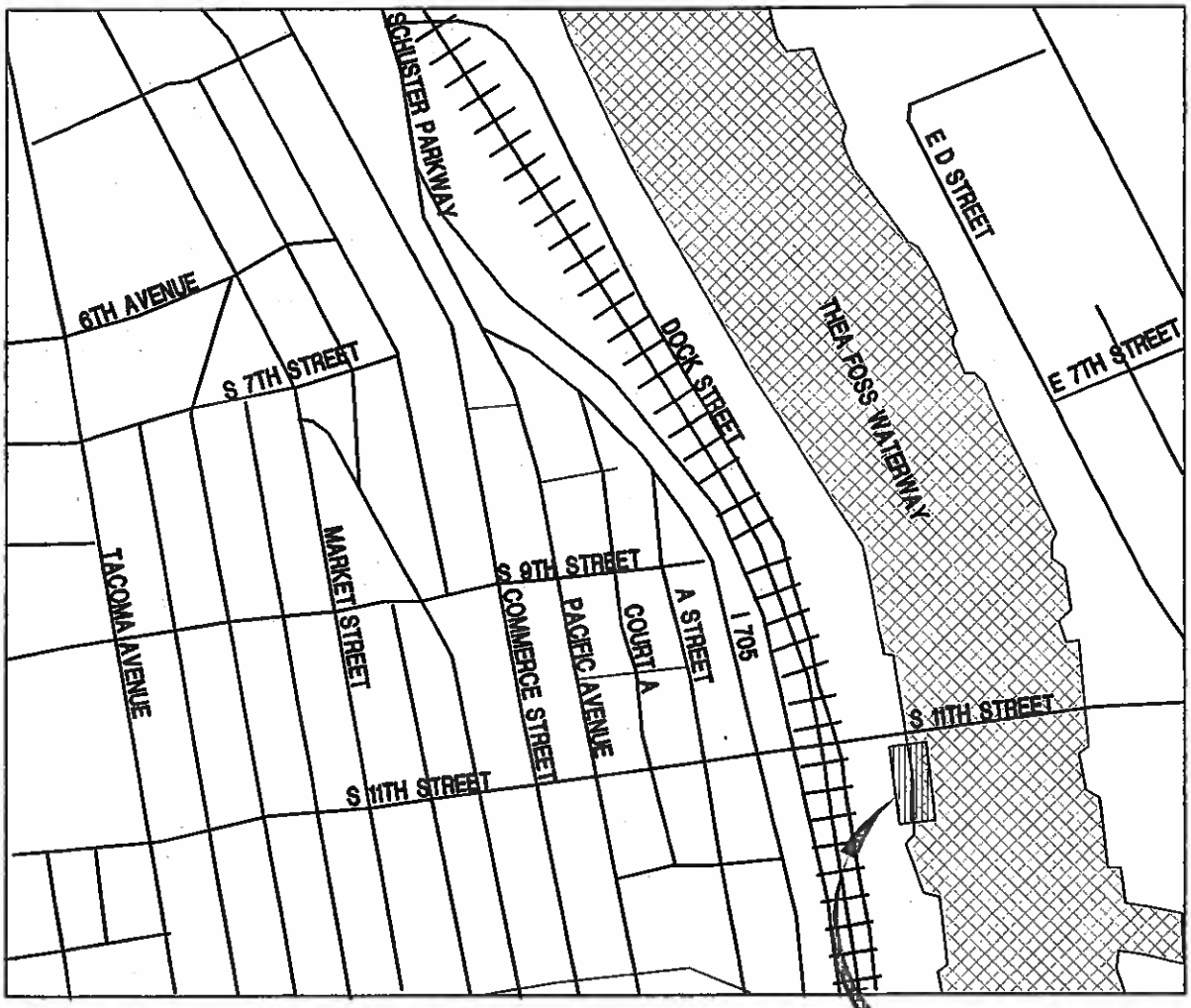
US ARMY CORPS OF ENGINEERING
PERMIT

SITE 9 BULKHEAD REPAIR AND ESPLANADE CONSTRUCTION

SECTION 04, TOWNSHIP 20 NORTH, RANGE 03 EAST

PROJECT LOCATION

STATE MAP
NO SCALE

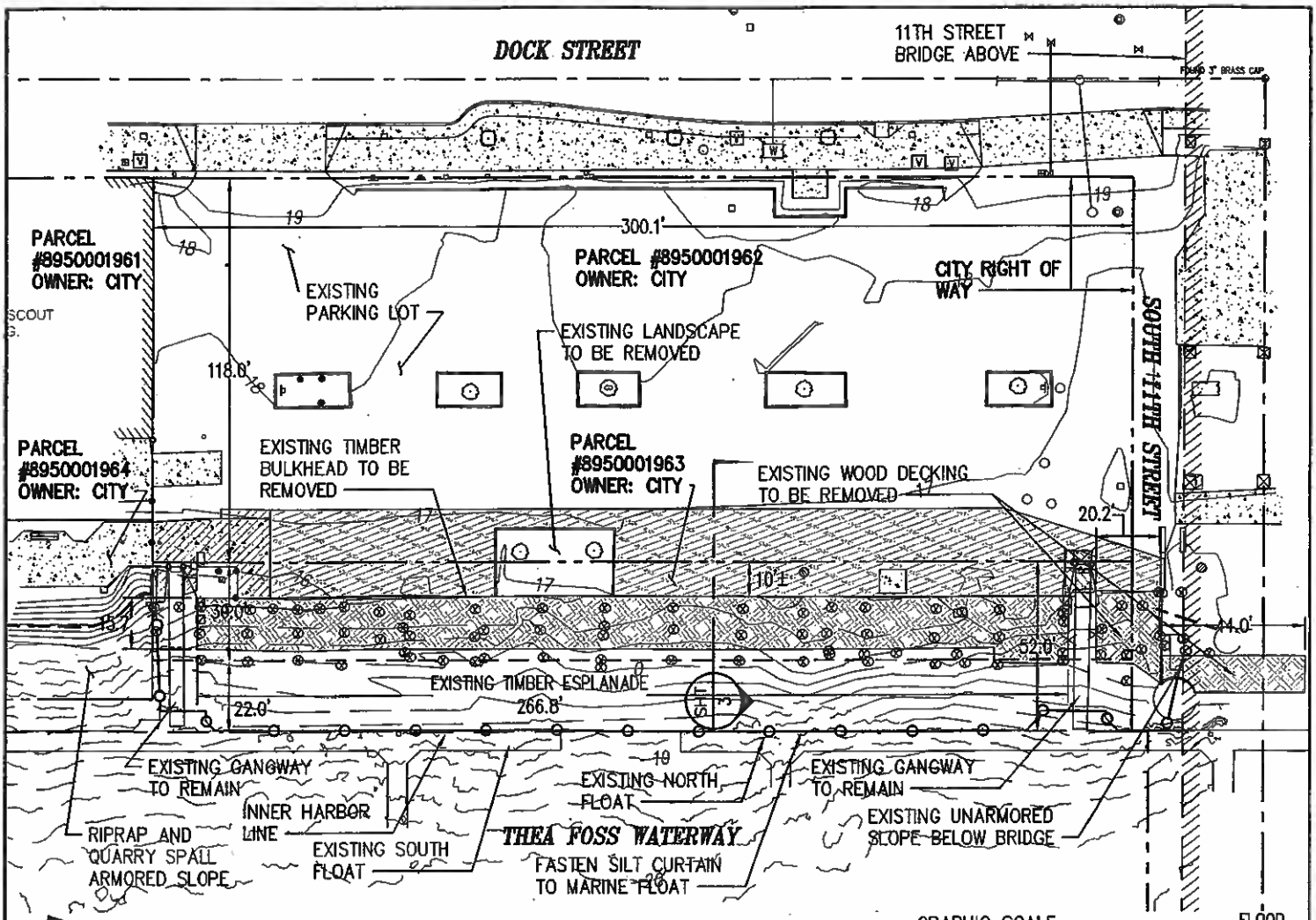


VICINITY MAP
NO SCALE

SITE 9 ESPLANADE SITE

NWS-2013-1124

REFERENCE: APPLICANT: CITY OF TACOMA (CITY) ADJACENT PROPERTY OWNERS: 1. CITY/8950001961 2. CITY/8950001964	LOCATION (PARCEL#): 8950001962 & 8950001963 LAT/LONG: 47° 15'11.82"N 122° 26'4.46"W SHEET 1 OF 8 DATE: 10/29/13	PROPOSED PROJECT: BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION IN: THEA FOSS WATERWAY NEAR: TACOMA COUNTY: PIERCE STATE: WASHINGTON



EXISTING SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

LEGEND:

- EXISTING OVER WATER COVERAGE TO BE REMOVED
- EXISTING ASPHALT PAVEMENT TO BE REMOVED
- EXISTING CONCRETE PAVEMENT TO BE REMOVED
- ⊗ TIMBER PILE TO BE REMOVED SEE NOTE 1 & 2.
- MHHW (EL = +11.85)
- SILT CURTAIN

REMOVAL QUANTITIES

	BELOW MHHW	
	EXIST QUANTITY TO BE REMOVED	EXIST OVER WATER AREA TO BE REMOVED (SF)
PILES	81	
TIMBER ESPLANADE		4,350
WOOD DECK		940
TOTAL	81	5,290

TOTAL EXCAVATION QUANTITIES

	EXCAVATION AREA (SF)	EXCAVATION VOLUME (CY)
BELOW MHHW	10,950	1,434
ABOVE MHHW	3,000	1,112
TOTAL	13,950	2,490

NOTES:

1. COMPLETE PILE EXTRACTION SHALL ALWAYS BE THE FIRST METHOD OF PILE REMOVAL. IF PILE BREAKS DURING FIRST EXTRACTION ATTEMPT, CUT THE PILE, EXCAVATE 1' AND ATTEMPT PILE EXTRACTION A SECOND TIME. IF PILE BREAKS THE SECOND TIME, CUT PILE AT THE BASE OF THE EXCAVATION. ALL CREOSOTE REMNANTS MUST BE AT LEAST 2' BELOW FINISHED GRADE.

2. ABSORBENT BOOMS SHALL BE USED DURING ALL PILE EXTRACTION AND SHALL REMAIN IN PLACE UNTIL HOLES CREATED BY PILE EXTRACTION ARE FILLED.

Tacoma

NWS-2013-1124

US ARMY CORPS OF ENGINEERS PERMIT

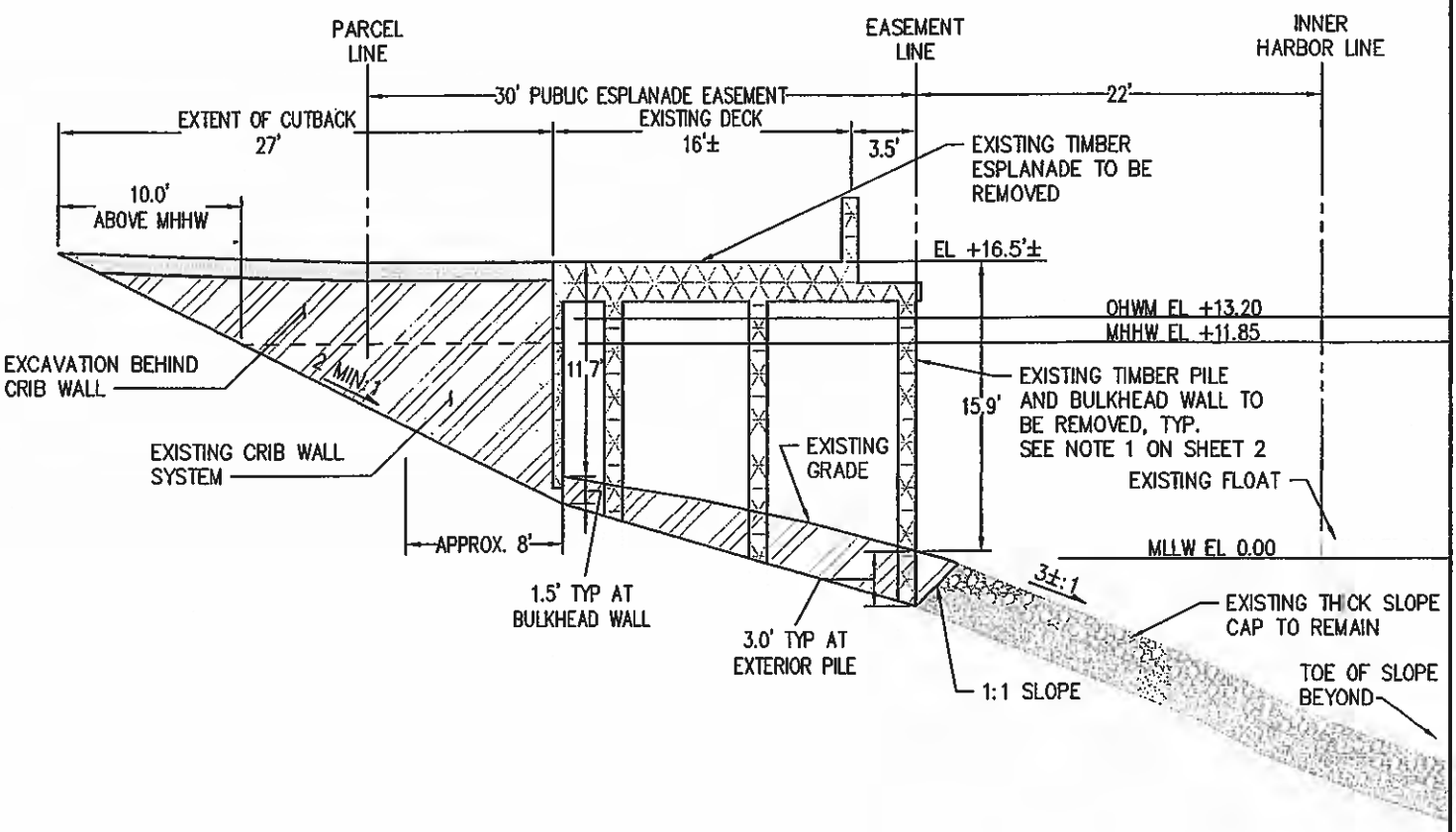
EXISTING SITE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 2 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 2.5 5 10 20

1 inch = 10 ft.

EXISTING SECTION

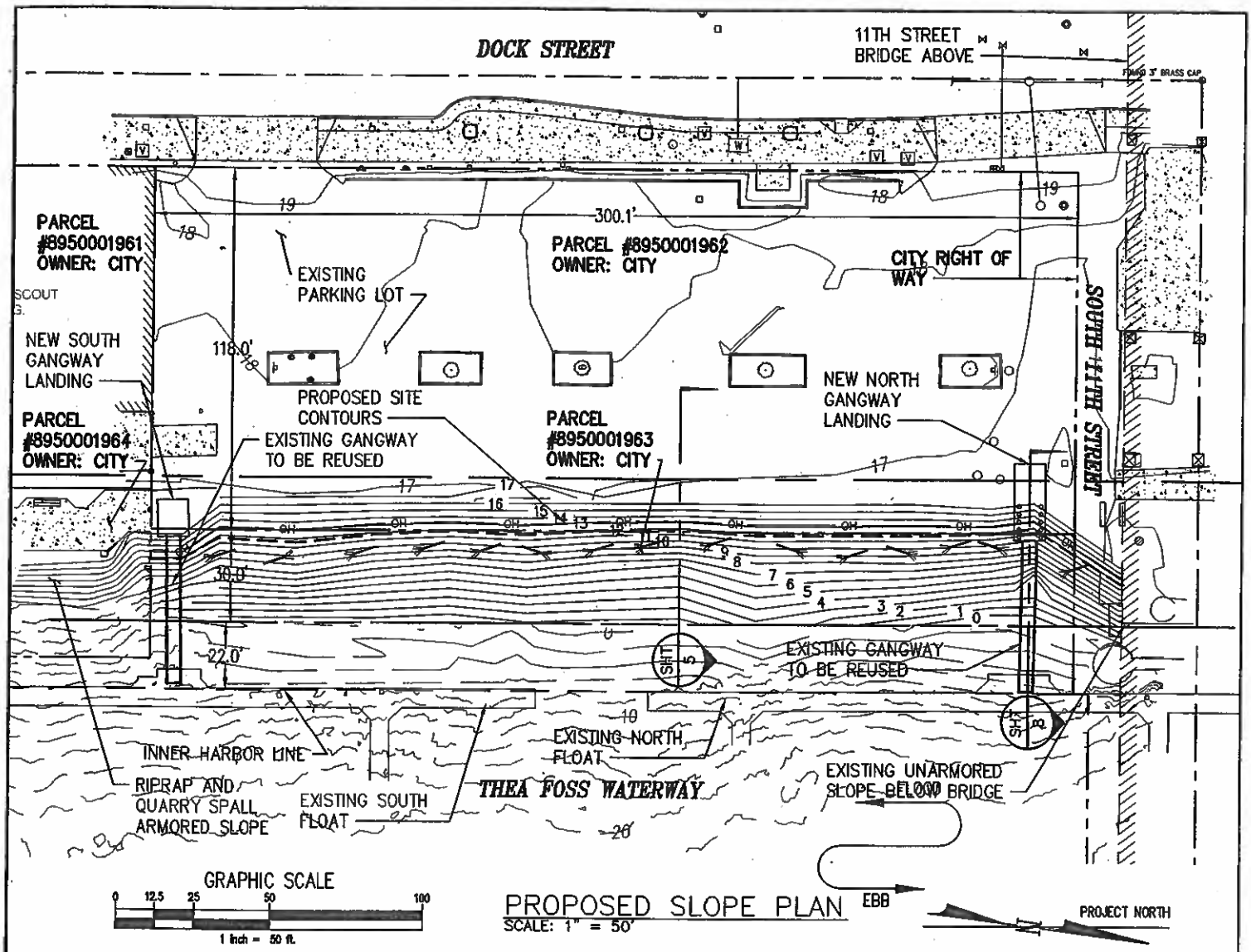
SCALE: 1" = 10'

LEGEND:

- PAVEMENT REMOVAL
- TIMBER STRUCTURE REMOVAL
- EXCAVATION

NWS-2013-1124

US ARMY CORPS OF ENGINEERS PERMIT EXISTING SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 3 **OF** 8 **DATE:** 10/29/13



PROPOSED SLOPE PLAN

SCALE: 1" = 50'

LEGEND:

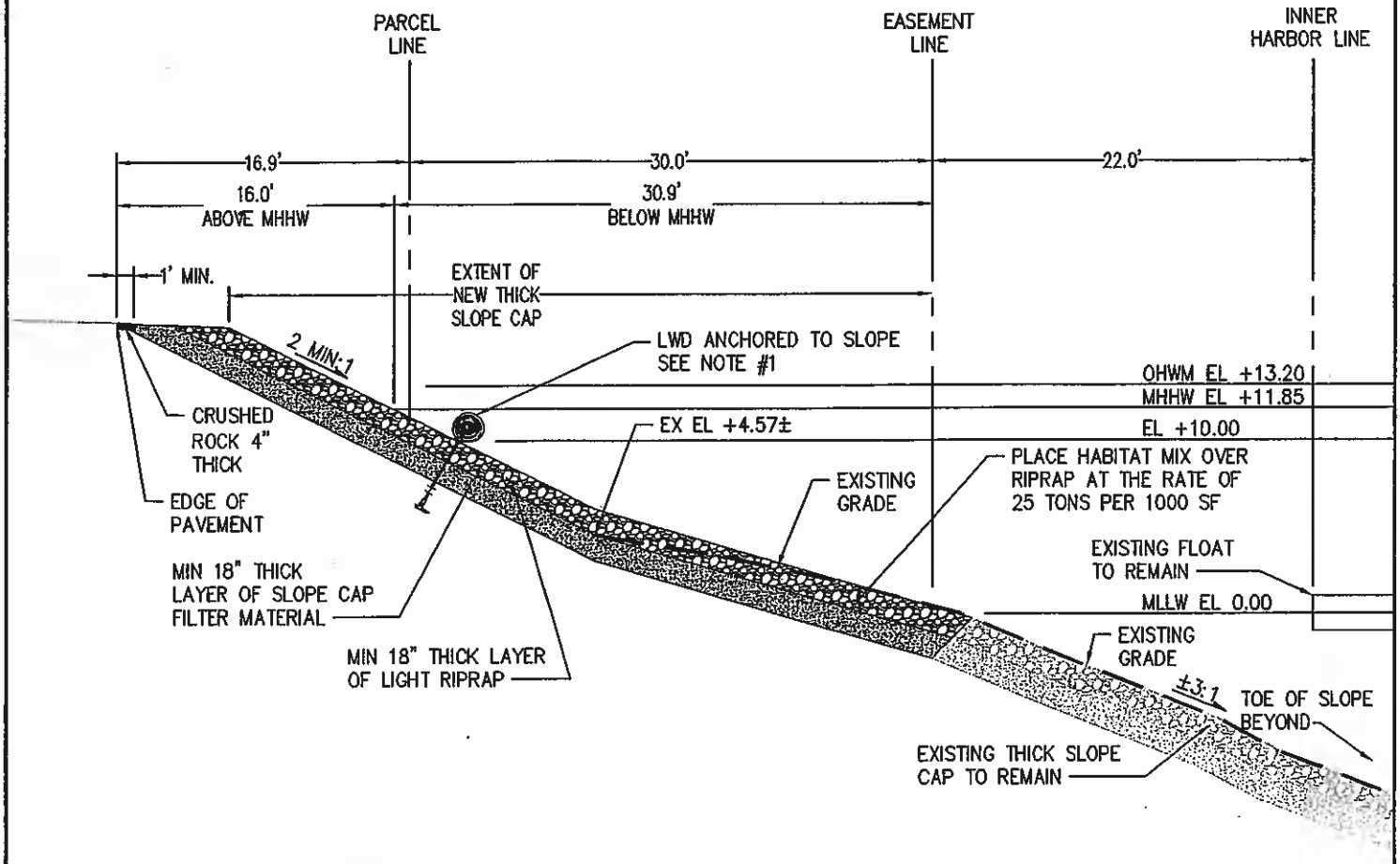
- LARGE WOODY DEBRIS (LWD) AT EL +10.0 (15 TOTAL)
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- 6 — PROPOSED GRADING CONTOUR

FILL QUANTITIES		
	FILL AREA (SF)	FILL VOLUME (CY)
FILL BELOW MHHW	9,270	1,167
FILL ABOVE MHHW	4,800	334
TOTAL	14,070	1,501

Tacoma

NWS-2013-1124

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SLOPE PLAN	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 4 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 2.5 5 10 20

1 inch = 10 ft.

PROPOSED SLOPE SECTION

SCALE: 1" = 10'

LEGEND:

- CAP FILTER FILL MATERIAL
- LIGHT RIPRAP FILL MATERIAL

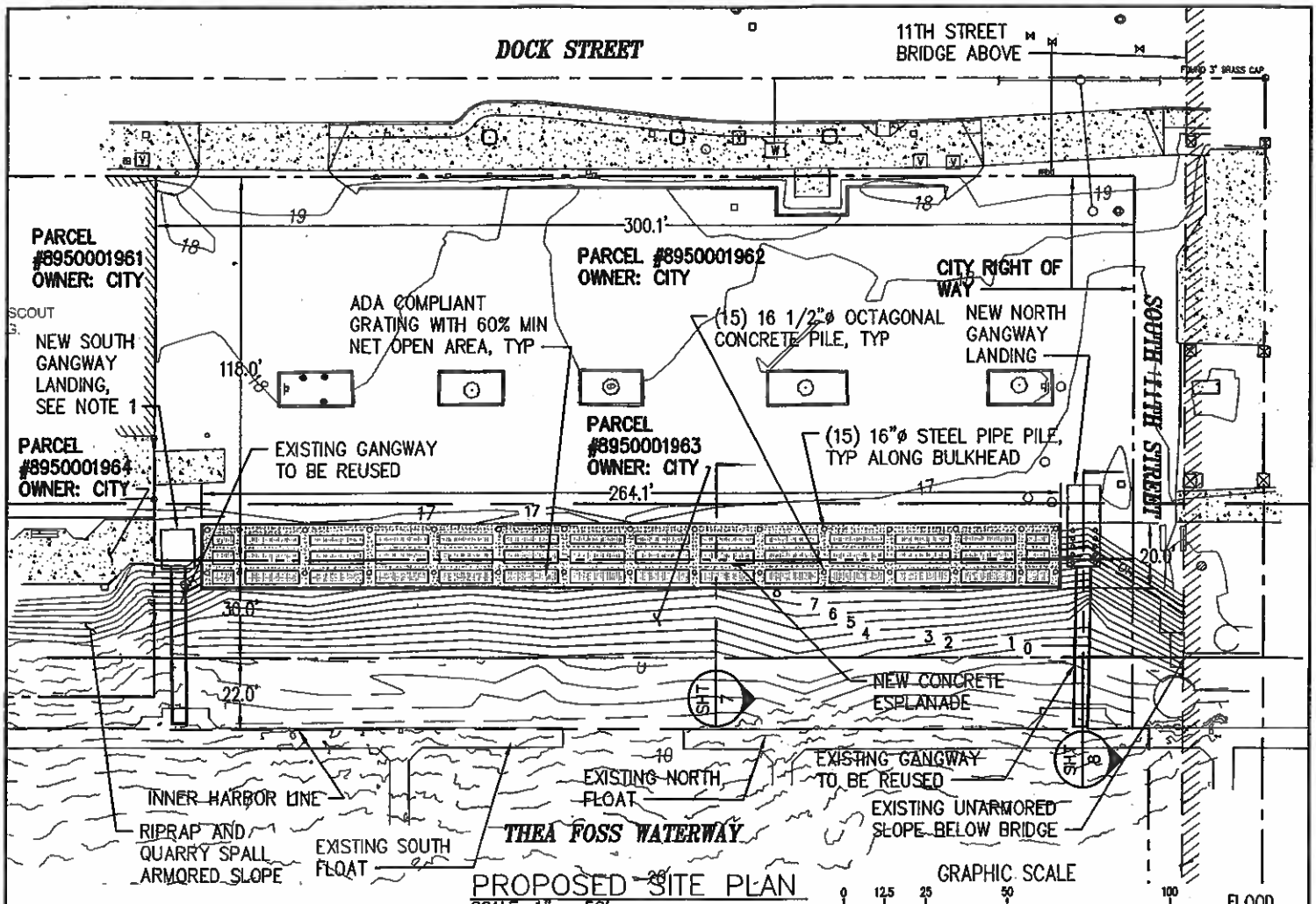
NOTES:

1. LWD SHALL BE DOUGLAS FIR OR CEDAR. LOG DIAMETER SHALL BE NO LESS THAN 18" UNLESS OTHERWISE APPROVED BY THE ENGINEER. LOG LENGTH SHALL BE NO LESS THAN 15-FEET AND NO MORE THAN 20-FEET. EACH LOG SHALL HAVE EITHER LIMBS OR ROOT WADS. BARK SHALL REMAIN INTACT ON THE LOGS.

Tacoma

NWS-2013-1124

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SLOPE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 5 **OF** 8 **DATE:** 10/29/13



PROPOSED SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

FLOOD

EBB

PROJECT NORTH

LEGEND:

- PROPOSED CONCRETE ESPLANADE
- PROPOSED MARINA FLOAT
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- 6 — PROPOSED GRADING CONTOUR

NOTES:

1. THE NEW SOUTH GANGWAY LANDING IS POSITIONED ABOVE THE TOP OF THE SLOPE AND THEREFORE NOT CONSIDERED IN OVER WATER COVERAGE CALCULATIONS.

PROPOSED QUANTITIES

	ABOVE MHHW		BELOW MHHW		ABOVE OHWM		BELOW OHWM	
	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)
CONCRETE PILES	1		14		0		15	
STEEL PILES	15		0		15		0	
STEEL PIN PILES	6		4		4		6	
NORTH LANDING		220		30		193		57
GROSS CONCRETE ESPLANADE AREA		3,253		2,028		2,377		2,904
GRATED AREA		1,351		923		742		1,532
TOTAL (SEE NOTE 1)	22	2,662*	18	1,504*	19	2,125*	21	2,042*

*TOTAL AREA = (GROSS AREA) – 0.6(GRATED AREA) + NORTH LANDING AREA

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

PROPOSED SITE PLAN

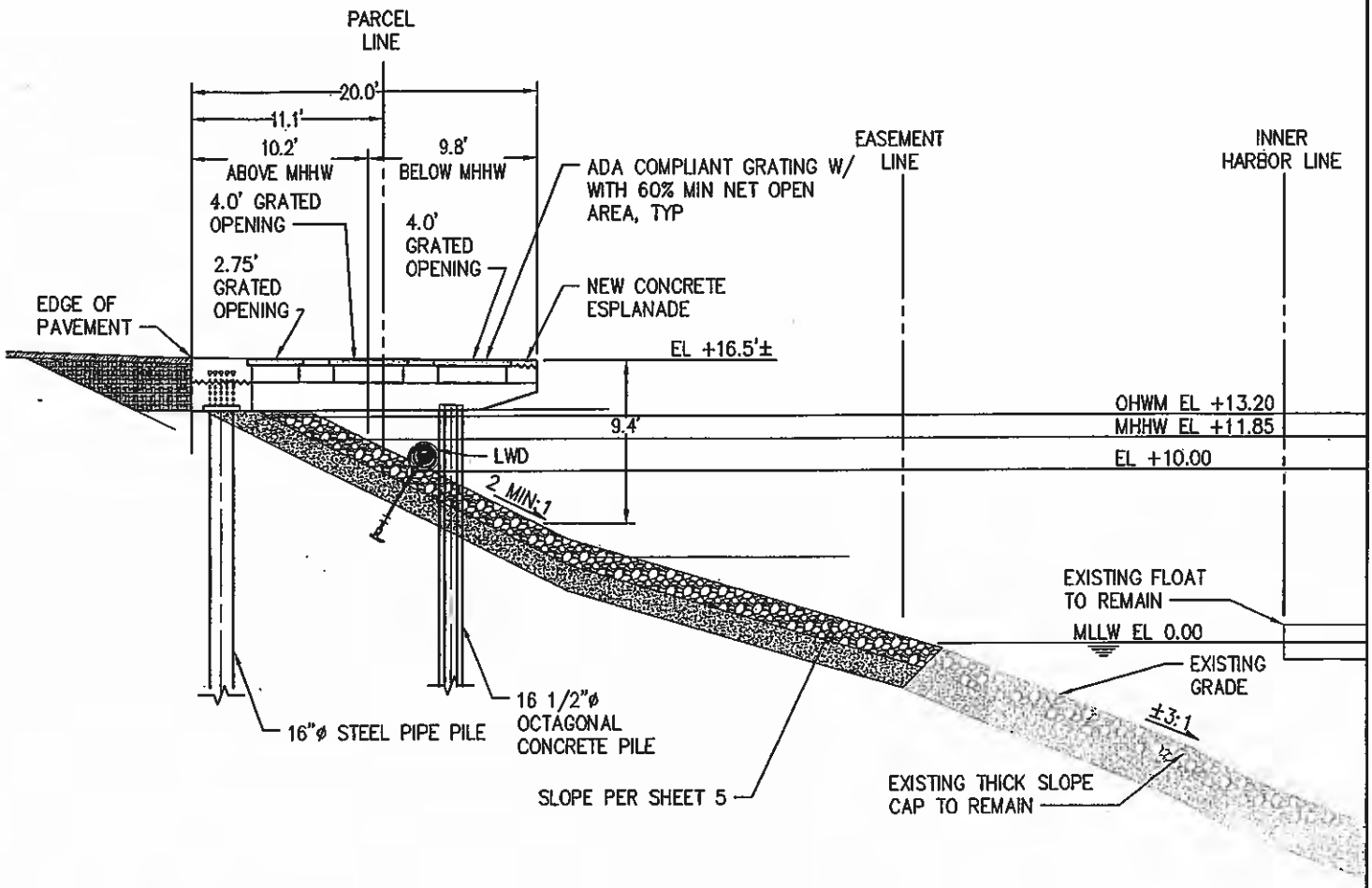
REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 6 **OF** 8 **DATE:** 10/29/13

NWS-2013-1124



GRAPHIC SCALE

0 5 10 20 40

1 inch = 10 ft.

PROPOSED SECTION

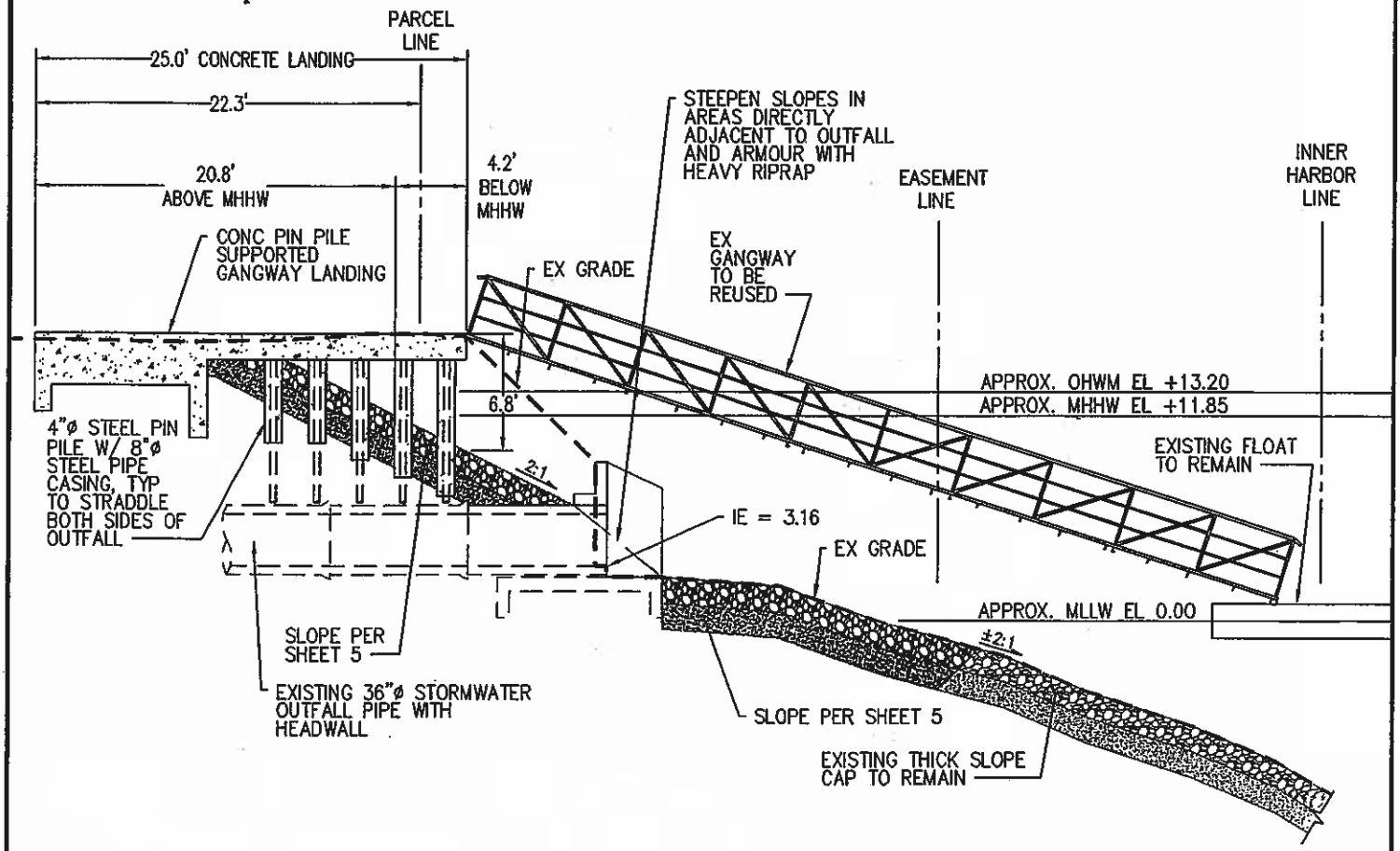
SCALE: 1" = 10'

LEGEND:

- CAP FILTER FILL MATERIAL
- LIGHT RIPRAP FILL MATERIAL

NWS-2013-1124

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET** 7 **OF** 8 **DATE:** 10/29/13



GRAPHIC SCALE

0 5 10 20 40

1 Inch = 10 ft.

PROPOSED SECTION AT NORTH GANGWAY LANDING

SCALE: 1" = 10'

LEGEND:

- CAP FILTER FILL MATERIAL
- LIGHT RIPRAP FILL MATERIAL

NWS-2013-1124

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED GANGWAY LANDING SECTION	REFERENCE: APPLICANT: CITY OF TACOMA (CITY)	PROPOSED PROJECT: BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION LOCATION (PARCEL#): 8950001962 & 8950001963 SHEET 8 OF 8 DATE: 10/29/13

US Army Corps of Engineers ®
Seattle District

NATIONWIDE PERMIT 3
Terms and Conditions

Effective Date: June 15, 2012

In addition to any special condition that may be required on a case-by-case basis by the District Engineer, the following terms and conditions must be met, as applicable, for a Nationwide Permit authorization to be valid in Washington State.

A. DESCRIPTION OF AUTHORIZED ACTIVITIES

3. Maintenance. (a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure, or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project or within the boundaries of the structure or fill. This NWP also authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the district engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

(b) This NWP also authorizes the removal of accumulated sediments and debris in the vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.) and/or the placement of new or additional riprap to protect the structure. The removal of sediment is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend farther than 200 feet in any direction from the structure. This 200 foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures. All dredged or excavated materials must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization. The placement of new or additional riprap must be the minimum necessary to protect the structure or to ensure the safety of the

structure. Any bank stabilization measures not directly associated with the structure will require a separate authorization from the district engineer.

(c) This NWP also authorizes temporary structures, fills, and work necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

(d) This NWP does not authorize maintenance dredging for the primary purpose of navigation. This NWP does not authorize beach restoration. This NWP does not authorize new stream channelization or stream relocation projects.

Notification: For activities authorized by paragraph (b) of this NWP, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 31). The pre-construction notification must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals. (Sections 10 and 404)

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Clean Water Act Section 404(f) exemption for maintenance.

B. CORPS NATIONAL GENERAL CONDITIONS FOR ALL NWPs

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR § 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or

degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant

adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332. (1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal

adverse effects on the aquatic environment. (2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered. (3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). (4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided. (5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:
"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include: (a) A statement that the authorized work was done in accordance with

the NWP authorization, including any general, regional, or activity-specific conditions; (b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and (c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either: (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or (2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information: (1) Name, address and telephone numbers of the prospective permittee; (2) Location of the proposed project; (3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans); (4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the

project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate; (5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan. (6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and (7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level. (2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5. (3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act. (4)

Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. For a linear project, this determination will include an evaluation of the individual crossings to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to intermittent or ephemeral streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51 or 52, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in minimal adverse effects. When making minimal effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

2. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

3. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (a) That the project does not qualify for

authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (c) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period, with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

C. CORPS SEATTLE DISTRICT REGIONAL GENERAL CONDITIONS

1. Aquatic Resources Requiring Special Protection. Activities resulting in a loss of waters of the United States in a mature forested wetland, bog, bog-like wetland, aspen-dominated wetland, alkali wetland, wetlands in a dunal system along the Washington coast, vernal pools, camas prairie wetlands, estuarine wetlands, and wetlands in coastal lagoons cannot be authorized by a NWP, except by the following NWPs:

NWP 3 – Maintenance
NWP 20 – Oil Spill Cleanup
NWP 32 – Completed Enforcement Actions
NWP 38 – Cleanup of Hazardous and Toxic Waste

In order to use one of the above-referenced NWPs in any of the aquatic resources requiring special protection, you must submit a pre-construction notification to the District Engineer in accordance with Nationwide Permit General Condition 31 (Pre-Construction Notification) and obtain written approval before commencing work.

2. Commencement Bay. The following NWPs may not be used to authorize activities located in the Commencement Bay Study Area (see Figure 1 at www.nws.usace.army.mil, select Regulatory Permits then Permit Guidebook, then Nationwide Permits) requiring Department of the Army authorization:

NWP 12 – Utility Line Activities (substations)
NWP 13 – Bank Stabilization
NWP 14 – Linear Transportation Projects
NWP 23 – Approved Categorical Exclusions
NWP 29 – Residential Developments
NWP 39 – Commercial and Institutional Developments
NWP 40 – Agricultural Activities

NWP 41 – Reshaping Existing Drainage Ditches
NWP 42 – Recreational Facilities
NWP 43 – Stormwater Management Facilities

3. New Bank Stabilization Prohibition Areas in Tidal Waters of Puget Sound. Activities involving new bank stabilization in tidal waters in Water Resource Inventory Areas (WRIAs) 8, 9, 10, 11, and 12 (within the specific area identified on Figure 2 at www.nws.usace.army.mil, select Regulatory Permits then Permit Guidebook, then Nationwide Permits) cannot be authorized by a NWP.

4. Bank Stabilization. Any project including new or maintenance bank stabilization activities requires pre-construction notification to the District Engineer in accordance with Nationwide Permit General Condition 31 for Pre-Construction Notification. This requirement does not apply to maintenance work exempt by 33 CFR 323.4 (a)(2). Each notification must also include the following information:

a. Need for the work, including the cause of the erosion and the threat posed to structures, infrastructure, and/or public safety. The notification must also include a justification for the need to place fill or structures waterward of the line of the Corps' jurisdiction (typically, the ordinary high water mark or mean higher high water mark).

b. Current and expected post-project sediment movement and deposition patterns in and near the project area. In tidal waters, describe the location and size of the nearest bluff sediment sources (feeder bluffs) to the project area and current and expected post-project nearshore drift patterns in the project area.

c. Current and expected post-project habitat conditions, including the presence of fish, wildlife and plant species, submerged aquatic vegetation, spawning habitat, and special aquatic sites (e.g., vegetated shallows, riffle and pool complexes, or mudflats) in the project area.

d. In rivers and streams, an assessment of the likely impact of the proposed work on upstream, downstream and cross-stream properties (at a minimum the area assessed should extend from the nearest upstream bend to the nearest downstream bend of the watercourse). Discuss the methodology used for determining effects. The Corps reserves the right to request an increase in the reach assessment area to fully address the relevant ecological reach and associated habitat.

e. For new bank stabilization activities in rivers and streams, describe the type and length of existing bank stabilization within 300 feet up and downstream of the project area. In tidal areas, describe the type and length of existing bank stabilization within 300 feet along the shoreline on both sides of the project area.

f. Demonstrate the proposed project incorporates the least environmentally damaging practicable bank protection methods. These methods include, but are not limited to, the use of bioengineering, biotechnical design, root wads, large woody material, native plantings, and beach nourishment in certain circumstances. If rock must be used due to site erosion conditions, explain how the bank stabilization structure incorporates elements beneficial to fish. If the Corps determines you have not incorporated the least environmentally damaging practicable bank protection methods and/or have not fully compensated for impacts to aquatic resources, you must submit a compensatory mitigation plan to compensate for impacts to aquatic resources.

g. A planting plan using native riparian plant species unless the applicant demonstrates a planting plan is not appropriate or not practicable.

5. Crossings of Waters of the United States. Any project including installing, replacing, or modifying crossings of waters of the United States, such as culverts, requires pre-construction notification to the District Engineer in accordance with Nationwide Permit General Condition 31 for Pre-Construction Notification. This requirement does not apply to maintenance work exempt by 33 CFR 323.4 (a)(2). Each notification must also include the following information:

a. Need for the crossing.

b. Crossing design criteria and design methodology.

c. Rationale behind using the specific design method for the crossing.

6. Cultural Resources and Human Burials. Permittees must immediately stop work and notify the District Engineer within 24 hours if, during the course of conducting authorized work, human burials, cultural resources, or historic properties, as identified by the National Historic Preservation Act, are discovered. Failure to stop work in the area of discovery until the Corps can comply with the provisions of 33 CFR 325 Appendix C, the National Historic Preservation Act, and other pertinent laws and regulations could result in a violation of state and federal laws. Violators are subject to civil and criminal penalties.

7. Essential Fish Habitat. An activity which may adversely affect essential fish habitat, as identified under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), may not be authorized by NWP until essential fish habitat requirements have been met by the applicant and the Corps. Non-federal permittees shall notify the District Engineer if essential fish habitat may be affected by, or is in the vicinity of, a proposed activity and shall not begin work until notified by the District Engineer that the requirements of the essential fish habitat provisions of the MSA have been satisfied and the activity is authorized. The notification must identify the type(s) of essential fish habitat (e.g., Pacific salmon, groundfish, and/or coastal-pelagic species) managed by a Fishery Management Plan that may be affected. Information about essential fish habitat is available at www.nwr.noaa.gov/.

8. Vegetation Protection and Restoration. Permittees must clearly mark all construction area boundaries before beginning work. The removal of native vegetation in riparian areas and wetlands, and the removal of submerged aquatic vegetation in estuarine and tidal areas must be avoided and minimized to the maximum extent practicable. Areas subject to temporary vegetation removal shall be replanted with appropriate native species by the end of the first planting season following the disturbance except as waived by the District Engineer. If an aquaculture area is permitted to impact submerged aquatic vegetation under NWP 48, the aquaculture area does not need to be replanted with submerged aquatic vegetation.

9. Access. You must allow representatives of this office to inspect the authorized activity at any time deemed necessary to ensure the work is being, or has been, accomplished in accordance with the terms and conditions of your permit.

10. Contractor Notification of Permit Requirements. The permittee must provide a copy of the nationwide permit verification letter, conditions, and permit drawings to all contractors involved with the authorized work, prior to the commencement of any work in waters of the U.S.

D. CORPS REGIONAL SPECIFIC CONDITIONS FOR THIS NWP: NONE

E. STATE 401 CERTIFICATION GENERAL CONDITIONS:

1. **For in-water construction activities.** Individual 401 review is required for projects or activities authorized under NWPs that will cause, or be likely to cause or contribute to an exceedence of a State water quality standard (WAC 173-201A) or sediment management standard (WAC 173-204).

   ***Note**: State water quality standards are posted on Ecology's website: http://www.ecy.wa.gov/programs/wq/swqs/. Click "Surface Water Criteria" for freshwater and marine water standards. Sediment management standards are posted on Ecology's website: http://www.ecy.wa.gov/biblio/wac173204.html. Information is also available by contacting Ecology's Federal Permit staff.*

2. **Projects or Activities Discharging to Impaired Waters.** Individual 401 review is required for projects or activities authorized under NWPs if the project or activity will occur in a 303(d) listed segment of a waterbody or upstream of a listed segment and may result in further exceedences of the specific listed parameter.

   ***Note**: To determine if your project or activity is in a 303(d) listed segment of a waterbody, visit Ecology's Water Quality Assessment webpage for maps and search tools, http://www.ecy.wa.gov/programs/wq/303d/2008/. Information is also available by contacting Ecology's Federal Permit staff.*

3. **Notification.** For projects or activities that will require Individual 401 review, applicants must provide Ecology with the same documentation provided to the Corps (as described in Corps Nationwide Permit General Condition 31, Pre-Construction Notification), including, when applicable:

   (a) A description of the project, including site plans, project purpose, direct and indirect adverse environmental effects the project would cause, and any other Department of the Army permits used or intended to be used to authorize any part of the proposed project or any related activity.

   (b) Delineation of special aquatic sites and other waters of the United States. Wetland delineations must be prepared in accordance with the current method required by the Corps and shall include Ecology's Wetland Rating form. Wetland rating forms are subject to review and verification by Ecology staff.

   ***Note**: Wetland rating forms are available on Ecology's Wetlands website: http://www.ecy.wa.gov/programs/sea/wetlands/ratingsystems or by contacting Ecology's Federal Permit staff.*

   (c) A statement describing how the mitigation requirement will be satisfied. A conceptual or detailed mitigation or restoration plan may be submitted.

   Mitigation plans submitted for Ecology review and approval shall be based on the guidance provided in Wetland Mitigation in Washington State, Parts 1 and 2 (Ecology Publications #06-06-011a and #06-06-011b).

   (d) Coastal Zone Management Program "Certification of Consistency" Form if the project is located within a coastal county (Clallam, Grays Harbor, Island, Jefferson, King, Kitsap, Mason, Pacific, Pierce, San Juan, Skagit, Snohomish, Thurston, Wahkiakum, and Whatcom counties).

   ***Note**: CZM Certification of Consistency forms are available on Ecology's Federal Permit website: http://www.ecy.wa.gov/programs/sea/fed-permit/index.html or by contacting Ecology's Federal Permit staff.*

(e) Other applicable requirements of Corps Nationwide Permit General Condition 31, Corps Regional Conditions, or notification conditions of the applicable NWP.

Note: Ecology has 180 days from receipt of applicable documents noted above ***and*** *a copy of the final authorization letter from the Corps providing coverage for a proposed project or activity under the NWP Program to issue a WQC and CZM consistency determination response. If more than 180 days pass after Ecology's receipt of these documents, your requirement to obtain an individual WQC and CZM consistency determination response becomes waived.*

4. **Aquatic resources requiring special protection.** Certain aquatic resources are unique, difficult-to-replace components of the aquatic environment in Washington State. Activities that would affect these resources must be avoided to the greatest extent possible. Compensating for adverse impacts to high value aquatic resources is typically difficult, prohibitively expensive, and may not be possible in some landscape settings.

   Individual 401 review is required for activities in or affecting the following aquatic resources (and not prohibited by Regional Condition 1):

   (a) Wetlands with special characteristics (as defined in the Washington State Wetland Rating Systems for western and eastern Washington, Ecology Publications #04-06-025 and #04-06-015):
   - Estuarine wetlands
   - Natural Heritage wetlands
   - Bogs
   - Old-growth and mature forested wetlands
   - Wetlands in coastal lagoons
   - Interdunal wetlands
   - Vernal pools
   - Alkali wetlands

   (b) Fens, aspen-dominated wetlands, camas prairie wetlands, and marine water with eelgrass (*Zostera marina*) beds (except for NWP 48).

   (c) Category 1 wetlands

   (d) Category II wetlands with a habitat score $\geq$ 29 points. This State General Condition does not apply to the following Nationwide Permits:

   NWP 20 – Response Operations for Oil and Hazardous Substances
   NWP 32 – Completed Enforcement Actions

5. **Mitigation.** For projects requiring Individual 401 review, adequate compensatory mitigation must be provided for wetland and other water quality-related impacts of projects or activities authorized under the NWP Program.

   (a) Mitigation plans submitted for Ecology review and approval shall be based on the guidance provided in Wetland Mitigation in Washington State, Parts 1 and 2 (Ecology Publications #06-06-011a and #06-06-011b) and shall, at a minimum, include the following:

i. A description of the measures taken to avoid and minimize impacts to wetlands and other waters of the U.S.

ii. The nature of the proposed impacts (i.e., acreage of wetlands and functions lost or degraded)

iii. The rationale for the mitigation site that was selected

iv. The goals and objectives of the compensatory mitigation project

v. How the mitigation project will be accomplished, including construction sequencing, best management practices to protect water quality, proposed performance standards for measuring success and the proposed buffer widths

vi. How it will be maintained and monitored to assess progress towards goals and objectives. Monitoring will generally be required for a minimum of five years. For forested and scrub-shrub wetlands, 10 years of monitoring will often be necessary.

vii. How the compensatory mitigation site will be legally protected for the long term.

Refer to Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Ecology Publication #06-06-011b) for guidance on developing mitigation plans.

Ecology encourages the use of alternative mitigation approaches, including advance mitigation and other programmatic approaches such as mitigation banks and programmatic mitigation areas at the local level. If you are interested in proposing use of an alternative mitigation approach, consult with the appropriate Ecology regional staff person. (see http://www.ecy.wa.gov/programs/sea/wetlands/contacts.htm)

Information on the state wetland mitigation banking program is available on Ecology's website: http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/index.html

6. **Temporary Fills.** Individual 401 review is required for any project or activity with temporary fill in wetlands or other waters of the State for more than 90 days, unless the applicant has received written approval from Ecology.

   ***Note**: This State General Condition does not apply to projects or activities authorized under NWP 33, Temporary Construction, Access, and Dewatering*

7. **Stormwater discharge pollution prevention**: All projects that involve land disturbance or impervious surfaces must implement prevention or control measures to avoid discharge of pollutants in stormwater runoff to waters of the state. For land disturbances during construction, the permittee must obtain and implement permits where required and follow Ecology's current stormwater manual.

   ***Note**: Stormwater permit information is available at Ecology's Water Quality website: http://www.ecy.wa.gov/programs/wq/stormwater/index.html. Ecology's Stormwater Management and Design Manuals are available at: http://www.ecy.wa.gov/programs/wq/stormwater/municipal/StrmwtrMan.html. Information is also available by contacting Ecology's Federal Permit staff.*

8. **State Certification for PCNs not receiving 45-day response.** In the event the U.S. Army Corps of Engineers does not respond to a complete pre-construction notification within 45 days, the applicant must contact Ecology for Individual 401 review.

F. STATE 401 CERTIFICATION SPECIFIC CONDITIONS FOR THIS NWP:

Certified, subject to conditions. Permittee must meet Ecology 401 General Conditions. Individual 401 review is required for projects or activities authorized under this NWP if:

1. The project or activities are below the OHWM with new work being proposed outside the original footprint.

2. The proposed project or activity increases the original footprint of the structure by more than $1/10^{th}$ acre in wetlands. Note 1: "Original footprint" refers to the configuration of the structure or filled area within the last two years. Note 2: This may include causing surrounding wetlands to be drained.

3. The project or activity includes adding a new structure, such as a weir, flap gate/tide gate, or culvert to the site.

G. EPA 401 CERTIFICATION GENERAL CONDITIONS:

A. Any activities in the following types of wetlands and waters of the United States will need to apply for an individual 401 certification: Mature forested wetlands, bogs, bog-like wetlands, wetlands in dunal systems along the Washington coast, coastal lagoons, vernal pools, aspen-dominated wetlands, alkali wetlands, camas prairie wetlands, estuarine wetlands, including salt marshes, and marine waters with eelgrass or kelp beds.

B. A 401 certification determination is based on the project or activity meeting established turbidity levels. The EPA will be using as guidance the state of Washington's water quality standards [WAC 173-201a] and sediment quality standards [WAC 173-204]. Projects or activities that are expected to exceed these levels or that do exceed these levels will require an individual 401 certification.

The water quality standards allow for short-term turbidity exceedances after all necessary Best Management Practices have been implemented (e.g., properly placed and maintained filter fences, hay bales and/or other erosion control devices, adequate detention of runoff to prevent turbid water from flowing off-site, providing a vegetated buffer between the activity and open water, etc.), and only up to the following limits:

Wetted Stream Width at Discharge Point	Approximate Downstream Point for Determining Compliance
Up to 30 feet	50 feet
>30 to 100 feet	100 feet
>100 feet to 200 feet	200 feet
>200 feet	300 feet
LAKE, POND, RESERVOIR	Lesser of 100 feet or maximum surface dimension

C. 401 certification of projects and activities under NWPs will use Washington State Department of Ecology's most recent stormwater manual or an EPA approved equivalent manual as guidance in meeting water quality standards.

D. For projects and activities requiring coverage under an NPDES permit, certification is based on compliance with the requirements of that permit. Projects and activities not in compliance with NPDES requirements will require individual 401certification.

E. Individual 401certification is required for projects or activities authorized under NWPs if the project will discharge to a waterbody on the list of impaired waterbodies (the 303(d) List) and the discharge may result in further exceedance of a specific parameter the waterbody is listed for. The EPA shall make this determination on a case-by-case basis.

For projects or activities that will discharge to a 303(d)-listed waterbody that does not have an approved Total Maximum Daily Load (TMDL) or an approved water quality management plan, the applicant must provide documentation for EPA approval showing that the discharge will not result in further exceedance of the listed contaminant or impairment.

For projects or activities that will discharge to a 303(d)-listed waterbody that does not have an approved TMDL, the applicant must provide documentation for EPA approval showing that the discharge is within the limits established in the TMDL. The current list of 303(d)-listed waterbodies in Washington State will be consulted in making this determination and is available on Ecology's web site at: www.ecy.wa.gov/programs/wq/303d/2012/index.html

The EPA may issue 401 certification for projects or activities that would result in further exceedance or impairment if mitigation is provided that would result in a net decrease in listed contaminants or less impairment in the waterbody. This determination would be made during individual 401 certification review.

F. For projects requiring individual 401 certification, applicants must provide the EPA with the same documentation provided to the Corps, (as described in Corps' National General Condition 31, Pre-Construction Notification), including, when applicable:

(a) A description of the project, including site plans, project purpose, direct and indirect adverse environmental effects the project would cause, any other U.S. Department of the Army permits used or intended to use to authorize any part of the proposed project or any related activity.

(b) Delineation of special aquatic sites and other waters of the United States. Wetland delineations must be prepared in accordance with the current method required by the Corps.

(c) A statement describing how the mitigation requirement will be satisfied. A conceptual or detailed mitigation or restoration plan may be submitted.

(d) Other applicable requirements of Corps National General Condition 31, Corps Regional Conditions, or notification conditions of the applicable NWP.

A request for individual 401 certification- review is not complete until the EPA receives the applicable documents noted above and the EPA has received a copy of the final authorization letter from the Corps providing coverage for a proposed project or activity under the NWP Program.

G. No activity, including structures and work in navigable waters of the United States or discharges of dredged or fill material, may consist of unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.) and material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

H. An individual 401 certification is based on adequate compensatory mitigation being provided for aquatic resource and other water quality-related impacts of projects or activities authorized under the NWP Program.

A 401 certification is contingent upon written approval from the EPA of the compensatory mitigation plan for projects and activities resulting in any of the following:

- impacts to any aquatic resources requiring special protection (as defined in EPA General Condition A or Corps General Regional Condition 1)
- any impacts to tidal waters or non-tidal waters adjacent to tidal waters (applies to NWP 14)
- Or, any impacts to aquatic resources greater than ¼ acre.

Compensatory mitigation plans submitted to the EPA shall be based on the Joint Agency guidance provided in *Wetland Mitigation in Washington State, Parts 1 and 2* (Ecology Publication #06-06-011a and #06-06-011b) and shall, at a minimum, include the following:

(1) A description of the measures taken to avoid and minimize impacts to wetlands and other waters of the U.S.
(2) The nature of the proposed impacts (i.e., acreage of wetlands and functions lost or degraded)
(3) The rationale for the mitigation site that was selected
(4) The goals and objectives of the compensatory mitigation project
(5) How the mitigation project will be accomplished, including proposed performance standards for measuring success (including meeting planting success standard of 80 percent survival after five years), evidence for hydrology at the mitigation site, and the proposed buffer widths;
(6) How it will be maintained and monitored to assess progress towards goals and objectives.
(7) Completion and submittal of an "as-built conditions report" upon completion of grading, planting and hydrology establishment at the mitigation site;
(8) Completion and submittal of monitoring reports at years 3 and 5 showing the results of monitoring for hydrology, vegetation types, and aerial cover of vegetation.
(9) For forested and scrub-shrub wetlands, 10 years of monitoring will often be necessary.
(10) Documentation of legal site protection mechanism (covenant or deed restriction) to show how the compensatory mitigation site will be legally protected for the long-term.

I. An individual 401 certification is required for any activity where temporary fill will remain in wetlands or other waterbodies for more than 90 days. The 90 day period begins when filling activity starts in the wetland or other waterbody.

J. An individual 401 is required for any proposed project or activity in waterbodies on the most current list of the following Designated Critical Resource Waters (per Corps General Condition 22).

K. An individual 401 certification is required for any proposed project that would increase permanent, above-grade fill within the 100-year floodplain (including the floodway and the flood fringe).

[*Note:* The 100-year floodplain is defined as those areas identified as Zones A, A1-30, AE, AH, AO, A99, V, V1-30, and VE on the most current Federal Emergency Management Agency Flood Rate Insurance Maps, or areas identified as within the 100-year floodplain on applicable local Flood Management Program maps. The 100-year flood is also known as the flood with a 100-year recurrence interval, or as the flood with an exceedance probability of 0.01.]

H. EPA 401 CERTIFICATION SPECIFIC CONDITIONS FOR THIS NWP:

Partially denied without prejudice. Permittee must meet EPA 401 General Conditions. An individual 401 certification is required for projects authorized under this NWP if:

1. The project or activity would extend beyond the original project footprint (either along the shoreline or below MHHW or OHWM), or

2. Any activity requiring excavation or dredging in open water.

I. COASTAL ZONE MANAGEMENT CONSISTENCY RESPONSE FOR THIS NWP:

Concur, subject to the following condition: When individual 401 review is triggered, a CZM Certificate of Consistency form must be submitted for project located within the 15 coastal counties (See State General 401 Condition 3 (Notification)).

US Army Corps of Engineers ®
Seattle District

CERTIFICATE OF COMPLIANCE WITH DEPARTMENT OF THE ARMY PERMIT

Permit Number: NWS-2013-1124

Name of Permittee: City of Tacoma

Date of Issuance: DEC 24 2013

Upon completion of the activity authorized by this permit, please check the applicable boxes below, date and sign this certification, and return it to the following address:

Department of the Army
U.S. Army Corps of Engineers
Seattle District, Regulatory Branch
Post Office Box 3755
Seattle, Washington 98124-3755

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of your authorization, your project is subject to suspension, modification, or revocation.

☐	The work authorized by the above-referenced permit has been completed in accordance with the terms and conditions of this permit. Date work complete: _____
	☐ Photographs and as-built drawings of the authorized work are attached.

☐	If applicable, the mitigation required (not including monitoring (e.g., construction and plantings) in the above-referenced permit has been completed in accordance with the terms and conditions of this permit. Date work complete: _____
	☐ Photographs and as-built drawings of the mitigation are attached.

Printed Name: _____

Signature: _____

Date: _____

Hydraulic Project Approval

Washington Department of FISH and WILDLIFE

HYDRAULIC PROJECT APPROVAL

RCW 77.55.021 - See appeal process at end of HPA

Coastal
48 Devonshire Road
Montesano, WA 98563
(360) 249-4628

Issue Date: December 19, 2013
Project Expiration Date: December 18, 2018

Control Number: 132184-1
FPA/Public Notice #: N/A

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
City of Tacoma Engineering Division	City of Tacoma Public Works Department
ATTENTION: Thomas Rutherford	ATTENTION: Tom Rutherford
747 Market Street, Room 544	747 Market St Rm 544
Tacoma, WA 98402-5181	Tacoma, WA 98402
253-591-5767	253-591-5767
Fax: 253-591-5181	

Project Name: Emergency Bulkhead Removal/Esplanade Replace.

Project Description: Emergency action to remove failing bulkhead and replace damaged pedestrian boardwalk over a 300' reach in Development Site 9.

PROVISIONS

1. Work below the ordinary high water line (OHWL) shall not occur from February 15 through July 15 of any year for the protection of migrating juvenile salmonids.

NOTIFICATION REQUIREMENT:

2. The Area Habitat Biologist (AHB: Leonard Machut; email: Leonard.Machut@dfw.wa.gov or fax: 360-876-1894) shall receive written notification from the person to whom this HPA is issued (permittee) or the agent/contractor no less than three working days prior to the start of construction. Applicant shall contact the AHB at the conclusion of project. All notifications shall include the permittee's name, project location, starting date for work, and the control number for this HPA.

3. Officer Prater shall receive written notification (e-mail: dustin.prater@dfw.wa.gov or FAX: 360-876-1894) from the permittee or the agent/contractor no less than three working days prior to start of work, and again within seven days of completion of work to arrange for a compliance inspection. The notification shall include the permittee's name, project location, starting date for work or completion date of work, and the control number for this HPA.

4. POST-CONSTRUCTION: The permittee, agent or contractor shall contact the Washington Department of Fish and Wildlife by e-mail to HPAapplications@dfw.wa.gov; mail to PO Box 43234, Olympia, Washington 98501; or fax to (360) 902-2946 within seven days of work completion. The notification shall include the permittee's name, project location, completion date for the work, and the HPA control number. The department may conduct a compliance inspection; however, the department will notify the permittee or agent prior to the inspection.

5. If at any time, as a result of project activities, fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), work shall stop immediately except for efforts to control the spill and prevent additional toxic substances from entering the water. Immediate notification shall be made to the Washington Military Department's Emergency Management Division at 1-800-258-5990, and to the AHB. Work shall not resume on the project until approved by the AHB.

Issue Date: December 19, 2013 | Control Number: 132184-1

Project Expiration Date: December 18, 2018 | FPA/Public Notice #: N/A

APPROVED PLANS:

6. Except as modified by this HPA, work shall be accomplished per plans and specifications approved by the Washington Department of Fish and Wildlife entitled "Emergency Bulkhead Removal and Esplanade Replacement - Development Site 9" and dated 7 November 2013. A copy of these plans shall be available on site during construction.

PROJECT PROVISIONS:

7. In areas above +2 MLLW, project activities shall not occur when the project area, including the work corridor, is inundated by tidal waters. Rock may be permitted to be placed in areas below +2 MLLW; however, the rock shall consist of clean (i.e. washed) material to reduce siltation.

8. As per plans, equipment (excavator pile driving equipment) shall operate from the upland reaching into the intertidal zone and limited to a 25-foot work corridor waterward of the bulkhead. Construction materials shall not touch the beach outside this work corridor.

9. All manmade debris on the beach shall be removed and disposed of upland such that it does not enter waters of the state. This includes, but is not limited to, losse angular rock, asphalt, steel, slag, plastic, brick, concrete, Styrofoam, trash, milled wood, and creosote wood.

10. During all project activities, containment booms and absorbent sausage booms (or other oil absorbent fabric) shall be placed around the perimeter of the work area to capture wood debris, oil, and other materials released into marine waters as a result of construction activities. All accumulated debris shall be collected and disposed upland at an approved disposal site.

11. To reduce and contain turbidity in the water column, a silt curtain shall extend from the upstream (head of the waterway) shoreline, around the work zone (e.g. anchored to the marina floats), and to the downstream (mouth of the waterway) shoreline. The silt curtain shall be of sufficient height and weighted so as to make solid contact with the bottom during all tidal ranges while reaching the water surface.

12. Sawdust, drillings, and trimmings from treated wood, metal, concrete, and/or composite materials (e.g. Fiberglass) during all project phases shall be contained with tarps or other impervious materials and prevented from contact with the beach, bed or waters of the state.

13. Wet concrete shall be prevented from entering waters of the state. Forms for any concrete structure shall be constructed to prevent leaching of wet concrete. Impervious materials shall be placed over any exposed concrete not lined with the forms that will come in contact with state waters. Forms and impervious materials shall remain in place until the concrete is cured.

14. All piling, lumber, and other materials treated with preservatives shall be sufficiently cured to minimize leaching into the water or bed.

Issue Date: December 19, 2013 | Control Number: 132184-1

Project Expiration Date: December 18, 2018 | FPA/Public Notice #: N/A

BULKHEAD AND ESPLANADE REMOVAL:

15. The existing timber bulkhead and esplanade shall be removed from the beach and deposited upland such that it does not enter waters of the state.

16. The eighty-one (81) existing creosote pilings shall be removed and disposed of upland such that they do not enter waters of the state.

17. The existing pilings shall be completely extracted and disposed of upland such that they do not enter waters of the state. In the event that the piles cannot be completely removed, the remainder of the pile shall be cut off 2 ft. below the mudline and removed with a clamshell bucket, chain, or similar means. The resulting hole from pile removal shall be filled with clean sand or gravel.

18. Piles removed from the substrate shall be moved immediately from the water into a barge or onto uplands. The pile shall not be shaken, hosed off, left hanging to dry or any other action intended to clean or remove adhering material from the pile.

19. Creosote logs and timbers shall be fully suspended during removal so no portion of the log drags through the water or onto the beach.

CUTBACK BANK PROTECTION:

20. The laid-back rock bulkhead shall not exceed a 2:1 slope and shall tie into existing neighboring armoring.

21. Rock for the bulkhead shall be composed of clean, angular material of a sufficient durability and size to prevent its being broken up or washed away by high water or wave action.

22. The re-constructed bed area waterward of the OHWL shall be covered with an light rp-rap as per project plans and shall be topped with habitat mix in compliance with the following specifications:

a.

Sieve Size	Percent Passing by Weight
6-inch	100
4-inch	90 to 100
3/4-inch	50 to 90
No. 4	35 to 65
No.10	15 to 45
No. 40	2 to 10
No. 200	0 to 2

b. "Habitat mix" shall be spread to a minimum depth of 12 inches.

c. Gravel shall be rounded (e.g. pea gravel), not be angular rock and shall not contain silty or clay type soils.

d. Materials shall be evenly spread along the entire length of the bulkhead so as to not entrap juvenile fishes during a receding tide.

23. As per plans, the beach shall be enhanced through the placement of large woody material (LWM) in the following manner:
    a) A minimum of fifteen (15) root wads, with attached stems, shall be placed as per plans. Alternative locations shall require approval of the AHB.
    b) LWM, shall be a minimum size of 18-inch dbh (diameter breast height) and a minimum of eight (8) feet in length, not including the root wad.
    c) LWM shall be anchored by means of helical or manta ray anchors and galvanized chain. Concrete "ecology blocks" may be subsituted; but, the top of the block shall be a minimum of 3 feet below completed beach grade and shall remain completely buried for the entire life of the project.
    d) LWM shall be countersunk a minimum of half the diameter of the LWM.
    e) Galvanized chain shall be tightly affixed from anchor to the log such that the log cannot float and become mobile. Under no circumstances shall rope or cable be used.

24. As per plans, the waterward face of the rootwad shall be located no further waterward than the +10 MLLW.

25. All upland drainage tightlines shall be incorporated into the bulkhead near beach grade to prevent erosion of the shoreline.

26. An outfall pad including up to 10" round river rock shall not encroach more than eight (8) feet waterward of the outfall.

27. All catch basins, culverts, biofiltration swales, energy dissipation devices, and pipeline outfalls shall be free of obstructions for the life of the project to ensure proper functioning of the stormwater management system.

28. Bed material, other than material excavated for base rocks, shall not be utilized for project construction or fills.

29. Excavated materials containing silt, clay, or other fine grained soil shall not be stockpiled below the OHWL. All contaminated excavated materials shall be immediately removed from the intertidal area and shall not enter waters of the state.

30. All trenches, depressions, or holes created in the beach area shall be backfilled prior to inundation by tidal waters. Trenches excavated for base rocks may remain open during construction. However, fish shall be prevented from entering such trenches.

31. Beach area depressions created during project activities shall be reshaped to preproject beach level upon project completion.

32. All exposed slopes shall be covered with natural fiber mesh, shall be hydroseeded, and shall be re-vegetated with natural vegetation immediately following construction.

33. Removal or destruction of overhanging bankline vegetation shall be limited to that necessary for the construction of the project. Vegetation removed from the upland area shall be replanted in kind, e.g. a tree for a tree.

ESPLANADE REPLACEMENT:

34. This approval is for repair/replacement of the existing esplanade only and shall not result in expansion of the structure.

35. The pier, ramp, and float structure shall not exceed 264.1 feet in total length. The esplanade shall not exceed 20 feet in width, of which only 12.5 feet shall be located waterward of the OHWL.

36. This HPA permits the installation of up to thirty (30) steel and/or concrete piles (esplanade) and ten (10) pin-piles for the north gangway. Use of both a vibratory and impact hammer are authorized under this HPA.

37. The following sound attenuation methods shall be required for the driving or proofing steel piles with an impact hammer below the OHWL:

a. For steel piles, 10 inches in diameter or less, a 6 inch thick wood block shall be installed between the piling and the impact hammer during pile driving operations or a bubble curtain shall be installed around the pile during pile driving operations.
b. For steel piles greater than 10 inches in diameter, a bubble curtain shall be installed around the pile during pile driving operations.
c. The bubble curtain shall be installed and properly functioning around the pile during all driving operations. The bubble curtain shall distribute air bubbles around 100 percent of the perimeter of the piling over the full length of the pile in the water column.

38. The esplanade grating plan (plan sheet 6 of 8) shall be followed. Grating materials shall contain a minimum of 60% percent open space; and the grated area shall not be used for storage purposes.

GENERAL PROVISIONS:

39. All natural habitat features on the beach larger than 12 inches in diameter, including trees, stumps, logs, and large rocks, shall be retained on the beach following construction. These habitat features may be moved during construction if necessary.

40. Project activities shall not degrade water quality to the detriment of fish life.

41. Project activities shall be conducted to minimize siltation of the beach area and bed.

42. All equipment used on this site, including excavator, barge deck, and hand tools, shall be thoroughly cleaned before arriving at the site. Equipment shall also be clean after leaving the site and before moving to a new construction site. All water and chemicals used to clean equipment

should be properly disposed of to prevent the spread of invasive species.

43. No petroleum products, or other deleterious materials resulting from construction, shall enter surface waters. An emergency spill containment kit must be located on site along with a pollution prevention plan detailing planned fueling, materials storage, and equipment storage. Waste storage areas must be prepared to address prevention and cleanup of accidental spills.

44. Wood treated with preservatives, trash, waste, or other deleterious materials shall not be burned below the OHWL.

PROJECT LOCATIONS

Location #1 1117 & 1119 Dock Street

WORK START: January 02, 2014				WORK END: December 18, 2018		
WRIA:	Waterbody:			Tributary to:		
10.9110	Wria 10 Marine			Puget Sound		
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
NW 1/4	04	20 N	03 E	N 47.253235	W 122.43465	Pierce

Location #1 Driving Directions

Interstate 5 to Exit 133, Left at fork for I-705, Schuster Pkway exit,
Right onto S 4th St., Left into parking area.

APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW (formerly RCW 77.20). Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in a civil penalty of up to one hundred dollars per day and/or a gross misdemeanor charge, possibly punishable by fine and/or imprisonment.

Issue Date: December 19, 2013 Control Number: 132184-1

Project Expiration Date: December 18, 2018 FPA/Public Notice #: N/A

All Hydraulic Project Approvals issued under RCW 77.55.021 are subject to additional restrictions, conditions, or revocation if the Department of Fish and Wildlife determines that changed conditions require such action. The person(s) to whom this Hydraulic Project Approval is issued has the right to appeal those decisions. Procedures for filing appeals are listed below.

MINOR MODIFICATIONS TO THIS HPA: You may request approval of minor modifications to the required work timing or to the plans and specifications approved in this HPA. A minor modification to the required work timing means up to a one-week deviation from the timing window in the HPA when there are no spawning or incubating fish present within the vicinity of the project. You may request subsequent minor modifications to the required work timing. A minor modification of the plans and specifications means any changes in the materials, characteristics or construction of your project that does not alter the project's impact to fish life or habitat and does not require a change in the provisions of the HPA to mitigate the impacts of the modification. Minor modifications do not require you to pay additional application fees or be issued a new HPA. To request a minor modification to your HPA, submit a written request that clearly indicates you are requesting a minor modification to an existing HPA. Include the HPA number and a description of the requested change and send by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234, or by email to HPAapplications@dfw.wa.gov. Do not include payment with your request. You should allow up to 45 days for the department to process your request.

MAJOR MODIFICATIONS TO THIS HPA: You may request approval of major modifications to any aspect of your HPA. Any approved change other than a minor modification to your HPA will require issuance of a new HPA. If you paid an application fee for your original HPA you must include payment of $150 with your written request or request billing to an account previously established with the department. If you did not pay an application fee for the original HPA, no fee is required for a change to it. To request a major modification to your HPA, submit a written request that clearly indicates you are requesting a major modification to an existing HPA. Include the HPA number, check number or billing account number, and a description of the requested change. Send your written request and payment, if applicable, by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234. If you are charging the fee to a billing account number or you are not subject to the fee, you may email your request to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.

APPEALS INFORMATION

If you wish to appeal the issuance, denial, conditioning, or modification of a Hydraulic Project Approval (HPA), Washington Department of Fish and Wildlife (WDFW) recommends that you first contact the department employee who issued or denied the HPA to discuss your concerns. Such a discussion may resolve your concerns without the need for further appeal action. If you proceed with an appeal, you may request an informal or formal appeal. WDFW encourages you to take advantage of the informal appeal process before initiating a formal appeal. The informal appeal process includes a review by department management of the HPA or denial and often resolves issues faster and with less legal complexity than the formal appeal process. If the informal appeal process does not resolve your concerns, you may advance your appeal to the formal process. You may contact the HPA Appeals Coordinator at (360) 902-2534 for more information.

A. INFORMAL APPEALS: WAC 220-110-340 is the rule describing how to request an informal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete informal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request an informal appeal of that action. You must send your request to WDFW by mail to the Washington Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. WDFW must receive your request within 30 days from the date you receive notice of the decision. If you agree, and you applied for the HPA, resolution of the appeal may be facilitated through an informal conference with the WDFW employee responsible for the decision and a supervisor. If a resolution is not reached through the informal conference, or you are not the person who applied for the HPA, the HPA Appeals Coordinator or designee will conduct an informal hearing and recommend a decision to the Director or designee. If you

results of the informal appeal, you may file a request for a formal appeal.

B. FORMAL APPEALS: WAC 220-110-350 is the rule describing how to request a formal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete formal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request a formal appeal of that action. You must send your request for a formal appeal to the clerk of the Pollution Control Hearings Boards and serve a copy on WDFW within 30 days from the date you receive notice of the decision. You may serve WDFW by mail to the Washington Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, you may request a formal appeal within 30 days from the date you receive the Director's or designee's written decision in response to the informal appeal.

C. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS: If there is no timely request for an appeal, the WDFW action shall be final and unappealable.

ENFORCEMENT: Sergeant Jackson (29) P2

Habitat Biologist Leonard Machut	leonard.machut@dfw.wa.gov	Leonard S. Machut	for Director WDFW

CC: Shirely Schultz, City of Tacoma (email);
Olivia Romano, USACE (email);
Russ Ladley, Puyallup Tribe (email);

Notification of Intent to Proceed with the Site 9 Emergency Action

City of Tacoma
Public Works Department

January 16, 2014

Mr. Marv Coleman
Site Manager, Toxics Cleanup Program
Washington Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

Subject: Notification of Intent to Proceed with the Site 9 Emergency Interim Action

Dear Marv,

As we have discussed with you, the City is undertaking an emergency interim action on Site 9 located at 1117 Dock Street, immediately south of the Murray Morgan Bridge. The bulkhead and esplanade structure at Site 9 on the Thea Foss Waterway is failing significantly and is near collapse. The in-water area adjacent to the bulkhead was capped as part of the Thea Foss Waterway Superfund cleanup. The upland site is part of the Ecology upland cleanup area and has not been remediated. The emergency interim action is intended to eliminate the threat of the Site 9 bulkhead and esplanade collapse and to prevent contamination of the waterway.

The emergency interim action includes removal of the bulkhead and esplanade, removal of debris on the shoreline beneath the esplanade, excavating behind the bulkhead at a 2:1 slope, and capping the slope in accordance with the Thea Foss and Wheeler-Osgood Waterways Area Slope Cap Maintenance Plan developed during the Superfund cleanup of the waterway. The City expedited design and permitting in order to start the emergency interim action in January and complete the in-water portion of the work before February 15 to meet agency fish window requirements. The City also conducted sampling of the material to be excavated behind the bulkhead and has determined that this material exceeds MTCA Level A cleanup levels for unrestricted use but is not classified as hazardous waste. The City worked with TPCHD to obtain a Waste Disposal Authorization for the soil excavated from the site.

The City will incorporate the emergency interim action into the SCAP being developed for Site 9. Please contact me if you have any questions regarding the actions being taken.

Sincerely,

Tom Rutherford

Tom Rutherford, P.E.
Project Manager

cc: Sue O'Neill

Buried Tank Information

STRUCTURAL
IMAGING

670 Marine Drive
Sequim, Washington 98382
Phone: (206) 290-7439
Fax: (214) 279-7439
WA. Regis. No. STRUCL*004RA

Client: Foss Harbor
Date of Job: 10-08-2014
Location: 1025 Dock St. Tacoma

Scan Results:

Scanned the parking lot 40'x200' to locate tanks below the slab. I found large amount of conduits/pipes 2'-4' down and a lot of distortion in the screen due to metal shavings left over from an old steel factory. I found two things that were large and looked to be tanks. They were 3'-4' down. Due to the amount of pipes and metal shavings below the slab, I recommend that you hydro vac around these areas. I have attached to photos of the tank layout.

If you have any further questions, please call me, (206) 423.7942.

Thank you for your business.

Jake Ehrensperger
jake@structuralimagingllc.com
206.423.7942
NW Region Manager
Structural Imaging

Google earth

feet 100

meters 40


?/Tank


Tank

From: O'Neill, Sue <soneill@ci.tacoma.wa.us>
Sent: Monday, June 16, 2014 10:01 AM
To: Rutherford, Tom
Subject: FW: Site 9 Thea Foss Esplanade

Sue O'Neill
Asst. Division Manager
Public Works Engineering
(253)591-5789 (Office)
(253)720-0178 (Mobile)
(253)591-5181 (Fax)

From: Rob Olsen [mailto:ROlsen@tpchd.org]
Sent: Wednesday, October 02, 2013 4:19 PM
To: Strom, Lynn
Cc: O'Neill, Sue; Norman, Chad; Buck, Brad; 'Johnston, Carol (ECY)' (cjoh461@ECY.WA.GOV)
Subject: RE: Site 9 Thea Foss Esplanade

I scanned our records, searching everything I could for this parcel and address, including adjacent addresses – the only records I have for UST decommissioning are for adjacent sites Western Fish and Oyster at 1117 and 1137 Dock, Pacific Trustee LTD at 1147 Dock and Colonial Fruit at 1179 Dock. I don't have anything for the parcel or address you cited. Perhaps the marina operator would know if the tank was a *heating oil tank under 1,100 gallons*? This size and use is exempt from both State and local UST regulations, but still requires a permit from the Fire Marshal in accordance with the International Fire Code. Perhaps the Fire Marshal has records? I would be happy if we find this tank has already been dealt with appropriately, but if it remains a mystery, our policy is to treat it like any other tank found abandoned.

Talk soon,

Rob Olsen, REHS
Environmental Health Specialist II
UST Program/ Environmental Health Division
Tacoma-Pierce County Health Department
3629 So D St, Tacoma, WA 98418
(253) 798-2855
UST Program

From: Strom, Lynn [mailto:lstrom@ci.tacoma.wa.us]
Sent: Wednesday, October 02, 2013 3:37 PM
To: Rob Olsen
Cc: O'Neill, Sue; Norman, Chad; Buck, Brad; 'Johnston, Carol (ECY)' (cjoh461@ECY.WA.GOV)
Subject: RE: Site 9 Thea Foss Esplanade

Rob,

The parcel # should be 8950001962 and the address is 1119 Dock Street. The manager at the Marina was really sure it had been abandoned, but didn't provide any documentation. It would be great if you could check your records and find us a piece of good news.

Thanks,

Lynn Strom
Construction Manager, Public Works
Engineering Construction Management
253.594.7919
Email: lstrom@cityoftacoma.org

From: Rob Olsen [mailto:ROlsen@tpchd.org]
Sent: Wednesday, October 02, 2013 3:04 PM
To: Strom, Lynn; cjoh461@ecy.wa.gov
Cc: O'Neill, Sue; 'Chad Norman (cot_chadnorman@outlook.com)'; Buck, Brad
Subject: RE: Site 9 Thea Foss Esplanade

Lynn – you mention something very important: if this tank has already been abandoned in-place, approved and permitted by our office, its regulatory status is nothing more than a chunk of inert material and you may do with it as you wish (leave it or remove and dispose of as ordinary inert solid waste). I would be glad to check our records, which go back to 1988. Abandonments done prior to 1988 we don't acknowledge as truly abandoned because no assessment of the soils/groundwater would have been done to demonstrate no contamination – we do permit and oversee removals of tanks of that variety.

We track our permits by address and parcel number. I'll see what I can find looking generally under 'foss harbor marina' but if you have more specific information about the address and parcel, my search will be more accurate.

Rob

From: Strom, Lynn [mailto:lstrom@ci.tacoma.wa.us]
Sent: Wednesday, October 02, 2013 2:37 PM
To: Rob Olsen; cjoh461@ecy.wa.gov
Cc: O'Neill, Sue; 'Chad Norman (cot_chadnorman@outlook.com)'; Buck, Brad
Subject: RE: Site 9 Thea Foss Esplanade

Hi Rob,

No worries, you deserve some time to catch up from what I hope was a restful vacation.

We did not encounter any evidence of a release from the tank, and have subsequently been told by the adjacent Marina that the tank was previously abandoned in place. Is it possible to check your records to see if that is the case? Please feel free to call me if you need more information on the location.

While I normally look forward to any award the City may receive, I would respectfully decline this one!

Thanks,

Lynn Strom
Construction Manager, Public Works
Engineering Construction Management
253.594.7919
Email: lstrom@cityoftacoma.org

From: Rob Olsen [mailto:ROlsen@tpchd.org]
Sent: Wednesday, October 02, 2013 10:55 AM
To: Strom, Lynn; cjoh461@ecy.wa.gov
Cc: O'Neill, Sue; 'Chad Norman (cot_chadnorman@outlook.com)'; Buck, Brad
Subject: RE: Site 9 Thea Foss Esplanade

Hi Lynn – I've been back a couple days and must apologize for the delay in getting back to you. Thank you for letting us know of your finding. Our office is amenable to your plan to return to the site to deal with the UST in the near term. Should you find evidence of a contaminant release during the course of construction activities, we would like to see some interim measures to limit exposure and potential for further contaminant migration. I do believe City of Tacoma will receive a reward this year for finding the most abandoned tanks!

Thanks again,

Rob Olsen, REHS
Environmental Health Specialist II
UST Program/ Environmental Health Division
Tacoma-Pierce County Health Department
3629 So D St, Tacoma, WA 98418
(253) 798-2855
UST Program

From: Strom, Lynn [mailto:lstrom@ci.tacoma.wa.us]
Sent: Wednesday, September 25, 2013 12:28 PM
To: Rob Olsen; cjoh461@ecy.wa.gov
Cc: O'Neill, Sue; 'Chad Norman (cot_chadnorman@outlook.com)'; Buck, Brad
Subject: Site 9 Thea Foss Esplanade

Hi Rob,

Hope this finds you well, since you will be coming back from vacation!

As you might guess, since you only hear from me when I have been lucky enough to find another tank; we have discovered an underground storage tank.

The City is making an emergency relocation of the utilities to the Foss Harbor Marina, due to the failure of the seawall supporting the esplanade. The City has been granted an HPA from Fish &Wildlife to perform this work which expires Friday 9/25, so time is critical.

As the contractor was digging the trench to relocate the utilities, an underground storage tank was observed. There was no odor or obvious leaking present, or any indications of what the tank usage had been. We were able to keep the tank out of our trench, so the tank was not disturbed or investigated further.

The City owns this property and there is a remediation plan for the site in the works. The City would like to add removal of the tank to that remediation plan and do nothing further at this point, if that is acceptable.

From my previous conversations with you, I believe this an acceptable course of action as the City acknowledges that the tank must be remediated.

I also made a call to Carol Johnston to run it past her and she was in agreement that this was acceptable to DOE.

Upon your return, can you please get in touch with me to discuss?

Thanks,

Lynn Strom
Construction Manager
City of Tacoma, Public Works
Engineering Construction Management
253.594.7919
Email: lstrom@cityoftacoma.org

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This e-mail and any attachments may contain confidential and privileged information. It has been scanned for viruses. If you are not the intended recipient, please notify the sender immediately by return e-mail, delete this e-mail and destroy any copies.
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This e-mail and any attachments may contain confidential and privileged information. It has been scanned for viruses. If you are not the intended recipient, please notify the sender immediately by return e-mail, delete this e-mail and destroy any copies.
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Utility Excavation Soil Characterization and Disposal
Waste Disposal Authorization

Tacoma-Pierce County Health Department
Healthy People in Healthy Communities

Tacoma-Pierce County Health Department
3629 South D Street, MS: 1045, Tacoma WA 98418-6813
(253) 798-6047

WASTE DISPOSAL AUTHORIZATION APPLICATION

The information requested below is essential in determining if this waste is acceptable for disposal at the City of Tacoma Landfill, the LRI Landfill, the Hidden Valley Transfer Station, or other permitted solid waste facilities such as petroleum contaminated soils treatment facilities. It is unlikely that you will be able to respond in the space provided. Feel free to modify the format and/or address the information on additional pages, but at a minimum include all the information requested below. The information listed below may be mailed or faxed to:

Tacoma-Pierce County Health Department
Waste Management
3629 South D Street, MS: 1045
Tacoma, WA 98418-6813
Fax - (253) 798-6498

Date: 10/15/2013 Site/Facility Name: City of Tacoma Thea Foss Upland Pa

Consultant/Contractor/Company representative: Olson Brothers Excavating

Proposed Solid Waste Disposal/Treatment Facility: LRI

Describe Where Waste Originated (physical location, company name, project name, etc.): Soil Excavation Fro Lot 9 Thea Foss Upland Properties. -1133 Dock St, Tacoma, WA.

Projected Quantity or Volume of Waste (generated per month, quarter, year, etc.): 50 - 100 yards

Describe How Waste is Generated/Source of Waste: Contaminated Soil, Site Excavation Source of Contamination = Previous Land Owner - Pacific Machine Shop.

Describe the Site History (if applicable): 1913 - Case Shaffer Evanver Company, 1918 Pacific Machine Shop, 1990 City of Tacoma Property Lot. Known Contaminated Site.

Describe the Sampling Method(s) or Submit Sampling Plan: 3 Grab Samples of Excavated Soil was Collected.

Tacoma-Pierce County Health Department
3629 South D St., MS: 1045, Tacoma WA 98418-6813
(253) 798-6047

WASTE DISPOSAL AUTHORIZATION PROCESS

Required Analysis/Analysis Conducted

The parameter(s) and analytical method(s) indicated below must be performed in order to characterize a waste stream. The Tacoma-Pierce County Health Department recommends the generator of the waste submit for analysis the number of samples per volume of waste provided in the table below. Analytical results must be submitted to the Health Department's Waste Management Program prior to disposal of waste at a permitted solid waste facility located in Pierce County. Analytical results may be forwarded to the address below.

Tacoma-Pierce County Health Department
Waste Management Program
3629 South D Street, MS: 1045
Tacoma, WA 98418-6813

Date: 10/15/2013 Facility Name: CITY OF TACOMA THEA FOSS UPLAND PROJ

Description of Waste: CONTAMINATED SOIL

PARAMETER	ANALYTICAL METHOD	YES/NO	SAMPLE TYPE
Total Metals (RCRA 8)	EPA #6010 TOTAL ZN, CU, NI	X	GRAB
TCLP Metals (RCRA 8)	EPA #1311/6010 LEAD	X	GRAB
Total Petroleum Hydrocarbons	WTPH-HCID, WTPH-G, WTPH-D, WTPH-418.1 Modified, WTPH-G or WTPH-D Extended	X	GRAB
Volatile Organics	EPA #8010 (Halogenated), 8020 (BTEX), 8240		
Semi-volatile Organics	EPA #8270, 8310 (PAH's)		
PCB's	EPA #8080, 8140	X	GRAB
TCLP Volatiles & Semi			
Paint Filter Test	EPA #9095		
pH	EPA #9040, 9045 (soil)		
PSCAA		X	GRAB
WDOE-80-12		X	GRAB

RECOMMENDED SAMPLING FREQUENCY

VOLUME (cubic yards)	NUMBER OF SAMPLES
0 - 25	2
26 – 100	3
101 – 500	5
501 - 1000	7
1001 – 2000	10
One (1) additional sample for every 500 cubic yards of material over 2000 cubic yards.	

Tacoma Pierce County
Health Department
Healthy People in Healthy Communities

Tacoma-Pierce County Health Department
3629 South D Street, MS: 1045, Tacoma WA 98418-6813
(253) 798-6047

Describe and/or Justify the Number of Samples per Volume of Waste: NUMBER OF SAMPLES WERE SELECTED BASED ON YARDAGE AND RECOMMENDED SAMPLING FREQUENCY

Describe and/or Justify the Parameters Selected for Analysis: PARAMETERS SELECTED WERE BASED ON HISTORICAL LAND USE AND KNOWN SITE CONTAMINATION - WDOE 80-12 WAS PERFORMED TO CONFIRM OR DISPUTE STATE TOXIC DESIGNATION.

In addition to the information requested above, please enclose copies of the analytical results, chain of custody forms, a sampling plan, and any other documents relevant to the review of the site, facility, and/or waste being characterized.

By my signature below, I certify that the information presented in this application is true and complete to the best of my knowledge.

Applicant Signature	Applicant Title	Date
Company Name	Company Address	
Phone Number	Email Address	
Fax Number		

SPECTRA Laboratories
2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

10/03/2013

Northern Environmental, LLC
2661 N. Pearl St #145
Tacoma, WA 98407

P.O.#: *
Project: City Tacoma- Lot 9
Client ID: Soil #1
Sample Matrix: Soil
Date Sampled: 09/25/2013
Date Received: 09/25/2013
Spectra Project: 2013090578
Spectra Number: 1
Rush

Analyte	Result	Units	Method
HCID- Gasoline	<20	mg/Kg	NWTPH-HCID
HCID-Diesel	<50	mg/Kg	NWTPH-HCID
HCID-Oil	<100	mg/Kg	NWTPH-HCID
TCLP Lead	0.13	mg/L	SW846 6010B
Total Arsenic	< 5	mg/Kg	SW846 6010B
Total Barium	34.1	mg/Kg	SW846 6010B
Total Cadmium	< 0.3	mg/Kg	SW846 6010B
Total Chromium	12.2	mg/Kg	SW846 6010B
Total Copper	33.2	mg/Kg	SW846 6010B
Total Lead	93	mg/Kg	SW846 6010B
Total Nickel	9.6	mg/Kg	SW846 6010B
Total Selenium	< 5	mg/Kg	SW846 6010B
Total Silver	< 0.7	mg/Kg	SW846 6010B
Total Zinc	135	mg/Kg	SW846 6010B
Total Mercury	<0.05	mg/Kg	SW846 7471B
PCB AR1262	0.05*	mg/Kg	SW846 8082A
1-Methylnaphthalene	<0.033	mg/Kg	SW846 8270D
2-Methylnaphthalene	<0.033	mg/Kg	SW846 8270D
Acenaphthene	<0.033	mg/Kg	SW846 8270D
Acenaphthylene	<0.033	mg/Kg	SW846 8270D
Anthracene	<0.033	mg/Kg	SW846 8270D

Analyte	Result	Units	Method
Benzo(a)Anthracene	0.101	mg/Kg	SW846 8270D
Benzo(a)Pyrene	0.098	mg/Kg	SW846 8270D
Benzo(b)Fluoranthene	0.103	mg/Kg	SW846 8270D
Benzo(ghi)Perylene	0.077	mg/Kg	SW846 8270D
Benzo(k)Fluoranthene	0.089	mg/Kg	SW846 8270D
Chrysene	0.174	mg/Kg	SW846 8270D
Dibenz(a,h)Anthracene	<0.033	mg/Kg	SW846 8270D
Fluoranthene	0.134	mg/Kg	SW846 8270D
Fluorene	<0.033	mg/Kg	SW846 8270D
Indeno(1,2,3-cd)Pyrene	0.081	mg/Kg	SW846 8270D
Naphthalene	<0.033	mg/Kg	SW846 8270D
Phenanthrene	0.070	mg/Kg	SW846 8270D
Pyrene	0.265	mg/Kg	SW846 8270D

*Sample contains multiple Aroclors. Total area of the PCB pattern in the sample was quantified on the basis of the Aroclor standard that is most similar to the sample.

Surrogate	Recovery	Method
4-Bromofluorobenzene	42	NWTPH-HCID
p-Terphenyl	77	NWTPH-HCID
2-Fluorobiphenyl	44	SW846 8270D
Nitrobenzene-d6	31	SW846 8270D

Surrogate	Recovery	Method
p-Terphenyl-d14	80	SW846 8270D
Decachlorobiphenyl	66	SW846 8082A

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a14/scj

SPECTRA Laboratories
2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

10/03/2013

P.O.#: *
Project: City Tacoma- Lot 9
Client ID: Soil #2
Sample Matrix: Soil
Date Sampled: 09/25/2013
Date Received: 09/25/2013
Spectra Project: 2013090578
Spectra Number: 2
Rush

Northern Environmental, LLC
2661 N. Pearl St #145
Tacoma, WA 98407

Analyte	Result	Units	Method
HCID- Gasoline	<20	mg/Kg	NWTPH-HCID
HCID-Diesel	<50	mg/Kg	NWTPH-HCID
HCID-Oil	<100	mg/Kg	NWTPH-HCID
TCLP Lead	0.27	mg/L	SW846 6010B
Total Arsenic	< 5	mg/Kg	SW846 6010B
Total Barium	59.5	mg/Kg	SW846 6010B
Total Cadmium	< 0.3	mg/Kg	SW846 6010B
Total Chromium	23.6	mg/Kg	SW846 6010B
Total Copper	184	mg/Kg	SW846 6010B
Total Lead	136	mg/Kg	SW846 6010B
Total Nickel	16.2	mg/Kg	SW846 6010B
Total Selenium	< 5	mg/Kg	SW846 6010B
Total Silver	< 5	mg/Kg	SW846 6010B
Total Zinc	127	mg/Kg	SW846 6010B
Total Mercury	0.12	mg/Kg	SW846 7471B
PCB AR1262	0.15*	mg/Kg	SW846 8082A
1-Methylnaphthalene	<0.033	mg/Kg	SW846 8270D
2-Methylnaphthalene	<0.033	mg/Kg	SW846 8270D
Acenaphthene	<0.033	mg/Kg	SW846 8270D
Acenaphthylene	<0.033	mg/Kg	SW846 8270D
Anthracene	<0.033	mg/Kg	SW846 8270D
Benzo(a)Anthracene	0.042	mg/Kg	SW846 8270D
Benzo(a)Pyrene	0.038	mg/Kg	SW846 8270D
Benzo(b)Fluoranthene	0.035	mg/Kg	SW846 8270D
Benzo(ghi)Perylene	<0.033	mg/Kg	SW846 8270D
Benzo(k)Fluoranthene	<0.033	mg/Kg	SW846 8270D
Chrysene	0.062	mg/Kg	SW846 8270D
Dibenz(a,h)Anthracene	<0.033	mg/Kg	SW846 8270D
Fluoranthene	0.054	mg/Kg	SW846 8270D
Fluorene	<0.033	mg/Kg	SW846 8270D
Indeno(1,2,3-cd)Pyrene	<0.033	mg/Kg	SW846 8270D
Naphthalene	<0.033	mg/Kg	SW846 8270D
Phenanthrene	0.034	mg/Kg	SW846 8270D
Pyrene	0.091	mg/Kg	SW846 8270D

*Sample contains multiple Aroclors. Total area of the PCB pattern in the sample was quantified on the basis of the Aroclor standard that is most similar to the sample.

Surrogate	Recovery	Method
4-Bromofluorobenzene	50	NWTPH-HCID
2-Fluorobiphenyl	54	SW846 8270D
p-Terphenyl	87	NWTPH-HCID
Nitrobenzene-d6	48	SW846 8270D
p-Terphenyl-d14	88	SW846 8270D
Decachlorobiphenyl	87	SW846 8082A

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a14/scj

SPECTRA Laboratories
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10/03/2013

Northern Environmental, LLC
2661 N. Pearl St #145
Tacoma, WA 98407

P.O.#:
Project: City Tacoma- Lot 9
Client ID: Soil #3
Sample Matrix: Soil
Date Sampled: 09/25/2013
Date Received: 09/25/2013
Spectra Project: 2013090578
Spectra Number: 3
Rush

Analyte	Result	Units	Method
HCID- Gasoline	<20	mg/Kg	NWTPH-HCID
HCID-Diesel	<50	mg/Kg	NWTPH-HCID
HCID-Oil	<100	mg/Kg	NWTPH-HCID
Total Arsenic	< 5	mg/Kg	SW846 6010B
Total Barium	20.9	mg/Kg	SW846 6010B
Total Cadmium	< 0.3	mg/Kg	SW846 6010B
Total Chromium	11.4	mg/Kg	SW846 6010B
Total Copper	29.8	mg/Kg	SW846 6010B
Total Lead	31	mg/Kg	SW846 6010B
Total Nickel	9.6	mg/Kg	SW846 6010B
Total Selenium	< 5	mg/Kg	SW846 6010B
Total Silver	< 0.7	mg/Kg	SW846 6010B
Total Zinc	95.8	mg/Kg	SW846 6010B
Total Mercury	<0.05	mg/Kg	SW846 7471B
PCB	<0.02	mg/Kg	SW846 8082A
1-Methylnaphthalene	<0.033	mg/Kg	SW846 8270D
2-Methylnaphthalene	<0.033	mg/Kg	SW846 8270D
Acenaphthene	<0.033	mg/Kg	SW846 8270D
Acenaphthylene	<0.033	mg/Kg	SW846 8270D
Anthracene	<0.033	mg/Kg	SW846 8270D
Benzo(a)Anthracene	<0.033	mg/Kg	SW846 8270D
Benzo(a)Pyrene	<0.033	mg/Kg	SW846 8270D
Benzo(b)Fluoranthene	<0.033	mg/Kg	SW846 8270D
Benzo(ghi)Perylene	<0.033	mg/Kg	SW846 8270D
Benzo(k)Fluoranthene	<0.033	mg/Kg	SW846 8270D
Chrysene	<0.033	mg/Kg	SW846 8270D
Dibenz(a,h)Anthracene	<0.033	mg/Kg	SW846 8270D
Fluoranthene	<0.033	mg/Kg	SW846 8270D
Fluorene	<0.033	mg/Kg	SW846 8270D
Indeno(1,2,3-cd)Pyrene	<0.033	mg/Kg	SW846 8270D
Naphthalene	<0.033	mg/Kg	SW846 8270D
Phenanthrene	<0.033	mg/Kg	SW846 8270D
Pyrene	0.035	mg/Kg	SW846 8270D

Surrogate	Recovery	Method
2-Fluorobiphenyl	49	SW846 8270D
4-Bromofluorobenzene	44	NWTPH-HCID
p-Terphenyl	81	NWTPH-HCID
Nitrobenzene-d6	32	SW846 8270D
p-Terphenyl-d14	83	SW846 8270D
Decachlorobiphenyl	91	SW846 8082A

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager
a14/scj

Rainier ENVIRONMENTAL

Dangerous Waste Characterization

Sample ID: Soil#2 20130905 78-2

Report date: October 14, 2013

Submitted to:

City of Tacoma

Rainier Environmental
5013 Pacific Hwy East
Suite 20
Tacoma, WA 98424

1.0 INTRODUCTION

A dangerous waste characterization using the test organism *Oncorhynchus mykiss* (rainbow trout) was conducted on one sample submitted by PRO-VAC for the City of Tacoma to Rainier Environmental. Testing was conducted following the Washington State Department of Ecology Publication 80-12.

2.0 METHODS

The sample, identified as Soil#2 20130905 78-2, was received in the laboratory on October 9, 2013. Upon arrival at the laboratory the sample was inspected and contents verified against information provided on the chain-of-custody form. The sample was stored at 4°C in the dark until use. The test procedure is outlined in Table 1.

Table 1. Summary of Dangerous Waste Characterization Test Conditions

Parameter	Standard Fish Toxicity Test
Test number	1310-005
Sample ID	Soil#2 20130905 78-2
Test initiation date; time	10/10/2013; 0900h
Test termination date; time	10/14/2013; 0915h
Endpoint	Mortality at 96-hours
Test chamber	7.5 L Plastic tank
Test temperature	12 ± 1°C
Dilution water	Moderately hard synthetic water
Test solution volume	6 L
Test concentrations (mg/L)	100, 10, 0
Number of organisms/ chamber	10
Number of replicates	3
Test organism	*Oncorhynchus mykiss* (rainbow trout)
Feeding	No feeding during test
Photoperiod	16 hours light/ 8 hours dark
Extraction	Rotary agitation (30 +/- 2 rpm) for 18 hours
Reference Toxicant	Copper sulfate
Deviations	None

The test organisms used in the test are outlined in Table 2. The sample was tested using fish received on September 4, 2013.

Table 2. Test organisms (*Oncorhynchus mykiss*)

Test organism age	66 days post swim-up (hatch date 7/20/2013)
Mean weight	0.36 g
Mean length	33 mm
Ratio of longest to shortest	1.2
Loading	0.60 g/L
Test organism source	Trout Lodge; Sumner, WA

3.0 RESULTS

A summary of results for the dangerous waste characterization conducted on sample Soil#2 20130905 78-2 is contained in Table 3. There was no mortality during the test. Based on these results, the sample does not designate as either a dangerous or extremely hazardous waste. Copies of the laboratory bench sheets, statistical summaries of reference toxicant tests, and chain-of-custody form are provided in Appendices A through C.

Table 3. Summary of Results

Sample ID	Concentration (mg/L)	Survival (# fish, N=30)	Percent Mortality	Dangerous Waste Designation
Control	0	30	0	NA
Soil#2 20130905 78-2	10	30	0	None
	100	30	0	

4.0 QUALITY ASSURANCE

The most recently completed reference toxicant test was initiated October 10, 2013. The LC_{50} of 57.6 µg/L copper fell within the acceptable range of mean ± two standard deviations of historical test results indicating that the test organisms were of an appropriate degree of sensitivity. The coefficient of variation (CV) for the last 21 tests was 13.3 percent, which is considered excellent by the Biomonitoring Science Advisory Board.

5.0 REFERENCES

WDOE. 2008. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised December 2008.

WDOE. 2009. Biological Testing Methods 80-12 for the Designation of Dangerous Waste. Washington State Department of Ecology. Hazardous Waste and Toxics Reduction Program. Publication number: 80-12, Revised June 2009.

Appendix A
Oncorhynchus mykiss Dangerous Waste Toxicity Test
Raw Bench Sheets

Dangerous Waste Toxicity Test

Client: City of Tacoma
Sample ID: SOIL #2 20130905 78-2
Test #: 1310-005
Log In #: T13-174

Start Date & Time: 10/10/13 9:00
End Date & Time: 10/14/13 9:15
Test Organism: *Oncorhynchus mykiss*
Test Protocol: **Washington State Department of Ecology Publ. 80-12**

Rep	Conc.	Cont #	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH (units) 0	24	48	72	96	Conductivity (umhos/cm) 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	Percent Survival
1	CON	8	10	10	10	10	10	9.5	8.8	8.5	8.0	7.8	7.49	7.38	7.31	7.25	7.11	280				278	12.3	11.7	12.1	11.5	12.4	
2		5	10	10	10	10	10	9.3	9.2	7.8	7.6	7.6	7.45	7.30	7.25	7.19	7.15	278				282						
3		11	10	10	10	10	10	9.7	9.7	8.4	8.1	8.0	7.51	7.41	7.29	7.18	7.16	281				283						
1	10 PPM	14	10	10	10	10	10	9.2	9.1	7.8	7.5	7.7	7.55	7.39	7.31	7.15	7.08	283				285	12.3	11.8	12.0	11.6	12.5	
2		18	10	10	10	10	10	9.2	8.8	8.5	8.2	7.8	7.51	7.37	7.37	7.27	7.22	281				280						
3		24	10	10	10	10	10	9.5	8.5	8.0	8.0	7.6	7.52	7.35	7.29	7.22	7.24	285				284						
1	100 PPM	6	10	10	10	10	10	9.6	8.7	8.5	8.2	7.9	7.55	7.42	7.35	7.19	7.17	292				295	12.5	11.6	12.1	11.5	12.5	
2		1	10	10	10	10	10	9.3	8.9	8.5	8.0	7.7	7.49	7.40	7.31	7.18	7.13	294				295						
3		22	10	10	10	10	10	9.3	8.6	8.1	7.5	7.2	7.52	7.43	7.31	7.15	7.17	295				295						
1																												
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Technician Initials			Et	Et	Et	Et	Et	Et	Et	Et	Et	Et																

Sample	Alk. (init.) (mg/L as CaCO3)	Hard. (init.) (mg/L as CaCO3)	Alk. (fin.) (mg/L as CaCO3)	Hard. (fin.) (mg/L as CaCO3)	Chlorine (mg/L Cl2)
Control	60	84	60	84	<0.03
100PPM	60	80	60	84	

Animal Source: Trout Lodge
Date of Hatch: 7/20/13

Test Volume: 60L
Date Received: 9/4/13
Date of Swim up: 8/4/13

Weights (g): .37 .36 .36 .33 .34 .36 .38 .36 .37 .37 μ = .36

Lengths(mm): 34 35 32 30 31 32 36 34 34 34 μ = 33

Length max/min: 36/30 1.2

Loading: 0.6 g/L

Rainier Environmental
Washington Laboratory
5013 Pacific HWY E Suite 20
Tacoma, WA 98424

Dilution Water Source: MHSW 027

QA Check: Et

Appendix B

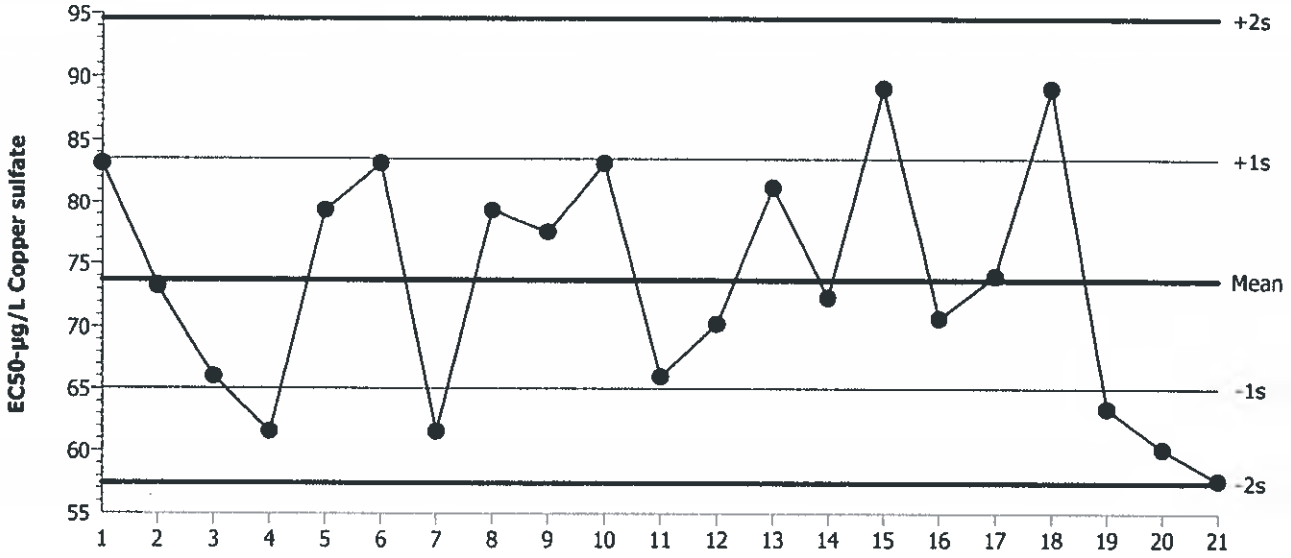
Reference Toxicant Test

Control Chart and Statistical Summary

Fish 96-h Acute Survival Test | Rainier Environmental Laboratory

Test Type:	Survival (96h)	**Organism:**	Oncorhynchus mykiss (Rainbow Tro	**Material:**	Copper sulfate
Protocol:	Not Applicable	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF

Fish 96-h Acute Survival Test



Mean:	73.7	**Count:**	20	**-1s Warning Limit:**	65.05	**-2s Action Limit:**	57.42
Sigma:	NA	**CV:**	13.30%	**+1s Warning Limit:**	83.5	**+2s Action Limit:**	94.59

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2012	May	5	83.12	9.424	0.9642			10-1629-6023	03-9407-2114
2		Jun	23	73.25	-0.4525	-0.04935			12-8458-6262	01-8363-2539
3		Jul	28	65.98	-7.724	-0.8872			14-4849-9030	17-5792-6047
4		Aug	17	61.56	-12.14	-1.443	(-)		02-6688-7148	14-4771-6805
5		Sep	10	79.37	5.67	0.5939			01-4358-3603	01-7531-0624
6			29	83.12	9.424	0.9642			02-2505-7663	10-3838-4319
7		Oct	24	61.56	-12.14	-1.443	(-)		05-3354-4421	03-5138-2420
8		Nov	15	79.37	5.67	0.5939			20-4525-1632	14-4493-0058
9		Dec	6	77.56	3.857	0.4088			12-3344-8238	20-5967-6311
10			29	83.12	9.424	0.9642			15-3315-1362	15-7624-4851
11	2013	Jan	28	65.98	-7.724	-0.8872			15-1647-8307	02-5970-9183
12		Mar	1	70.27	-3.425	-0.3813			12-4134-1782	07-9817-7749
13			21	81.23	7.525	0.7791			20-5256-9679	01-1364-4491
14		Apr	18	72.36	-1.336	-0.1466			06-8806-4852	01-3197-9163
15		May	11	89.09	15.39	1.52	(+)		08-9010-5144	11-6918-4199
16		Jun	5	70.71	-2.989	-0.3318			10-1721-3173	06-1997-6347
17			29	74.05	0.3551	0.03851			15-1684-1783	13-3566-1282
18		Aug	1	89.09	15.39	1.52	(+)		09-0330-9746	12-0951-1867
19			22	63.45	-10.25	-1.2	(-)		16-9864-6914	00-6124-6082
20		Sep	17	60.15	-13.55	-1.628	(-)		21-1905-3940	04-4877-1810
21		Oct	10	57.64	-16.06	-1.969	(-)		06-9743-0071	06-8712-0368

CETIS Summary Report

Fish 96-h Acute Survival Test — **Rainier Environmental Laboratory**

Batch ID:	20-6182-5988	**Test Type:**	Survival (96h)	**Analyst:**	Eric Tollefson
Start Date:	10 Oct-13 08:30	**Protocol:**	Not Applicable	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	14 Oct-13 08:45	**Species:**	Oncorhynchus mykiss	**Brine:**	
Duration:	4d 0h	**Source:**	Trout Lodge Fish Farm	**Age:**	66d
Sample ID:	04-2085-4454	**Code:**	RA101013OM	**Client:**	Internal Lab
Sample Date:	10 Oct-13	**Material:**	Copper sulfate	**Project:**	
Receive Date:	10 Oct-13	**Source:**	Reference Toxicant		
Sample Age:	8h	**Station:**	In House		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
15-2428-9196	96h Survival Rate	25	50	35.36	19.7%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
06-8712-0368	96h Survival Rate	LC50	57.64	47.88	69.39		Trimmed Spearman-Kärber

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
25		3	0.9333	0.8902	0.9765	0.8	1	0.06667	0.1155	12.37%	6.67%
50		3	0.5667	0.5451	0.5882	0.5	0.6	0.03333	0.05774	10.19%	43.33%
100		3	0.2	0.1353	0.2647	0	0.3	0.1	0.1732	86.6%	80.0%
200		3	0	0	0	0	0	0	0		100.0%
400		3	0	0	0	0	0	0	0		100.0%

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
25		1	0.8	1
50		0.6	0.5	0.6
100		0	0.3	0.3
200		0	0	0
400		0	0	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
25		10/10	8/10	10/10
50		6/10	5/10	6/10
100		0/10	3/10	3/10
200		0/10	0/10	0/10
400		0/10	0/10	0/10

Appendix C
Chain-of-Custody Form

Chain of Custody

Rainier ENVIRONMENTAL

Washington
5013 Pacific Highway East, Suite 20 Fife,
WA 98424
Phone253.922.8898

Date _____ Page ___ of ___

Sample Collection By:

Report to:	CITY OF TACOMA - LOT 9
Company	~~OLSON~~
Address	THEA FOSS UPLAND PROP
City/State/Zip	
Contact	~~SUE~~ SUE ONEIL
Phone	
Email	

Invoice To:	(PRO-VAC)
Company	OLSON BROS. EXCAVATING
Address	6622 112TH ST E.
City/State/Zip	PUYALLUP WA 98373
Contact	DENNIS MILLER
Phone	253-212-5446
Email	

ANALYSES REQUIRED

NWTPH-Dx 8021

Receipt Temperature (°C)

SAMPLE ID	DATE	TIME	MATRIX	CONTAINER TYPE	NO. OF CONTAINERS	COMMENTS	NWTPH-Dx	8021
Soil # 2								
20130905 78-2	10/9	0940	Soil	Glass	1		X	

PROJECT INFORMATION

Client:	
PO No.:	
Shipped Via:	Client

SAMPLE RECEIPT

Total No. of Containers	1
Received Good Condition?	✓
Matches Test Schedule?	✓

RELINQUISHED BY (CLIENT)

(Signature) (Time)

(Printed Name) (Date)
DENNIS MILLER

(Company)
OLSON BROS EXCAVATING

RELINQUISHED BY (COURIER)

(Signature) (Time)

(Printed Name) (Date)

(Company)

SPECIAL INSTRUCTIONS/COMMENTS:

RUSH RUSH RUSH

RECEIVED BY (COURIER)

(Signature) (Time)

(Printed Name) (Date)

(Company)

RECEIVED BY (LABORATORY)

(Signature) (Time)
Eric Tollefson 940

(Printed Name) (Date)
ERIC TOLLEFSON 10/9/13

(Log In #)
T13-174

Tacoma - Pierce County
Health Department
Healthy People in Healthy Communities
www.tpchd.org

No. 1728

WASTE DISPOSAL AUTHORIZATION

Tacoma Pierce County
Health Department

10/18/2013 11:45:20 AM
Clerk 6-T1
Waste Disposal Authorization
$145.00
Receipt #318441
visa 27446 Jamison WDA olson bro

( ) Non-Asbestos (XX) New
( ) Asbestos (PSCAA Case # _____) ( ) Amendment ers

A. Generator Name: City of Tacoma – Environmental Services (Contractor – Olson Bros. Excavating)
B. Generator Address: Lot 9 – 1133 Dock Street, Tacoma WA
C. Transporter Name: Contract Hauler - Contractor is Green Earthworks Construction / Javson Stevens (253)534-8202
D. Technical Contact: Sue O'Neill, Asst Division Manager, City of Tacoma Environmental Services Phone: (253)591-5789
E. Waste Description: Contaminated Soils
( ) Sludge (X) Solid ( ) PCS ( ) Other
F. Approved Quantity: **150 Tons**
G. **Actual Quantity (Filled in upon disposal):** _____
H. Multiple Loads: (X) Yes ( ) No
I. Dates of Disposal: **October 18, 2013 through March 31, 2014**
J. Testing: Fish Bioassay; NWTPH-Dx & -Gx; Total Metals; TCLP Lead; PCB's; PAH's
K. Reviewed by Department of Ecology (TCP): (XX) Yes ( ) No
L. Disposal/Transportation Requirements: **A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator.** Soils demonstrating excessive odors are not suitable for use as daily cover and shall be directly buried (disposed of) in the landfill. If odors are not excessive and the soils physical characteristics are suitable for utilization as a daily cover then the soils may be used as alternative daily cover. Loads shall be covered during transport to the landfill to prevent fugitive emissions of contaminated soils. Load sizes shall comply with conditional-use and solid waste permit criteria.
M. Facility: (X X) **LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA**

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

10/18/13 Owner Rep. Scott Jamison
Date Title

AUTHORIZED BY:

Andy Comstock, TPCHD (253)798-6538

Cc: LRI LF Scalehouse via Fax – 253 875 7205

APPROVED

OCT 18 2013

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.

For Official Use Only

Tacoma - Pierce County
Health Department
Healthy People in Healthy Communities
www.tpchd.org

No. 1728A

WASTE DISPOSAL AUTHORIZATION

Tacoma Pierce County
Health Department

10/24/2013 10:42:45 AM
Clerk 48-T2
Waste Disposal Auth Renew/Mod
$80.00
Receipt #318960
ck:20901 Olson Bros/Lot9 1133 d

( ) Non-Asbestos ( ) New
( ) Asbestos (PSCAA Case # _____) (XX) Amendment St

A. Generator Name: City of Tacoma – Environmental Services (Contractor – Olson Bros. Excavating)
B. Generator Address: Lot 9 – 1133 Dock Street, Tacoma WA
C. Transporter Name: Contract Hauler - Contractor is Green Earthworks Construction / Jayson Stevens (253)534-8202
D. Technical Contact: Sue O'Neill, Asst Division Manager, City of Tacoma Environmental Services Phone: (253)591-5789
E. Waste Description: Contaminated Soils
( ) Sludge (XX) Solid ( ) PCS ( ) Other
F. Approved Quantity: **250 Tons**
G. **Actual Quantity (Filled in upon disposal):** _____
H. Multiple Loads: (XX) Yes ( ) No
I. Dates of Disposal: **October 24, 2013 through March 31, 2014**
J. Testing: Fish Bioassay; NWTPH-Dx & -Gx; Total Metals; TCLP Lead; PCB's; PAH's
K. Reviewed by Department of Ecology (TCP): (XX) Yes ( ) No
L. Disposal/Transportation Requirements: **A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator.** Soils demonstrating excessive odors are not suitable for use as daily cover and shall be directly buried (disposed of) in the landfill. If odors are not excessive and the soils physical characteristics are suitable for utilization as a daily cover then the soils may be used as alternative daily cover. Loads shall be covered during transport to the landfill to prevent fugitive emissions of contaminated soils. Load sizes shall comply with conditional-use and solid waste permit criteria.
M. Facility: (XX) LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

10-24-13 Transporter on behalf of Olson Bros.
Date Title Signature

AUTHORIZED BY:

APPROVED

OCT 24 2013

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.
For Official Use Only

Dan Watts, TPCHD (253) 798-3512

Cc: LRI LF Scalehouse via Fax – 253 875 7205

Well Decommissioning Report

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Intent to Decommission a Well

Notification Number **AE24499**

This form and required fees **MUST BE RECEIVED** by the Department of Ecology **72 HOURS BEFORE** you construct a well.

Submit one completed form for each job site and required fee (check or money order only) to:
Department of Ecology Cashiering Unit, P.O. Box 47611, Olympia, WA 98504-7611

NOTE: Please print. Processing your Notice of Intent may be delayed if all fields are not filled in completely.

1. Property Owner	Phone Number
City Of Tacoma	

Mailing Address	City	State	Zip Code
747 Market St	Tacoma	WA	98402

2. Agent (if different from above)	Phone Number

Mailing Address	City	State	Zip Code

3. Well Location

Tax Parcel Number, Township, Range, Section, ¼, and ¼ ¼ are Required. Latitude and longitude (if available).

County Name: Pierce - 27

Well Site Street Address	City	State	Zip Code
1117 Dock St	Tacoma	WA	

Tax Parcel Number	Township	Range	Section	¼ (within 160 acres)	¼ -¼ (within 40 acres)
	20N	3E	4	NW	SE

Latitude Degrees	Latitude Time	Horizontal Collection Method
	min sec	
Longitude Degrees	Longitude Time	
	min sec	

4. Notice of Intent Number of well being decomissioned

Unique Well Tag Number of well being decomissioned (if applicable)

5. Well Type to Decommission

Resource Protection - $20.00 each Revised Code: 027-WEL1**-02-87-000101 How Many? 1

6. Estimated Decommission Start Date: 11/14/2013 Project Name: City Tacoma - Decom

7. Professional's License Number

8. Well Drilling Company Name	Phone Number
Holt Services, Inc.	(253) 604-4878
9. Well Driller Name	Driller License Number

10. **Send the entire form.**

Please copy the notification number (located in the upper and lower right corners) and keep in a safe place. Use this reference number when communicating with the Department of Ecology.

Water Well :	$50.00
Soil Sampling, Dewatering, Environmental investigation wells:	No Fee
All other wells:	$20.00 each
Amount Enclosed $	$20.00

This notification number must be provided to your driller:

AE24499

Your validation will be sent to the e-mail address you provided: sk@holtservicesinc.com

Instructions

Item 1: Property owner's name, daytime phone number and mailing address.

Item 2: Agent - If the driller, consultant or other person is acting as your agent and is submitting the notification fee, please provide their name, mailing address and daytime phone number

Item 3: Complete county name and code number from drop down list. If the site street address is available, please fill in the complete address here. Include city and zip code. Please enter the tax parcel number if available. NOTE: Include all dashes and zeros. Please provide the Township, Range, Section, where the well is located. This information can be found in your property legal description or the County Assessor's Office

Item 4: Please enter the original construction notice of intent number if available.

Item 5: Type of well to decommission. Please note those wells that require a fee and those that do not.

Item 6: Enter the approximate decommissioning start date.

Item 7-11: This information should be available from your well driller.

For Assistance

Contact the Department of Ecology Regional Office where the well is located.

Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima counties contact:

Central Regional Office (CRO) (509) 575-2490 TTY 711 and 1-800-833-6388

Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman counties contact:

Eastern Regional Office (ERO) (509) 329-3400 TTY 711 and 1-800-833-6388

Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom counties contact:

Northwest Regional Office (NWRO) (425) 649-7000 TTY 711 and 1-800-833-6388

Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum counties contact:

Southwest Regional Office (SWRO) (360) 407-6300 TTY 711 and 1-800-833-6388

If you need this document in a format for the visually impaired, call Water Resources Program at 360-407-6872.
Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE24499

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(select one)*

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm City of Tacoma

Unique Ecology Well ID Tag No: NA / IDH MB-MW01

Type of Well *(select one)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner City of Tacoma

Site Address 1117 Dock St.

City Tacoma County WA

Location NW 1/4-1/4 SE 1/4 Sec 4 Twn 20N R 3 Select One ☒ EWM ☐ WWM

Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

Cased or Uncased Diameter 2" Static Level _____

Work/Decommission Start Date 11-14-13

Work/Decommission Completed Date 11-14-13

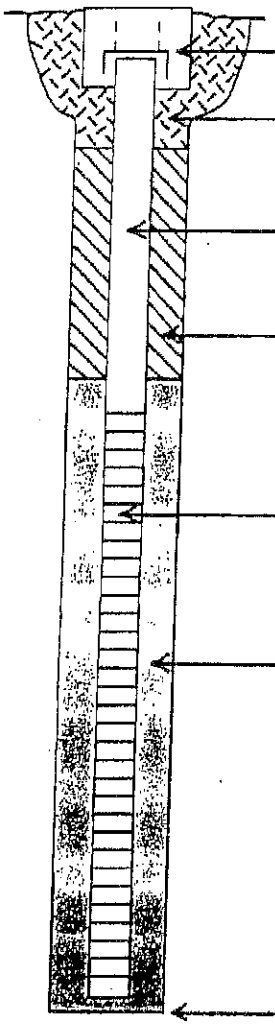
WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print): Dale Smith

Driller/Engineer /Trainee Signature Dale Smith

Driller or Trainee License No. 1229

If trainee, licensed driller's Signature and License No. _____

Construction/Design	Well Data	Formation Description
	MONUMENT TYPE: Flush CONCRETE SURFACE SEAL ft. PVC BLANK 2" "x BACKFILL ft. TYPE: PVC SCREEN 2" "x SLOT SIZE: TYPE: GRAVEL PACK ft. MATERIAL: WELL DEPTH 16.5 "	0 - ft. - ft. - ft. - ft. 16'5" ft.

REMARKS Filled in place with Bentonite Chips

Please print, sign and return by mail to Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE24499

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *(select one)*

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Consulting Firm City of Tacoma

Unique Ecology Well ID Tag No. NA / IDH HB-MW01

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Dale Smith

Driller/Engineer/Trainee Signature Dale Smith

Driller or Trainee License No. 1229

If trainee, licensed driller's Signature and License No. _____

Type of Well *(select one)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner City of Tacoma

Site Address 1117 Dock St.

City Tacoma County WA

Location NW 1/4-1/4 SE 1/4 Sec 4 Twn 20N R 3 Select One ☒ EWM ☐ WWM

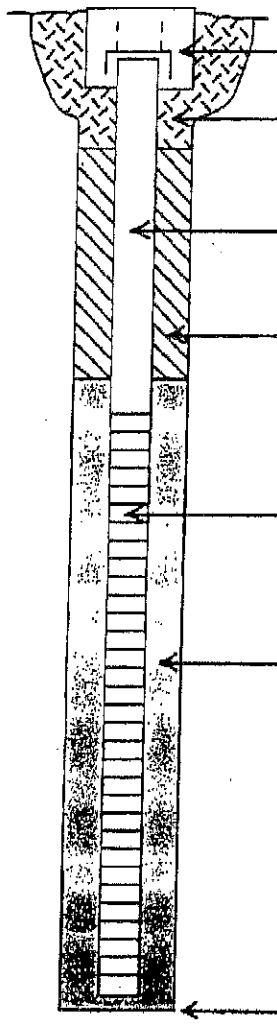
Lat/Long (s, t, r still REQUIRED) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

Cased or Uncased Diameter 2" Static Level _____

Work/Decommission Start Date 11-14-13

Work/Decommission Completed Date 11-14-13

Construction/Design	Well Data	Formation Description
	MONUMENT TYPE: Flush CONCRETE SURFACE SEAL _____ ft. PVC BLANK 2" "x _____ BACKFILL _____ ft. TYPE: _____ PVC SCREEN 2" "x _____ SLOT SIZE: _____ TYPE: _____ GRAVEL PACK _____ ft. MATERIAL: _____ WELL DEPTH 16.5 "	0 - _____ ft. _____ - _____ ft. _____ - _____ ft. _____ - _____ ft. 16'5" ft.

REMARKS Filled in place with Bentonite Chips

Interim Action Area Soil and Sediment Pre-Characterization and Waste Disposal Authorization

Field Report

To: Tom Rutherford and Sue O'Neil, Public Works Engineering

From: Chris Burke, Environmental Services Department

Date: December 24, 2013

Re: Foss Site 9 Parcels 8950001962, -63 Soil and Sediment Waste Disposal Assessment

---

Summary

Foss upland Site 9 is the former Hicks-Bull properties that are currently owned by the City of Tacoma and include parcels 8950001962 and 8950001963. A bulkhead between the parking lot and esplanade (wood walkway over Foss waters/sediments) is failing. Tacoma Public Works endeavors to remove the esplanade, bulkhead, sediments, soils and replace with a naturalized shoreline.

This report focuses on an *in-situ* assessment of soil and sediment quality for waste disposal. The ability to stockpile soils, sample and wait for lab results is limited by the nature of the work (night, low tides) and site characteristics. That is, the stockpile area is small relative to the volume of material being removed.

Sixteen of 19 soil and sediment samples exceeded the 0.1 mg/kg ∑carcinogenic PAH (cPAH) standard calculated using the toxic equivalency methodology in WAC 173-340-708(8) (Model Toxics Control Act). Four of the sixteen cPAH exceeding results also had concentrations of lead greater than the MTCA guideline value of 250 mg/kg. Similarly, two of the 16 results exceeded the MTCA guideline value of 20 mg/kg for arsenic. No results exceeded TCLP criteria of 173-303-090.

Soils and sediments from this site are cPAH contaminated with two potential exceptions,

1. One sample was taken from the crib wall supporting the west side of the bulkhead. This sample was primarily gravel and the mixed soils tested did not contain cPAHs, arsenic or lead at levels exceeding MTCA guidelines. Only one sample was taken from this section due to concern of damaging the direct push soil corer (Geoprobe).
2. The majority of soil samples were obtained as continuous 0-5' and 5-10' cores, which were homogenized and tested as a composite representing the interval of material to be excavated. In most composites, an upper layer contained mixed fill while the lower layer contained dredge fill, described by HartCrowser 2002 as sediments dredged from the Thea Foss Waterway between 1890 and 1905. One sample was split between the mixed (BH2) and dredge (BH1) fill layers. The mixed fill layer had benzo(a)pyrene and cPAH results

exceeding MTCA Level A Cleanup Levels and typical of the entire site. The 'dredge fill' layer had no, or extremely low results for metals and PAHs. This layer is variable in depth (2 to >10ft below mixed fill) but if separated, this lower layer may be set aside and re-evaluated or considered clean.

A 2-6" oil mat runs through the site and was tested as borehole 8, 28-31" depth. This sample had a cPAH concentration of 0.27 mg/kg and an NWTPH-Heavy Oil concentration of 7,000 mg/kg. While this sample was located above the water table, care should be exercised to prevent this layer from mixing with water during excavation.

A Site-specific cleanup action plan (SCAP) is being created for the City of Tacoma by Landau Associates, Inc. and will contain greater detail of former site uses as well as proposed site cleanup actions.

Background

Historically, Foss upland Site 9 supported the following industries,

- Hicks-Bull Machine Shop,
- Fish Packing,
- Dravis Machine Shop, including an Oil House,
- Welding Shop and Auto Repair (Gas and Oil), and
- Coast Iron and Machine Works

Additionally, a former rail spur transected the property. All background information has been summarized from 'Site-Specific Remedial Investigation, Thea-Foss Upland Properties, Hicks-Bull, Coast Iron Works, and Steam Plant Properties, Tacoma, Washington.' Prepared by HartCrowswer for the City of Tacoma Public Works Department. February 26, 2001. Report#4676-72.

One composite sample (3 subsamples) was taken from the sediment bank along the bulkhead of Site 9, sample designated as RD-S21, and results exceeding MTCA standards included arsenic 22.8 mg/kg and total cPAHs of 9.6 mg/kg (Hart Crowser, 1994). Subsequently, HartCrowser (2002) sampled soils upland of the bulkhead and within site 9. Results include,

- Site HB TP-01, 0.2 to 1ft depth, Heavy Oil 4,000 mg/kg and cPAH of 0.413 mg/kg.
- HB TP02
    - o 0.5 to 1.5ft cPAH 0.728 mg/kg
    - o 6 to 7 ft cPAH 0.478 mg/kg
- HB-MW01, 10 to 11.5ft cPAH 0.571 mg/kg

The remaining samples are west of the line of expected excavation but within site 9,

- HB-TP03, 0.5 to 1.5ft cPAH 0.155 mg/kg and lead 694 mg/kg.
- HB-TP04, 1 to 2ft, cPAH 3.219 mg/kg and lead 696 mg/kg.

Given the preceding results; PAHs, NWTPH-Heavy Oil, and the RCRA 8 metals were selected for soil analysis for the current excavation project.

Sample Design

Approximately 800 yd^3 of sediment east of the bulkhead wall (BHW), and 2490 yd^3 of soils west of the BHW are designated for removal (Figure 1). Following the Tacoma-Pierce County Health Department (TPCHD) Recommended Sampling Frequency for waste disposal

assessment (http://www.tpchd.org/files/library/ec190928d928c22b.pdf), seven sediment (501-1000 yd^3) and eleven soil (2,000-2,500 yd^3) sample locations were selected.

Sediment (waterward) and soil (landward) sample sites were evenly distributed from north to south (where possible, Figure 2). Samples were taken from the expected depth of excavation, 0 to 3ft for sediment and 0 to 11ft for soils. The distance east to west from the bulkhead for soil samples was weighted according to excavation volume (more samples from planned 8-11 ft excavation zone, fewer for 0-5ft excavation zone). Sediment samples generally (proportionally) represented the excavation area, though more samples were taken from near the waterline than the bulkhead due to safety concerns.

Exact sample locations are presented in Figure 2 and sample labels follow the format,

- W of 300 feet from north to south.
- X of 20 feet west to east for sediments or,
- Y of 27 feet east to west for soils and
- Z to Z inches is the depth interval sampled.

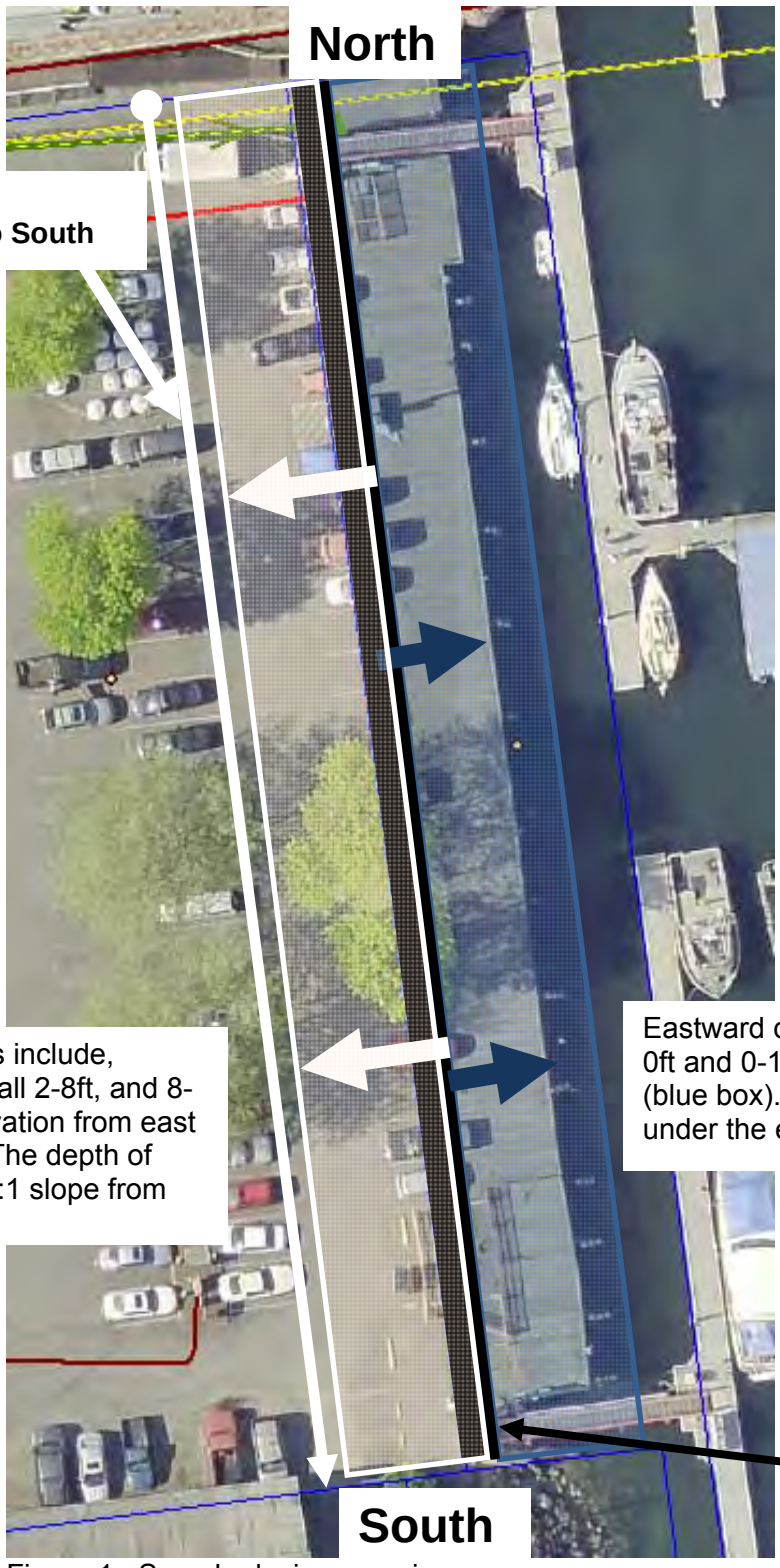


Figure 1. Sample design overview.

Geoprobe sample series. White line running west of bulkhead.

'Crib Wall' 38/300ft N-S, 5.5/27ft E-W, 6-56.4" d.

BH1&2 52/300ft N-S, 21/37 ft E-W,
1 32-120'' depth
2 4-32" depth

BH3 67/300ft N-S, 14/27ft E-W, 6-60" d.

BH4 89/300ft N-S, 20-27ft E-W, 4-60" depth

BH5 120/300ft N-S, 8/27ft E-W, 4-120" d.

BH6 149/300ft N-S, 11-15ft E-W, 6-120" depth

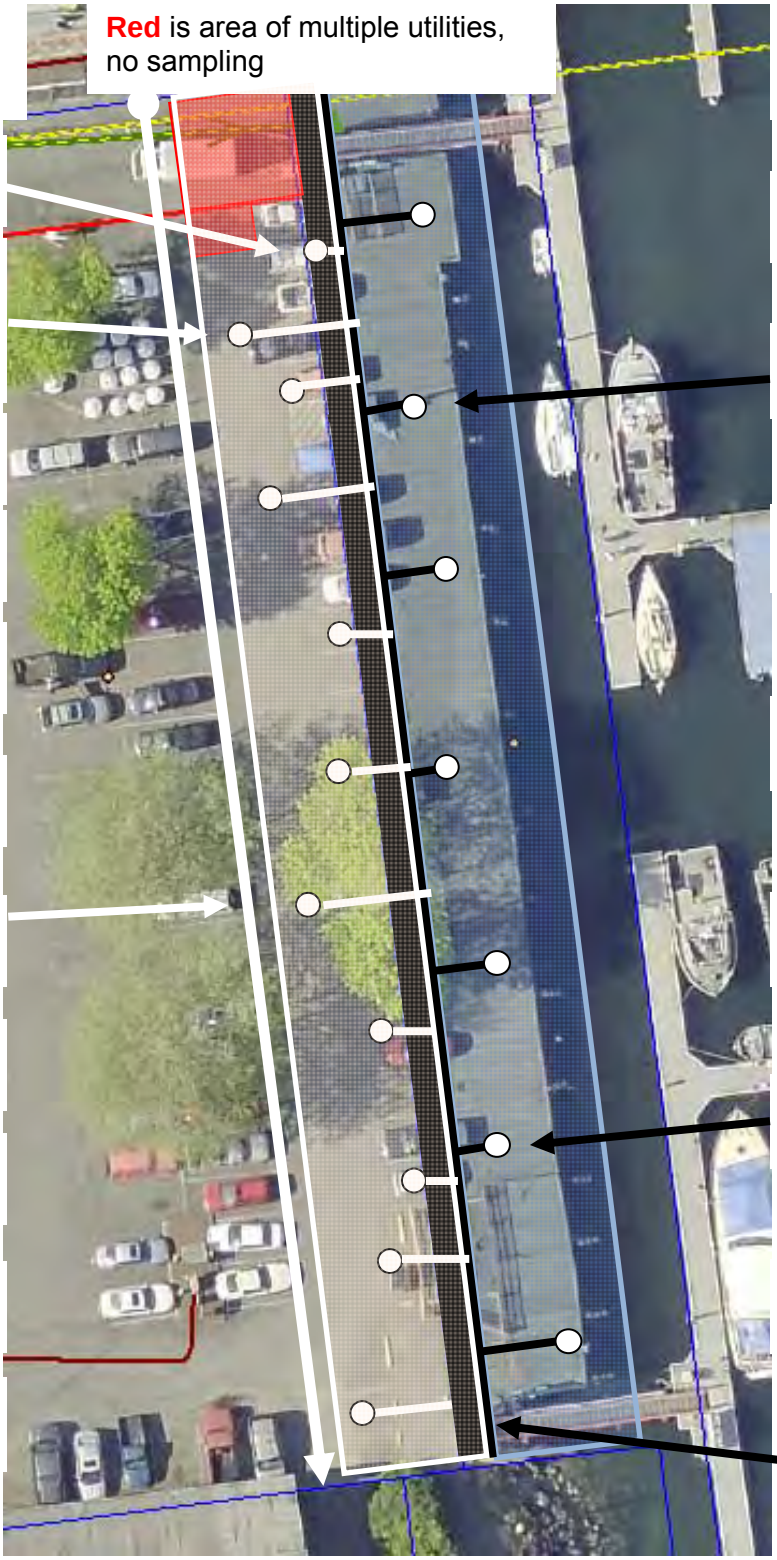
BH7 175/300ft N-S, 15-23ft E-W, 6-60" depth

BH8 206/300ft N-S, 11/27ft E-W, 6-120" d.

BH9 238/300ft N-S, 8/27ft E-W, 4-120" depth

BH10 255/300ft N-S, 16/27ft E-W, 6-60" depth

BH11 290/300ft N-S, 25/27ft E-W, 6-60" depth



Sediment sample series. Black line running east of bulkhead.

S1 30/300ft N-S, 17/24ft W-E, 7-13" depth

S2 73/300ft N-S, 10/20ft W-E, 24-30" depth

S3 110/300ft N-S, 15/20ft W-E, 9-15" depth

S4 152/300ft N-S, 8/20ft W-E, 6-12" depth

S5 190/300ft N-S, 18/20ft W-E, 5-11" depth

S6 230/300ft N-S, 8/20ft W-E, 4-11" depth

S7 278/300ft N-S, 18/20ft W-E, 9-15" depth

Bulkhead and crib wall, no samples

Figure 2. Sample location and depth intervals.

Procedure

The general procedure for soil and sediment sampling included collecting a representative sample volume in a stainless steel bowl, homogenizing the sample, filling sample containers, cooling (for preservation) and transferring to the City lab under Chain-of-Custody. Clean techniques include wearing and changing gloves frequently, washing samplers between sites or distinct sample levels and ensuring samples are protected from contaminated materials (pilings, etc.).

Sediments

Sediment samples were initially taken with a stainless steel corer. Coring in the sediment/rubble mixture below the esplanade proved problematic so a clean shovel was used to excavate to sample depth. Maximum sample depth was routinely defined by the depth that could be reached using a shovel, and not utilizing a pry bar or larger equipment. At depth, a large volume of material was extracted and placed in a stainless steel bowl to minimize any influence of the sampling utensil (Photo 1). The sample hole and measured depth were photo-documented (Photos 1-3). The sample was homogenized and placed in sample containers back at the vehicle (not running, Photo 4).

Photo 1. Sample location SED 5.

Photo 2. Sample location SED 4.

Photo 3. Sample location SED 1.

Photo 4. Processing sediment samples at the vehicle (*not running*).

Soils

Soil samples were taken in the parking lot using a Geoprobe direct push soil corer (Photo 5). The Geoprobe pushes a steel tube, with a plastic inner liner, to a depth of five feet or refusal (Photo 6). At this point, a second tube may be placed on the machine to push a second five foot core (Photo 7).

Photo 5. Geoprobe direct push soil corer.

Photo 6. Coring directly through asphalt.

Photo 7. End of five foot core which may be retrieved, or stacked with a second five foot section.

Eleven sites were cored in the parking lot to provide results for the waste disposal assessment. Three characteristics were common to the majority of cores,

1. A mixed fill layer extended from just below asphalt (4-6”),
2. Through a distinct oily mat (28-31 inches in Photo 8) and quickly transitioning to a
3. Loose, black, sandy layer (often with shells) characterized as dredge fill (Photo 9, 10).

The crib wall sample is presented on Photo 11.

Similar to the sediment samples, the sample interval is homogenized in a stainless steel bowl and transferred to a sample container.

Photo 8. Oily layer from 28-31 inches of borehole 8.

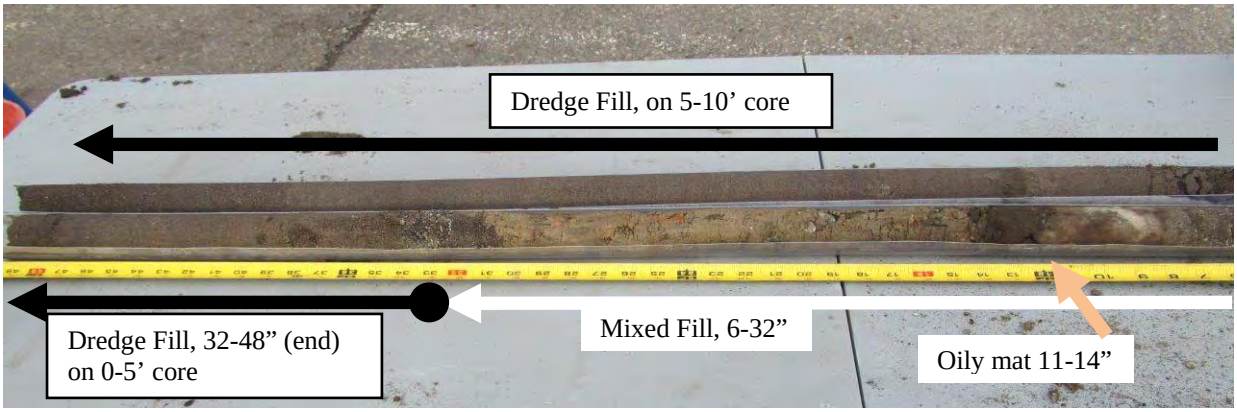


Photo 9. Two plastic encased cores, 0-5ft and 5-10ft representing borehole 2 and 1 respectively.

Photo 10. Mixed fill composite (before homogenization) on right (top layer), dredge fill composite on left.

Photo 11. Sample obtained from crib wall core.

Results and Discussion

Eleven soil and seven sediment samples were tested for PAHs, NWTPH-Dx and the RCRA 8 metals. If a total metal result exceeded a MTCA Method A Soil Cleanup Level for Unrestricted Land Uses, then the toxicity characteristic leaching procedure was performed to determine if the sample designated as a dangerous waste. No TCLP results exceeded WAC 173-303-090 dangerous waste criteria.

Sample results which exceeded a MTCA Level A cleanup level are presented in Figure 3.

Sediments

All seven sediment sample results exceeded the 0.1 mg/kg ∑carcinogenic PAH (cPAH) cleanup level calculated using the toxic equivalency methodology in WAC 173-340-708(8) (Model Toxics Control Act). Sites 2 and 5-7 exceeded cleanup levels for benzo(a)pyrene alone. Results from sediment sites 2 and 6 exceeded MTCA arsenic and lead cleanup levels of 20 mg/kg and 250 mg/kg respectively.

Upland soils

Nine of 11 parking lot core samples exceeded cPAH cleanup levels. Five of those samples exceeded levels for benzo(a)pyrene alone. Sites 4 and 11 exceeded the MTCA cleanup level for lead.

A 2-6" oil mat runs through the upland site and was tested as borehole 8, 28-31" depth. This sample had a cPAH concentration of 0.27 mg/kg and a NWTPH-Heavy Oil concentration of 7,000 mg/kg. This was the only heavy oil result that exceeded the MTCA cleanup level of 2,000 mg/kg. While this sample was located above the water table, care should be exercised to prevent this layer from mixing with water during excavation.

All geoprobe (borehole) samples contained an upper 'mixed fill' and lower 'dredge fill' layer as described by HartCrowser 2002. The majority of soil samples were a 0-5' or 0-10' composite. One sample was split between the upper mixed (BH2) and lower dredge (BH1) fill layers. The mixed fill layer had benzo(a)pyrene and cPAH results exceeding MTCA cleanup levels and typical of the entire site. The 'dredge fill' layer had no, or extremely low results for all tested analytes. This layer is variable in depth (2 to >10ft below mixed fill) but if separated, this lower layer may be set aside and re-evaluated or considered clean, depending on TPCHD guidance.

The crib wall, borehole 1 (dredge fill) and borehole 10 results did not exceed MTCA cleanup levels. Chromium results may be an exception. Chromium was tested in all samples and results ranged from 22.5 to 102 mg/kg total chromium.

- Seven of the ten greatest chromium results were tested under the TCLP procedure and none resulted in detections at the 0.02 mg/l practical quantitation level for total chromium.
- MTCA distinguishes between a chromium III cleanup level of 2,000 mg/kg and chromium VI cleanup level of 19 mg/kg. Chromium speciation was not conduced for these samples.

The 102 mg/kg chromium result was in the crib wall sample. All other tested analytes were non-detect or detected at very low levels (far below cleanup criteria) in the crib wall sample. Additional crib wall samples were not taken due to minimal soil composition (mostly gravels)

and concern of damaging the Geoprobe. Depending on TPCHD guidance, the crib wall section may be retested for chromium VI or considered clean based on results of this investigation.

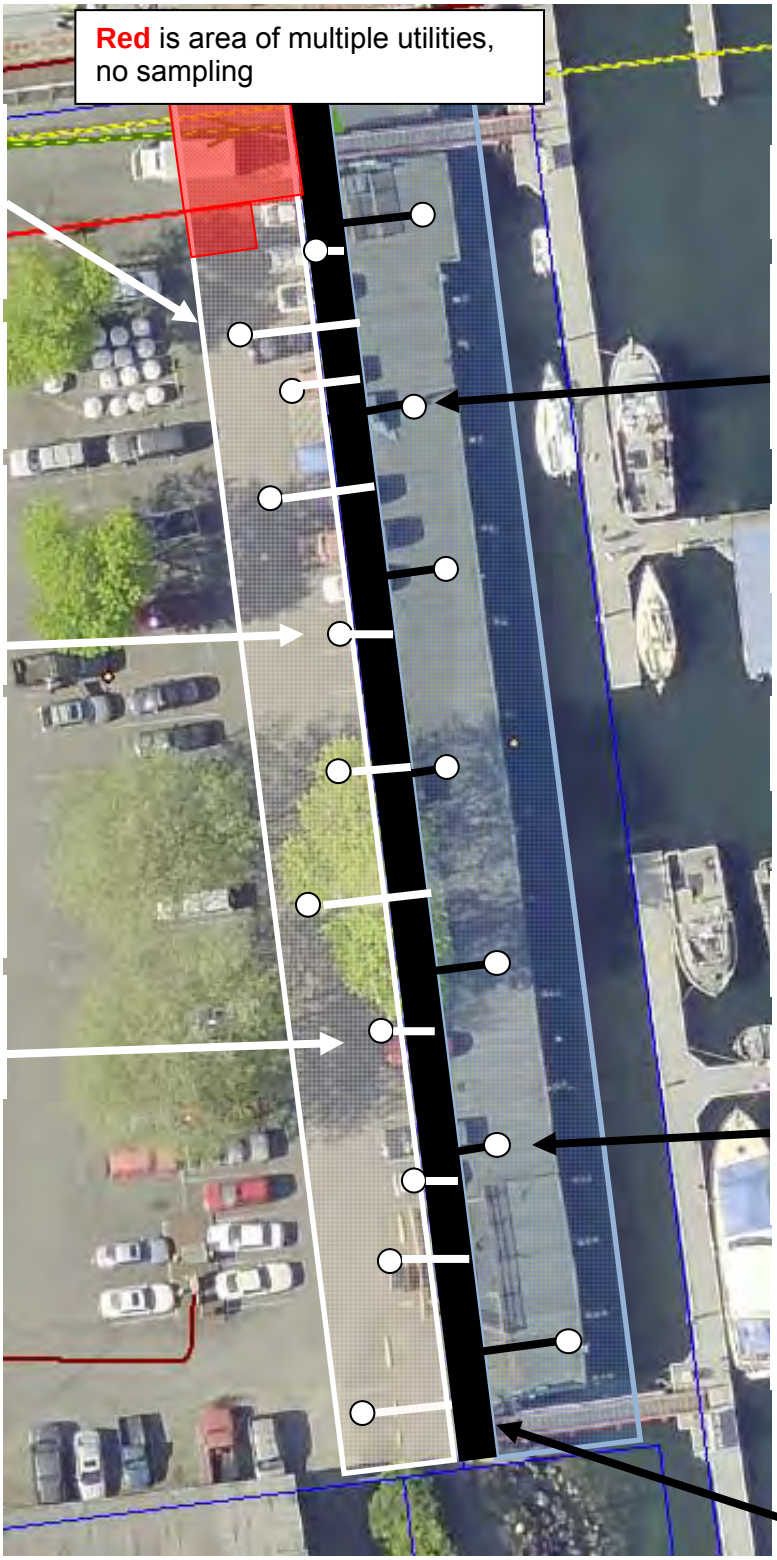


Figure 3. Sample results. Borehole 10 and the crib wall sample did not have any results exceeding MTCA criteria

Please do not hesitate to call or email for further information regarding this sampling investigation.

Sincerely,

Chris Burke

City of Tacoma
Environmental Services Department
326 East D Street
Tacoma, WA 98421
Desk (253) 502-2247
Cell (253) 377-0505
cburke@cityoftacoma.org

#145.00

Anthony L-T Chen, MD, MPH, Director of Health

Tacoma - Pierce County
Health Department
Healthy People in Healthy Communities
www.tpchd.org

No. 1743

WASTE DISPOSAL AUTHORIZATION

PAID
PAID DEC 31 2013
ACH PYMT REC'D
12/30/13
DT

( ) Non-Asbestos (XX) New
( ) Asbestos (PSCAA Case # _____) ( ) Amendment

A. Generator Name: City of Tacoma – Environmental Services
B. Generator Address: Thea Foss Waterway Site 9 – 1117 and 1119 Dock Street, Tacoma WA
C. Transporter Name: Contract Hauler, Quigg Brothers
D. Technical Contact: Sue O'Neill, Asst Division Manager, City of Tacoma Environmental Services Phone: (253)591-5789
E. Waste Description: Contaminated Soils
( ) Sludge (X) Solid ( ) PCS ( ) Other
F. Approved Quantity: **5,000 Tons**
G. **Actual Quantity (Filled in upon disposal):** _____
H. Multiple Loads: (X) Yes ( ) No
I. Dates of Disposal: **December 30, 2013 through June 30, 2014**
J. Testing: NWTPH-Dx & -Gx; Total Metals; TCLP Metals; PAH's
K. Reviewed by Department of Ecology: (X) Yes ( ) No
L. Disposal/Transportation Requirements: **A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator.** Soils demonstrating excessive odors are not suitable for use as daily cover and shall be directly buried (disposed of) in the landfill. If odors are not excessive and the soils physical characteristics are suitable for utilization as a daily cover then the soils may be used as alternative daily cover. Loads shall be covered during transport to the landfill to prevent fugitive emissions of contaminated soils. Soils to be disposed shall not contain free liquids as defined by the paint filter test (EPA Method #9095). Load sizes shall comply with conditional-use and solid waste permit criteria.
M. Facility: **(X X) LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA**

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

1/2/14 — Date
Project Manager — Title
Tom Rutherford — Signature

AUTHORIZED BY:

David Bosch — David Bosch, TPCHD (253)798-6574

APPROVED

DEC 30 2013

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.
For Official Use Only

Cc: LRI LF Scalehouse via Fax - 253 875 7205

Tacoma Pierce County
Health Department
Healthy People in Healthy Communities

Tacoma-Pierce County Health Department
3629 South D Street, MS: 1045, Tacoma WA 98418-6813
(253) 798-6047

WASTE DISPOSAL AUTHORIZATION APPLICATION

The information requested below is essential in determining if this waste is acceptable for disposal at the City of Tacoma Landfill, the LRI Landfill, the Hidden Valley Transfer Station, or other permitted solid waste facilities such as petroleum contaminated soils treatment facilities. It is unlikely that you will be able to respond in the space provided. Feel free to modify the format and/or address the information on additional pages, but at a minimum include all the information requested below. The information listed below may be mailed or faxed to:

Tacoma-Pierce County Health Department
Waste Management
3629 South D Street, MS: 1045
Tacoma, WA 98418-6813
Fax - (253) 798-6498

Date: 12-27-13 Site/Facility Name: City of Tacoma Thea Foss Site 9

Consultant/Contractor/Company representative: Quigg Bros.-contractor; COT PM - Tom Rutherford

Proposed Solid Waste Disposal/Treatment Facility: LRI

Describe Where Waste Originated (physical location, company name, project name, etc.): soil and sediment with rubble resulting from excavation at Site 9 on the Thea Foss Waterway - 1117 & 1119 Dock St., Tacoma, WA.

Projected Quantity or Volume of Waste (generated per month, quarter, year, etc.): 2,000 - 2,500 cy estimated

Describe How Waste is Generated/Source of Waste: Upland soils will be excavated as the shoreline is laid back for armoring. Sediments & rubble on the waterward side of the bulkhead will also be excavated prior to placing an in-water sediment cap. Sediments will be decanted prior to shipment. Site is contaminated from past property uses.

Describe the Site History (if applicable): 1913 Case Shaffer Furnace Company, 1918 Machine Shop, 1990 City of Tacoma parking lot -- this is current use. The upland site is part of the Thea Foss Upland cleanup (Dept. of Ecology lead) and the sediments are part of the EPA cleanup site. Both Ecology & EPA have renewed and approved the City's planned work

Describe the Sampling Method(s) or Submit Sampling Plan: See attached Field Report

Tacoma-Pierce County
Health Department
Healthy People in Healthy Communities

Tacoma-Pierce County Health Department

3629 South D Street, MS: 1045, Tacoma WA 98418-6813
(253) 798-6047

Describe and/or Justify the Number of Samples per Volume of Waste: see attached Field Report

Describe and/or Justify the Parameters Selected for Analysis: Based on previous Remedial Investigation Report and samples collected during utility relocation work. See attached Field Report for added information.

In addition to the information requested above, please enclose copies of the analytical results, chain of custody forms, a sampling plan, and any other documents relevant to the review of the site, facility, and/or waste being characterized. See attached lab report

By my signature below, I certify that the information presented in this application is true and complete to the best of my knowledge.

Jim O'Neill Applicant Signature	Asst. Division Mgr. Applicant Title	12/27/13 Date
City of Tacoma Company Name	747 Market St., Rm 544 Tacoma, WA 98402 Company Address	
591-5789 Phone Number	soneill@cityoftacoma.org Email Address	
591-5181 Fax Number		

Tacoma Pierce County
Health Department
Healthy People in Healthy Communities

Tacoma-Pierce County Health Department
3629 South D St., MS: 1045, Tacoma WA 98418-6813
(253) 798-6047

WASTE DISPOSAL AUTHORIZATION PROCESS
Required Analysis/Analysis Conducted

The parameter(s) and analytical method(s) indicated below must be performed in order to characterize a waste stream. The Tacoma-Pierce County Health Department recommends the generator of the waste submit for analysis the number of samples per volume of waste provided in the table below. Analytical results must be submitted to the Health Department's Waste Management Program prior to disposal of waste at a permitted solid waste facility located in Pierce County. Analytical results may be forwarded to the address below.

Tacoma-Pierce County Health Department
Waste Management Program
3629 South D Street, MS: 1045
Tacoma, WA 98418-6813

Date: 12-27-13 Facility Name: City of Tacoma Thea Foss Site 9

Description of Waste: soil, sediment & rubble

PARAMETER	ANALYTICAL METHOD	YES/NO	SAMPLE TYPE
Total Metals (RCRA 8)	EPA #6010	Yes	soil, sediments
TCLP Metals (RCRA 8)	EPA #1311/6010	Yes	soil, sediments
Total Petroleum Hydrocarbons	WTPH-HCID, WTPH-G, WTPH-D, WTPH-418.1 Modified, WTPH-G or WTPH-D Extended	Yes	soil, sediments
Volatile Organics	EPA #8010 (Halogenated), 8020 (BTEX), 8240		
Semi-volatile Organics	EPA #8270, 8310 (PAH's)	Yes	soil, sediments
PCB's	EPA #8080, 8140		
TCLP Volatiles & Semi			
Paint Filter Test	EPA #9095		
pH	EPA #9040, 9045 (soil)		
	See attached lab report		

RECOMMENDED SAMPLING FREQUENCY

VOLUME (cubic yards)	NUMBER OF SAMPLES
0 - 25	2
26 – 100	3
101 – 500	5
501 - 1000	7
1001 – 2000	10
One (1) additional sample for every 500 cubic yards of material over 2000 cubic yards.	

City of Tacoma
Environmental Services Laboratory

20 December 2013

Tom Rutherford
PW Engineering
747 Market Street, Rm 544
Tacoma, WA 98402

Subject: SIte 9 Construction

Enclosed are the analytical results for samples collected between 11/23/2013 and 11/27/2013.

Quality Control Data are included with the sample results for your review.

If you have any questions concerning this report, call me at (253)502-2130. Please note that remaining samples associated with this report will be discarded 3 months from the date of this report unless we are notified otherwise.

Sincerely,

Stuart Magoon
Assistant Division Manager
Environmental Services Laboratory

cc. Chris Burke

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled
8950001963-01	T311208-01	Sediment	23-Nov-13 01:40
8950001963-02	T311208-02	Sediment	23-Nov-13 01:45
8950001963-03	T311208-03	Sediment	23-Nov-13 01:50
8950001963-04	T311208-04	Sediment	23-Nov-13 01:13
8950001963-05	T311208-05	Sediment	23-Nov-13 01:09
8950001963-06	T311208-06	Sediment	23-Nov-13 00:53
8950001963-07	T311208-07	Sediment	23-Nov-13 00:46
8950001962 BH-01	T311208-08	Soil	27-Nov-13 12:45
8950001962 BH-02	T311208-09	Soil	27-Nov-13 12:20
8950001962 BH-03	T311208-10	Soil	27-Nov-13 12:10
8950001962 BH-04	T311208-11	Soil	27-Nov-13 11:35
8950001962 BH-05	T311208-12	Soil	27-Nov-13 11:20
8950001962 BH-06	T311208-13	Soil	27-Nov-13 11:05
8950001962 BH-07	T311208-14	Soil	27-Nov-13 10:30
8950001962 BH-08	T311208-15	Soil	27-Nov-13 10:20
8950001962 BH-09	T311208-16	Soil	27-Nov-13 10:00
8950001962 BH-10	T311208-17	Soil	27-Nov-13 09:05
8950001962 BH-11	T311208-18	Soil	27-Nov-13 08:45
BH8 28-31"	T311208-19	Soil	27-Nov-13 10:20
Crib Wall 0-4.5'	T311208-20	Soil	27-Nov-13 12:55

CHAIN OF CUSTODY

The samples were received under appropriate Chain of Custody procedures.

SAMPLE RECEIPT, PRESERVATION AND STORAGE

Samples were properly preserved and stored in accordance with the applicable method requirements.

HOLDING TIMES

All analyses were performed within the required holding times.

METHODS

The samples were analyzed by the following methods:

Standard Methods 2540G for Total Solids
EPA Method 1311 for TCLP Extraction (samples 01-07, -11, -18, -20)
EPA Method 7471B (TCLP -01-07 and Total Mercury, samples -01-20)
EPA Method 6010C (TCLP Metals, samples 11, 18, 20)
EPA Method 6020A (Total Metals)
EPA 8270D
WA DOE NWTPH-Dx

TCLP analysis was not performed on samples 08-10, 12-17, and 19 because the concentrations determined in the total metals analysis demonstrated that the individual analytes concentrations were sufficiently low enough that TCLP regulatory limits could not possibly be exceeded (Method 1311, section 1.2).

CONTRACT LABS

Analytical Resources, Incorporated analyzed the samples for TCLP Metals and Total Mercury.

MINIMUM REPORTING LIMITS

All analytes are reported to the Practical Quantitation Limit (PQL) which is below or no greater than the Minimum Project Reporting Limit.

METHOD BLANKS

Blanks were analyzed at the required frequencies of the methods. There was a minimum of one Method Blank for each analytical batch. Blank values were less than the PQL, sample concentrations were greater than 10 times the blank values, or the analytes were not detected in the sample.

SURROGATE COMPOUNDS

Surrogate compounds were added to each sample to monitor system performance. Surrogate recoveries were within the laboratory's limits.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples were analyzed with these samples. The recoveries for all associated LCS were within the laboratory limits.

DUPLICATE SAMPLE ANALYSIS

Duplicate analysis was performed with these samples. Relative percent differences were within the laboratory limits of less than 35%, except for total chrome with a RPD of 53%. The total chrome values for the sediment samples (T311208-01 - -07) are qualified as estimated (J).

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Matrix Spike and/or Matrix Spike Duplicate analysis was performed with these samples. The recoveries were within the laboratory limits.

INTERNAL STANDARDS

Internal Standards were added to these samples for quantitation purposes. The Area counts of these standards must not vary more than a factor of two from the mid-point standard of the calibration curve according to the method. The retention times must not vary by more than 30 seconds. No compounds varied by more than 30 seconds retention time. The internal standard criteria were met for these samples.

DATA AVAILABILITY

All data associated with the samples referenced in this report are archived at the Environmental Services Laboratory and are available upon request.

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 10:56

8950001963-01
T311208-01 (Sediment)
23-Nov-13 01:40

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
Mercury	0.004 U	0.004	mg/kg	27-Nov-13	27-Nov-13	EPA 7471B
TCLP Mercury	**0.0001 U**	0.00005	mg/L	27-Nov-13	27-Nov-13	7471B
TCLP Arsenic	**0.2 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Barium	**0.1**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Cadmium	**0.01 U**	0.001	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Chromium	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Lead	**0.1 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Silver	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 10:56

8950001963-02
T311208-02 (Sediment)
23-Nov-13 01:45

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
Mercury	0.004 U	0.004	mg/kg	27-Nov-13	27-Nov-13	EPA 7471B
TCLP Mercury	**0.0001 U**	0.00005	mg/L	27-Nov-13	27-Nov-13	7471B
TCLP Arsenic	**0.2 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Barium	**0.1**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Cadmium	**0.01 U**	0.001	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Chromium	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Lead	**0.1 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Silver	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-03

T311208-03 (Sediment)

23-Nov-13 01:50

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
Mercury	0.004 U	0.004	mg/kg	27-Nov-13	27-Nov-13	EPA 7471B
TCLP Mercury	**0.0001 U**	0.00005	mg/L	27-Nov-13	27-Nov-13	7471B
TCLP Arsenic	**0.2 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Barium	**0.04**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Cadmium	**0.01 U**	0.001	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Chromium	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Lead	**0.1 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Silver	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-04

T311208-04 (Sediment)

23-Nov-13 01:13

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
Mercury	0.004 U	0.004	mg/kg	27-Nov-13	27-Nov-13	EPA 7471B
TCLP Mercury	**0.0001 U**	0.00005	mg/L	27-Nov-13	27-Nov-13	7471B
TCLP Arsenic	**0.2 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Barium	**0.04**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Cadmium	**0.01 U**	0.001	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Chromium	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Lead	**0.1 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Silver	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-05
T311208-05 (Sediment)
23-Nov-13 01:09

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
Mercury	0.004 U	0.004	mg/kg	27-Nov-13	27-Nov-13	EPA 7471B
TCLP Mercury	**0.0001 U**	0.00005	mg/L	27-Nov-13	27-Nov-13	7471B
TCLP Arsenic	**0.2 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Barium	**0.31**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Cadmium	**0.01 U**	0.001	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Chromium	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Lead	**0.1 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Silver	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-06
T311208-06 (Sediment)
23-Nov-13 00:53

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
Mercury	0.004 U	0.004	mg/kg	27-Nov-13	27-Nov-13	EPA 7471B
TCLP Mercury	**0.0001 U**	0.00005	mg/L	27-Nov-13	27-Nov-13	7471B
TCLP Arsenic	**0.2 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Barium	**0.08**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Cadmium	**0.01 U**	0.001	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Chromium	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Lead	**0.1 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Silver	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-07

T311208-07 (Sediment)

23-Nov-13 00:46

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
Mercury	0.004 U	0.004	mg/kg	27-Nov-13	27-Nov-13	EPA 7471B
TCLP Mercury	**0.0001 U**	0.00005	mg/L	27-Nov-13	27-Nov-13	7471B
TCLP Arsenic	**0.2 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Barium	**0.06**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Cadmium	**0.01 U**	0.001	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Chromium	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Lead	**0.2**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C
TCLP Silver	**0.02 U**	0.01	mg/L	27-Nov-13	02-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-04
T311208-11 (Soil)
27-Nov-13 11:35

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
TCLP Chromium	**0.02 U**	0.01	mg/L	06-Dec-13	09-Dec-13	EPA 6010C
TCLP Lead	**1.3**	0.01	mg/L	06-Dec-13	09-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-11
T311208-18 (Soil)
27-Nov-13 08:45

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
TCLP Chromium	**0.02 U**	0.01	mg/L	06-Dec-13	09-Dec-13	EPA 6010C
TCLP Lead	**0.3**	0.01	mg/L	06-Dec-13	09-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Crib Wall 0-4.5'
T311208-20 (Soil)
27-Nov-13 12:55

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Metals						
TCLP Chromium	**0.02 U**	0.01	mg/L	06-Dec-13	09-Dec-13	EPA 6010C
TCLP Lead	**0.1 U**	0.01	mg/L	06-Dec-13	09-Dec-13	EPA 6010C

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-01
T311208-01 (Sediment)
23-Nov-13 01:40

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**84.3**	1.0		%	23-Nov-13	25-Nov-13	SM 2540 G
Metals							
Arsenic	**7.43**	0.240		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Barium	**68.1**	0.240		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Cadmium	0.240 U	0.240		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Chromium	**76.1 J**	0.240		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Lead	**26.9**	0.240		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Selenium	0.240 U	0.240		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Silver	0.240 U	0.240		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	4.4 U	4.4		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**36**	8.9		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*57.8 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*97.4 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	25-Nov-13	27-Nov-13	EPA 8270D
1-Methylnaphthalene	9 U	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
2-Methylnaphthalene	11 U	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthene	11 U	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthylene	11 U	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Anthracene	**12**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)anthracene	**43**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)pyrene	**34**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(b,k)fluoranthenes	**86**	22		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(g,h,i)perylene	**31**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Chrysene	**70**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Dibenz(a,h)anthracene	11 U	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluoranthene	**79**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluorene	11 U	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**24**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Naphthalene	11 U	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Phenanthrene	**45**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Pyrene	**68**	11		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*61.3 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

Lori A. Zboralski
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PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-01
T311208-01 (Sediment)
23-Nov-13 01:40

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
Surrogate: Terphenyl-d14		*78.2*	*50-150*	%	*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-02
T311208-02 (Sediment)
23-Nov-13 01:45

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**75.8**	1.0		%	23-Nov-13	25-Nov-13	SM 2540 G
Metals							
Arsenic	**28.1**	0.0088		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Barium	**55.3**	0.439		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Cadmium	**0.153**	0.0022		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Chromium	**46.3 J**	0.0439		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Lead	**279**	0.0022		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Selenium	**0.225**	0.0110		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Silver	**0.355**	0.0110		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**56**	3.8		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*85.0 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*108 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**3.0**	0.50		mg/kg	25-Nov-13	27-Nov-13	EPA 8270D
1-Methylnaphthalene	**32**	8		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
2-Methylnaphthalene	**66**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthene	**20**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthylene	**119**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Anthracene	**239**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)anthracene	**473**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)pyrene	**492**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(b,k)fluoranthenes	**942**	19		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(g,h,i)perylene	**542**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Chrysene	**571**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Dibenz(a,h)anthracene	**125**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluoranthene	**954**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluorene	**51**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**424**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Naphthalene	**106**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Phenanthrene	**503**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Pyrene	**786**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*65.9 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*73.6 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-02
T311208-02RE1 (Sediment)
23-Nov-13 01:45

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Semi-VOA						
NWTPH-Heavy Oil	**560**	77	mg/kg dry	25-Nov-13	05-Dec-13	NWTPH-Dx

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-03
T311208-03 (Sediment)
23-Nov-13 01:50

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**93.8**	1.0		%	23-Nov-13	25-Nov-13	SM 2540 G
Metals							
Arsenic	**5.30**	0.0088		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Barium	**51.1**	0.439		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Cadmium	**0.0753**	0.0022		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Chromium	**46.1 J**	0.0439		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Lead	**9.05**	0.0022		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Selenium	**0.174**	0.0110		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Silver	**0.0531**	0.0110		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	3.9 U	3.9		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**32**	7.8		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*71.6 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*103 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	25-Nov-13	27-Nov-13	EPA 8270D
1-Methylnaphthalene	8 U	8		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
2-Methylnaphthalene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthylene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Anthracene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)anthracene	**34**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)pyrene	**16**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(b,k)fluoranthenes	**67**	19		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(g,h,i)perylene	**14**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Chrysene	**38**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Dibenz(a,h)anthracene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluoranthene	**128**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluorene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**13**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Naphthalene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Phenanthrene	**25**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Pyrene	**77**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*71.2 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*76.4 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-04
T311208-04 (Sediment)
23-Nov-13 01:13

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**85.3**	1.0		%	23-Nov-13	25-Nov-13	SM 2540 G
Metals							
Arsenic	**3.87**	0.0096		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Barium	**41.2**	0.481		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Cadmium	**0.0727**	0.0024		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Chromium	**43.5 J**	0.0481		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Lead	**8.18**	0.0024		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Selenium	**0.0653**	0.0120		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Silver	**0.0577**	0.0120		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	4.0 U	4.0		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**25**	8.0		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*68.4 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*98.8 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	25-Nov-13	27-Nov-13	EPA 8270D
1-Methylnaphthalene	8 U	8		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
2-Methylnaphthalene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthylene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Anthracene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)anthracene	**15**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)pyrene	**15**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(b,k)fluoranthenes	**49**	20		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(g,h,i)perylene	**13**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Chrysene	**48**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Dibenz(a,h)anthracene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluoranthene	**27**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluorene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**11**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Naphthalene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Phenanthrene	**15**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Pyrene	**19**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*64.9 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*77.8 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

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PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-05
T311208-05 (Sediment)
23-Nov-13 01:09

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**74.7**	1.0		%	23-Nov-13	25-Nov-13	SM 2540 G
Metals							
Arsenic	**13.8**	0.0089		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Barium	**84.9**	0.446		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Cadmium	**0.0800**	0.0022		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Chromium	**35.8 J**	0.0446		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Lead	**56.7**	0.0022		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Selenium	**0.186**	0.0112		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Silver	**0.0829**	0.0112		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**12**	3.9		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**150**	7.7		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*76.8 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*86.6 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**0.99**	0.50		mg/kg	25-Nov-13	27-Nov-13	EPA 8270D
1-Methylnaphthalene	**14**	8		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
2-Methylnaphthalene	**23**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthene	10 U	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthylene	**30**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Anthracene	**52**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)anthracene	**135**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)pyrene	**151**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(b,k)fluoranthenes	**353**	19		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(g,h,i)perylene	**129**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Chrysene	**208**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Dibenz(a,h)anthracene	**33**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluoranthene	**225**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluorene	**14**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**106**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Naphthalene	**35**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Phenanthrene	**103**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Pyrene	**169**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*72.1 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*77.1 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-06
T311208-06 (Sediment)
23-Nov-13 00:53

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**75.7**	1.0		%	23-Nov-13	25-Nov-13	SM 2540 G
Metals							
Arsenic	**43.5**	0.0100		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Barium	**68.4**	0.500		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Cadmium	**0.285**	0.0025		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Chromium	**64.9 J**	0.0500		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Lead	**337**	0.0025		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Selenium	**0.544**	0.0125		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Silver	**0.187**	0.0125		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**35**	3.9		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*91.2 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*105 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**2.8**	0.50		mg/kg	25-Nov-13	27-Nov-13	EPA 8270D
1-Methylnaphthalene	**20**	8		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
2-Methylnaphthalene	**45**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthene	**17**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthylene	**107**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Anthracene	**186**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)anthracene	**439**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)pyrene	**470**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(b,k)fluoranthenes	**987**	20		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(g,h,i)perylene	**231**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Chrysene	**656**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Dibenz(a,h)anthracene	**68**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluoranthene	**669**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluorene	**35**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**204**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Naphthalene	**76**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Phenanthrene	**250**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Pyrene	**474**	10		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*80.2 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*80.0 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-06
T311208-06RE1 (Sediment)
23-Nov-13 00:53

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Semi-VOA						
NWTPH-Heavy Oil	**1100**	79	mg/kg dry	25-Nov-13	05-Dec-13	NWTPH-Dx

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001963-07

T311208-07 (Sediment)

23-Nov-13 00:46

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**79.3**	1.0		%	23-Nov-13	25-Nov-13	SM 2540 G
Metals							
Arsenic	**8.24**	0.0093		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Barium	**48.5**	0.463		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Cadmium	**0.121**	0.0023		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Chromium	**51.3 J**	0.0463		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Lead	**62.6**	0.0023		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Selenium	**0.164**	0.0116		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Silver	**0.129**	0.0116		mg/kg dry	26-Nov-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**26**	3.7		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**300**	7.4		mg/kg dry	25-Nov-13	04-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*81.2 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*106 %*	*50-150*		*25-Nov-13*	*04-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**2.1**	0.50		mg/kg	25-Nov-13	27-Nov-13	EPA 8270D
1-Methylnaphthalene	**14**	7		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
2-Methylnaphthalene	**22**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthene	**17**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Acenaphthylene	**63**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Anthracene	**182**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)anthracene	**335**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(a)pyrene	**208**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(b,k)fluoranthenes	**664**	19		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Benzo(g,h,i)perylene	**130**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Chrysene	**723**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Dibenz(a,h)anthracene	**39**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluoranthene	**1630**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Fluorene	**33**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**115**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Naphthalene	**31**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Phenanthrene	**120**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Pyrene	**561**	9		ug/kg dry	25-Nov-13	27-Nov-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*71.9 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*78.2 %*	*50-150*		*25-Nov-13*	*27-Nov-13*	*EPA 8270D*

Center for Urban Waters - Environmental Services Lab

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-01
T311208-08 (Soil)
27-Nov-13 12:45

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**91.0**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**1.96**	0.0081		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**20.4**	0.403		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.0325**	0.0020		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**22.5**	0.0403		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**1.64**	0.0020		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	0.0167 U	0.0167		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0636**	0.0101		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0341**	0.0101		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	9.9 U	9.9		mg/kg dry	09-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**81**	20		mg/kg dry	09-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*73.2 %*	*50-150*		*09-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*97.2 %*	*50-150*		*09-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-01
T311208-08RE1 (Soil)
27-Nov-13 12:45

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
1-Methylnaphthalene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Anthracene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	25 U	25		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Chrysene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluorene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**22**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Pyrene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*63.3 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*80.8 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-02
T311208-09 (Soil)
27-Nov-13 12:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**89.1**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**8.00**	0.0100		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**107**	0.500		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.210**	0.0025		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**46.7**	0.0500		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**61.6**	0.0025		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.111**	0.0182		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.133**	0.0125		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.103**	0.0125		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**55**	9.9		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**990**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*110 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*114 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**3.0**	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-02
T311208-09RE1 (Soil)
27-Nov-13 12:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
1-Methylnaphthalene	**99**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**129**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	**189**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**37**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**532**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**602**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**556**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**875**	25		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**233**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**686**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	**72**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**1760**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluorene	**279**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**190**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**196**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**1970**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**1150**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*82.1 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*69.1 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-03
T311208-10 (Soil)
27-Nov-13 12:10

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**90.1**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**3.54**	0.0094		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**88.0**	0.472		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.115**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**31.3**	0.0472		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**48.9**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0822**	0.0189		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0817**	0.0118		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0786**	0.0118		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**21**	9.9		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**500**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*70.8 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*80.8 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**0.62**	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-03
T311208-10RE1 (Soil)
27-Nov-13 12:10

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
1-Methylnaphthalene	**21**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**34**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	**18**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**19**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**45**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**116**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**113**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**196**	25		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**59**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**140**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	**17**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**213**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluorene	**41**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**39**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**44**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**211**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**193**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*78.3 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*75.9 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-04
T311208-11 (Soil)
27-Nov-13 11:35

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**89.7**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**8.53**	0.0096		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**92.2**	0.481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**1.03**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**35.8**	0.0481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**359**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.277**	0.0185		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.160**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.537**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**24**	9.9		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**380**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*87.2 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*99.2 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**0.54**	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-04
T311208-11RE1 (Soil)
27-Nov-13 11:35

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
1-Methylnaphthalene	**33**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**47**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**38**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**47**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**77**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**83**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**202**	25		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**60**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**118**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	**15**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**174**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Fluorene	**27**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**42**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**69**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**126**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**134**	12		ug/kg dry	09-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*74.5 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*76.1 %*	*50-150*		*09-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-05
T311208-12 (Soil)
27-Nov-13 11:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**87.7**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**3.29**	0.0096		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**62.7**	0.481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.101**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**31.6**	0.0481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**26.8**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0547**	0.0200		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0785**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0506**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	10 U	10		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**180**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*68.4 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*94.0 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**19**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**32**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**61**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**62**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**125**	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**32**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**78**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**236**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	**13**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**26**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**18**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**84**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**148**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*62.7 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-05
T311208-12 (Soil)
27-Nov-13 11:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
Surrogate: Terphenyl-d14		*75.9*	*50-150*	%	*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-06
T311208-13 (Soil)
27-Nov-13 11:05

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**87.4**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**3.69**	0.0093		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**83.9**	0.463		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.113**	0.0023		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**36.0**	0.0463		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**32.9**	0.0023		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0764**	0.0192		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0697**	0.0116		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0582**	0.0116		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	10 U	10		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**200**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*81.2 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*101 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**0.64**	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**17**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**38**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**30**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**106**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**100**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**223**	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**58**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**151**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	**15**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**259**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	**12**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**48**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**28**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**144**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**215**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*68.6 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-06

T311208-13 (Soil)

27-Nov-13 11:05

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
Surrogate: Terphenyl-d14		*77.5 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-07
T311208-14 (Soil)
27-Nov-13 10:30

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**89.2**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**3.46**	0.0096		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**79.7**	0.481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.151**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**37.1**	0.0481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**22.0**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0737**	0.0196		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.135**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0697**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**46**	9.9		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*103 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*102 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**0.91**	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	**28**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**47**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**22**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**19**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**135**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**176**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**231**	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**100**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**314**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**142**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	**14**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**49**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**35**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**114**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**156**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*80.9 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*88.4 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

Lori A. Zboralski
Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-07
T311208-14RE1 (Soil)
27-Nov-13 10:30

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Semi-VOA						
NWTPH-Heavy Oil	**1900**	200	mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx

Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-08
T311208-15 (Soil)
27-Nov-13 10:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**88.6**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**3.38**	0.0094		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**59.1**	0.472		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.150**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**42.1**	0.0472		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**41.7**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0772**	0.0169		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0455**	0.0118		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.109**	0.0118		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**16**	9.9		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**360**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*82.4 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*96.0 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**0.86**	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	**19**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**28**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	**25**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**75**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**112**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**131**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**149**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**320**	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**97**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**161**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	**28**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**303**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	**47**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**76**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**33**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**293**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**220**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*69.0 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

Lori A. Zboralski
Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-08
T311208-15 (Soil)
27-Nov-13 10:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
Surrogate: Terphenyl-d14		*72.1 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-09
T311208-16 (Soil)
27-Nov-13 10:00

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**89.9**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**2.80**	0.0096		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**37.1**	0.481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.0641**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**25.3**	0.0481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**29.7**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0609**	0.0164		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0444**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0649**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**11**	10		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**190**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*78.4 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*104 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**14**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**23**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**38**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**63**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**67**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**151**	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**45**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**83**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	**12**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**136**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**38**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**18**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**64**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**116**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*58.3 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-09
T311208-16 (Soil)
27-Nov-13 10:00

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
Surrogate: Terphenyl-d14		*80.5 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-10
T311208-17 (Soil)
27-Nov-13 09:05

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**89.1**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**1.78**	0.0091		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**23.1**	0.455		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.0376**	0.0023		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**26.7**	0.0455		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**2.95**	0.0023		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0191**	0.0182		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0428**	0.0114		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0355**	0.0114		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**20**	10		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**320**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*86.0 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*96.4 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**12**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	25 U	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**13**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**24**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**14**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**31**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**15**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*73.5 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-10
T311208-17 (Soil)
27-Nov-13 09:05

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
Surrogate: Terphenyl-d14		*76.9*	*50-150*	%	*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

8950001962 BH-11
T311208-18 (Soil)
27-Nov-13 08:45

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**87.1**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**9.63**	0.0096		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**108**	0.481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.436**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**38.9**	0.0481		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**371**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.717**	0.0189		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.156**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.182**	0.0120		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	**49**	10		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**800**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*85.2 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*91.6 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	**0.66**	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	**221**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**246**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	13 U	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	**24**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	**23**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	**79**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	**87**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	**229**	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**91**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**183**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	**21**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	**157**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	13 U	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	**63**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	**104**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**389**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	**127**	13		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

BH8 28-31"
T311208-19 (Soil)
27-Nov-13 10:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**94.1**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**2.90**	0.0089		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**59.4**	0.446		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.124**	0.0022		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**33.8**	0.0446		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**15.0**	0.0022		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0444**	0.0189		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0829**	0.0112		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0530**	0.0112		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	125 U	125		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	**152**	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	**80**	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	62 U	62		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*76.7 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*
Surrogate: Terphenyl-d14		*85.6 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 14:29

BH8 28-31"
T311208-19RE1 (Soil)
27-Nov-13 10:20

Analyte	Result	PQL	Units	Prepared	Analyzed	Method
Semi-VOA						
NWTPH-Heavy Oil	**7000**	500	mg/kg dry	04-Dec-13	12-Dec-13	NWTPH-Dx

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 14:29

BH8 28-31"
T311208-19RE2 (Soil)
27-Nov-13 10:20

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
NWTPH-Diesel	**65**	25		mg/kg dry	04-Dec-13	12-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*52.0 %*	*50-150*		*04-Dec-13*	*12-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*64.0 %*	*50-150*		*04-Dec-13*	*12-Dec-13*	*NWTPH-Dx*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Crib Wall 0-4.5'
T311208-20 (Soil)
27-Nov-13 12:55

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Conventional							
Total Solids	**92.3**	1.0		%	27-Nov-13	03-Dec-13	SM 2540 G
Metals							
Arsenic	**3.63**	0.0094		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Barium	**56.7**	0.472		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Cadmium	**0.187**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Chromium	**102**	0.0472		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Lead	**7.42**	0.0024		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Mercury	**0.0300**	0.0175		mg/kg	02-Dec-13	03-Dec-13	EPA 7471B
Selenium	**0.0457**	0.0118		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Silver	**0.0630**	0.0118		mg/kg dry	02-Dec-13	02-Dec-13	EPA 6020A
Semi-VOA							
NWTPH-Diesel	10 U	10		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
NWTPH-Heavy Oil	**76**	20		mg/kg dry	04-Dec-13	17-Dec-13	NWTPH-Dx
Surrogate: 2-Fluorobiphenyl		*70.4 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Surrogate: Terphenyl-d14		*82.0 %*	*50-150*		*04-Dec-13*	*17-Dec-13*	*NWTPH-Dx*
Total Carcinogenic PAH	0.50 U	0.50		mg/kg	04-Dec-13	10-Dec-13	EPA 8270D
1-Methylnaphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
2-Methylnaphthalene	**13**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Acenaphthylene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(a)pyrene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(b,k)fluoranthenes	25 U	25		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Benzo(g,h,i)perylene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Chrysene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Dibenz(a,h)anthracene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluoranthene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Fluorene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Indeno(1,2,3-c,d)pyrene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Naphthalene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Phenanthrene	**15**	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Pyrene	12 U	12		ug/kg dry	04-Dec-13	10-Dec-13	EPA 8270D
Surrogate: 2-Fluorobiphenyl		*57.0 %*	*50-150*		*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Crib Wall 0-4.5'
T311208-20 (Soil)
27-Nov-13 12:55

Analyte	Result	PQL		Units	Prepared	Analyzed	Method
Semi-VOA							
Surrogate: Terphenyl-d14		*72.8*	*50-150*	%	*04-Dec-13*	*10-Dec-13*	*EPA 8270D*

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Conventional - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1347082 - Conventionals No-Prep									
Blank (1347082-BLK1)			Prepared: 23-Nov-13 Analyzed: 25-Nov-13						
Total Solids	1.0 U	%							
Duplicate (1347082-DUP1)		**Source: T311208-01**	Prepared: 23-Nov-13 Analyzed: 25-Nov-13						
Total Solids	83.3	%		84.3			1	35	
Batch 1348044 - Conventionals No-Prep									
Blank (1348044-BLK1)			Prepared: 27-Nov-13 Analyzed: 03-Dec-13						
Total Solids	1.0 U	%							
Duplicate (1348044-DUP1)		**Source: T311208-08**	Prepared: 27-Nov-13 Analyzed: 03-Dec-13						
Total Solids	91.2	%		91.0			0.2	35	
Duplicate (1348044-DUP2)		**Source: T311208-18**	Prepared: 27-Nov-13 Analyzed: 03-Dec-13						
Total Solids	87.1	%		87.1			0.02	35	

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Metals - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1348025 - 3051A									
Blank (1348025-BLK1)			Prepared: 26-Nov-13 Analyzed: 02-Dec-13						
Arsenic	0.0164	mg/kg dry							
Barium	0.200 U	mg/kg dry							
Cadmium	0.0011	mg/kg dry							
Chromium	0.0200 U	mg/kg dry							
Lead	0.181	mg/kg dry							
Selenium	0.0069	mg/kg dry							
Silver	0.0050 U	mg/kg dry							
Duplicate (1348025-DUP1)		**Source: T311208-01**	Prepared: 26-Nov-13 Analyzed: 02-Dec-13						
Arsenic	7.07	mg/kg dry		7.43			5	35	
Barium	66.8	mg/kg dry		68.1			2	35	
Cadmium	0.0925	mg/kg dry		0.0909			2	35	
Chromium	44.4	mg/kg dry		76.1			53	35	
Lead	31.3	mg/kg dry		26.9			15	35	
Selenium	0.162	mg/kg dry		0.137			17	35	
Silver	0.0729	mg/kg dry		0.0757			4	35	
Matrix Spike (1348025-MS1)		**Source: T311208-01**	Prepared: 26-Nov-13 Analyzed: 02-Dec-13						
Arsenic	184	mg/kg dry	185	7.43	95	70-130			
Barium	247	mg/kg dry	185	68.1	97	70-130			
Cadmium	182	mg/kg dry	185	0.0909	98	70-130			
Chromium	234	mg/kg dry	185	76.1	85	70-130			
Lead	199	mg/kg dry	185	26.9	93	70-130			
Selenium	178	mg/kg dry	185	0.137	96	70-130			
Silver	182	mg/kg dry	185	0.0757	98	70-130			
Reference (1348025-SRM1)			Prepared: 26-Nov-13 Analyzed: 02-Dec-13						
Arsenic	91.5	mg/kg dry	88.4		103	78-130			
Barium	721	mg/kg dry	710		102	10-250			
Cadmium	241	mg/kg dry	225		107	73-127			
Chromium	111	mg/kg dry	92.7		119	66-130			
Lead	304	mg/kg dry	266		114	76-124			
Selenium	51.3	mg/kg dry	47.9		107	59-141			
Silver	90.6	mg/kg dry	75.9		119	54-146			

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Metals - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1349005 - 3051A									
Blank (1349005-BLK1)			Prepared & Analyzed: 02-Dec-13						
Arsenic	0.100 U	mg/kg dry							
Barium	0.100 U	mg/kg dry							
Cadmium	0.100 U	mg/kg dry							
Chromium	0.100 U	mg/kg dry							
Lead	0.100 U	mg/kg dry							
Selenium	0.100 U	mg/kg dry							
Silver	0.100 U	mg/kg dry							
Reference (1349005-SRM1)			Prepared & Analyzed: 02-Dec-13						
Arsenic	88.9	mg/kg dry	88.4		101	78-130			
Barium	1010	mg/kg dry	710		143	10-250			
Cadmium	231	mg/kg dry	225		103	73-127			
Chromium	105	mg/kg dry	92.7		114	66-130			
Lead	298	mg/kg dry	266		112	76-124			
Selenium	50.0	mg/kg dry	47.9		104	59-141			
Silver	86.6	mg/kg dry	75.9		114	54-146			
Batch 1349009 - Waterbath									
Blank (1349009-BLK1)			Prepared: 02-Dec-13 Analyzed: 03-Dec-13						
Mercury	0.0040 U	mg/kg							
Reference (1349009-SRM1)			Prepared: 02-Dec-13 Analyzed: 03-Dec-13						
Mercury	27.6	mg/kg	25.0		110	11-289			

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Semi-VOA - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1348014 - SVOA No-Prep									
Blank (1348014-BLK1)			Prepared: 25-Nov-13 Analyzed: 27-Nov-13						
1-Methylnaphthalene	10 U	ug/kg wet							
2-Methylnaphthalene	10 U	ug/kg wet							
Acenaphthene	10 U	ug/kg wet							
Acenaphthylene	10 U	ug/kg wet							
Anthracene	10 U	ug/kg wet							
Benzo(a)anthracene	10 U	ug/kg wet							
Benzo(a)pyrene	10 U	ug/kg wet							
Benzo(b,k)fluoranthenes	10 U	ug/kg wet							
Benzo(g,h,i)perylene	10 U	ug/kg wet							
Chrysene	10 U	ug/kg wet							
Dibenz(a,h)anthracene	10 U	ug/kg wet							
Fluoranthene	10 U	ug/kg wet							
Fluorene	10 U	ug/kg wet							
Indeno(1,2,3-c,d)pyrene	10 U	ug/kg wet							
Naphthalene	10 U	ug/kg wet							
Phenanthrene	10 U	ug/kg wet							
Pyrene	10 U	ug/kg wet							
Blank (1348014-BLK2)			Prepared: 25-Nov-13 Analyzed: 04-Dec-13						
Surrogate: 2-Fluorobiphenyl	*0.99*	mg/kg wet	*1.25*		*79.0*	*50-150*			
NWTPH-Diesel	5.0 U	mg/kg wet							
NWTPH-Heavy Oil	10 U	mg/kg wet							
Surrogate: Terphenyl-d14	*1.2*	mg/kg wet	*1.25*		*97.6*	*50-150*			
LCS (1348014-BS1)			Prepared: 25-Nov-13 Analyzed: 27-Nov-13						
1-Methylnaphthalene	935	ug/kg wet	1250		74.8	50-150			
2-Methylnaphthalene	895	ug/kg wet	1250		71.6	50-150			
Acenaphthene	963	ug/kg wet	1250		77.0	50-150			
Acenaphthylene	984	ug/kg wet	1250		78.7	50-150			
Anthracene	1130	ug/kg wet	1250		90.3	50-150			
Benzo(a)anthracene	1180	ug/kg wet	1250		94.5	50-150			
Benzo(a)pyrene	1080	ug/kg wet	1250		86.2	50-150			
Benzo(b,k)fluoranthenes	2460	ug/kg wet	2500		98.3	50-150			
Benzo(g,h,i)perylene	1170	ug/kg wet	1250		93.3	50-150			

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Semi-VOA - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1348014 - SVOA No-Prep									
LCS (1348014-BS1)			Prepared: 25-Nov-13 Analyzed: 27-Nov-13						
Chrysene	1170	ug/kg wet	1250		93.8	50-150			
Dibenz(a,h)anthracene	1230	ug/kg wet	1250		98.6	50-150			
Fluoranthene	1240	ug/kg wet	1250		99.3	50-150			
Fluorene	1080	ug/kg wet	1250		86.4	50-150			
Indeno(1,2,3-c,d)pyrene	1200	ug/kg wet	1250		96.4	50-150			
Naphthalene	874	ug/kg wet	1250		69.9	50-150			
Phenanthrene	1070	ug/kg wet	1250		85.5	50-150			
Pyrene	1150	ug/kg wet	1250		91.9	50-150			
Matrix Spike (1348014-MS1)	**Source: T311208-03**		Prepared: 25-Nov-13 Analyzed: 27-Nov-13						
1-Methylnaphthalene	667	ug/kg dry	961	8 U	69.4	50-150		50	
2-Methylnaphthalene	646	ug/kg dry	961	8 U	67.2	50-150		50	
Acenaphthene	718	ug/kg dry	961	8 U	74.7	50-150		50	
Acenaphthylene	732	ug/kg dry	961	8 U	76.2	50-150		50	
Anthracene	851	ug/kg dry	961	8 U	88.0	50-150		50	
Benzo(a)anthracene	902	ug/kg dry	961	34	90.4	50-150		50	
Benzo(a)pyrene	828	ug/kg dry	961	16	84.5	50-150		50	
Benzo(b,k)fluoranthenes	1770	ug/kg dry	1920	67	88.8	50-150		50	
Benzo(g,h,i)perylene	888	ug/kg dry	961	14	91.0	50-150		50	
Chrysene	873	ug/kg dry	961	38	87.0	50-150		50	
Dibenz(a,h)anthracene	912	ug/kg dry	961	8 U	94.5	50-150		50	
Fluoranthene	968	ug/kg dry	961	128	87.5	50-150		50	
Fluorene	831	ug/kg dry	961	8 U	86.5	50-150		50	
Indeno(1,2,3-c,d)pyrene	906	ug/kg dry	961	13	92.9	50-150		50	
Naphthalene	626	ug/kg dry	961	8 U	64.7	50-150		50	
Phenanthrene	830	ug/kg dry	961	25	83.8	50-150		50	
Pyrene	827	ug/kg dry	961	77	78.2	50-150		50	

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Semi-VOA - Quality Control

Environmental Services Laboratory

Sample ID Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1348014 - SVOA No-Prep									
Matrix Spike Dup (1348014-MSD1)	**Source: T311208-03**		Prepared: 25-Nov-13 Analyzed: 27-Nov-13						
1-Methylnaphthalene	655	ug/kg dry	966	8 U	67.8	50-150		50	
2-Methylnaphthalene	638	ug/kg dry	966	8 U	66.1	50-150		50	
Acenaphthene	713	ug/kg dry	966	8 U	73.8	50-150		50	
Acenaphthylene	738	ug/kg dry	966	8 U	76.4	50-150		50	
Anthracene	904	ug/kg dry	966	8 U	93.0	50-150		50	
Benzo(a)anthracene	1010	ug/kg dry	966	34	101	50-150		50	
Benzo(a)pyrene	922	ug/kg dry	966	16	93.8	50-150		50	
Benzo(b,k)fluoranthenes	1940	ug/kg dry	1930	67	97.1	50-150	9.16	50	
Benzo(g,h,i)perylene	975	ug/kg dry	966	14	99.6	50-150		50	
Chrysene	966	ug/kg dry	966	38	96.1	50-150		50	
Dibenz(a,h)anthracene	995	ug/kg dry	966	8 U	103	50-150		50	
Fluoranthene	1060	ug/kg dry	966	128	96.3	50-150	8.85	50	
Fluorene	850	ug/kg dry	966	8 U	88.0	50-150		50	
Indeno(1,2,3-c,d)pyrene	993	ug/kg dry	966	13	102	50-150		50	
Naphthalene	607	ug/kg dry	966	8 U	62.4	50-150		50	
Phenanthrene	869	ug/kg dry	966	25	87.4	50-150		50	
Pyrene	906	ug/kg dry	966	77	85.9	50-150	9.11	50	
Batch 1349034 - SVOA No-Prep									
Blank (1349034-BLK1)			Prepared: 04-Dec-13 Analyzed: 10-Dec-13						
1-Methylnaphthalene	10 U	ug/kg wet							
2-Methylnaphthalene	10 U	ug/kg wet							
Acenaphthene	10 U	ug/kg wet							
Acenaphthylene	10 U	ug/kg wet							
Anthracene	10 U	ug/kg wet							
Benzo(a)anthracene	10 U	ug/kg wet							
Benzo(a)pyrene	10 U	ug/kg wet							
Benzo(b,k)fluoranthenes	10 U	ug/kg wet							
Benzo(g,h,i)perylene	10 U	ug/kg wet							
Chrysene	10 U	ug/kg wet							
Dibenz(a,h)anthracene	10 U	ug/kg wet							
Fluoranthene	10 U	ug/kg wet							
Fluorene	10 U	ug/kg wet							

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Semi-VOA - Quality Control

Environmental Services Laboratory

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1349034 - SVOA No-Prep									
Blank (1349034-BLK1)			Prepared: 04-Dec-13 Analyzed: 10-Dec-13						
Indeno(1,2,3-c,d)pyrene	10 U	ug/kg wet							
Naphthalene	10 U	ug/kg wet							
Phenanthrene	10 U	ug/kg wet							
Pyrene	10 U	ug/kg wet							
Blank (1349034-BLK2)			Prepared: 09-Dec-13 Analyzed: 10-Dec-13						
1-Methylnaphthalene	10 U	ug/kg wet							
2-Methylnaphthalene	10 U	ug/kg wet							
Acenaphthene	10 U	ug/kg wet							
Acenaphthylene	10 U	ug/kg wet							
Anthracene	10 U	ug/kg wet							
Benzo(a)anthracene	10 U	ug/kg wet							
Benzo(a)pyrene	10 U	ug/kg wet							
Benzo(b,k)fluoranthenes	10 U	ug/kg wet							
Benzo(g,h,i)perylene	10 U	ug/kg wet							
Chrysene	10 U	ug/kg wet							
Dibenz(a,h)anthracene	10 U	ug/kg wet							
Fluoranthene	10 U	ug/kg wet							
Fluorene	10 U	ug/kg wet							
Indeno(1,2,3-c,d)pyrene	10 U	ug/kg wet							
Naphthalene	10 U	ug/kg wet							
Phenanthrene	10 U	ug/kg wet							
Pyrene	10 U	ug/kg wet							
Blank (1349034-BLK4)			Prepared: 09-Dec-13 Analyzed: 12-Dec-13						
Surrogate: 2-Fluorobiphenyl	*0.76*	mg/kg wet	*1.25*		*60.8*	*50-150*			
NWTPH-Diesel	10 U	mg/kg wet							
NWTPH-Heavy Oil	20 U	mg/kg wet							
Surrogate: Terphenyl-d14	*0.96*	mg/kg wet	*1.25*		*76.8*	*50-150*			

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 11:10

Notes and Definitions

J	The result is an estimated concentration.
U	Analyte Not Detected at or above the associated value
UJ	Analyte Not Detected at or above the associated estimated value
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 15:13

Metals - Quality Control

Analytical Resources, Inc

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 112613 - Waterbath									
BLK (112613-BLK1 (Soil))			Prepared: 26-Nov-13 Analyzed: 03-Dec-13						
Mercury	0.02 U	mg/kg		0.02 U		0-0		0	
BS (112613-BS1 (Soil))			Prepared: 26-Nov-13 Analyzed: 03-Dec-13						
Mercury	0.56	mg/kg	0.5	0.02 U	112	80-120			
DUP (112613-DUP1 (Soil))	**Source: T311208-01**		Prepared: 26-Nov-13 Analyzed: 03-Dec-13						
Mercury	0.03	mg/kg		0.03		-		35	
MS (112613-MS1 (Soil))	**Source: T311208-01**		Prepared: 26-Nov-13 Analyzed: 03-Dec-13						
Mercury	0.26	mg/kg	0.21	0.03	110	75-125		35	
Batch 112713 - Waterbath									
BLK (112713-BLK1 (Soil))			Prepared & Analyzed: 27-Nov-13						
TCLP Mercury	0.0001 U	mg/L		0.0001 U		0-0		0	
DUP (112713-DUP1 (Soil))	**Source: T311208-01**		Prepared & Analyzed: 27-Nov-13						
TCLP Mercury	0.0001 U	mg/L		0.0001 U		-		20	
MS (112713-MS1 (Soil))	**Source: T311208-01**		Prepared & Analyzed: 27-Nov-13						
TCLP Mercury	0.0011	mg/L	0.001	0.0001 U	110	75-125			
DUP (13-26167-DUP1 (Soil))	**Source: T311208-01**		Prepared: 27-Nov-13 Analyzed: 02-Dec-13						
TCLP Arsenic	0.02 U	mg/L		0.02 U		70-130			
TCLP Barium	0.1	mg/L		0.1		70-130			
TCLP Cadmium	0.01 U	mg/L		0.01 U		70-130			
TCLP Chromium	0.02 U	mg/L		0.02 U		70-130			
TCLP Lead	0.1 U	mg/L		0.1 U		70-130			
TCLP Silver	0.02 U	mg/L		0.02 U		70-130			

Lori A. Zbaraloski
Reviewed By

PW Engineering	Project: **SIte 9 Construction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	20-Dec-13 15:13

Metals - Quality Control

Analytical Resources, Inc

Sample ID / Analyte	Result	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 112713 - EPA 1311									
MS (13-26167-MS1 (Soil))	**Source: T311208-01**		Prepared: 27-Nov-13 Analyzed: 02-Dec-13						
TCLP Arsenic	4.3	mg/L	4	0.02 U	108	70-130			
TCLP Barium	4.3	mg/L	4	0.1	105	70-130			
TCLP Cadmium	1.1	mg/L	1	0.01 U	110	70-130			
TCLP Chromium	1.04	mg/L	1	0.02 U	104	70-130			
TCLP Lead	4.1	mg/L	4	0.1 U	102	70-130			
TCLP Silver	1.06	mg/L	1	0.02 U	106	70-130			
BLK (20131126-BLK1 (Soil))			Prepared: 27-Nov-13 Analyzed: 02-Dec-13						
TCLP Arsenic	0.02 U	mg/L		0.02 U		0-0		0	
TCLP Barium	0.1 U	mg/L		0.1 U		0-0		0	
TCLP Cadmium	0.01 U	mg/L		0.01 U		0-0		0	
TCLP Chromium	0.02 U	mg/L		0.02 U		0-0		0	
TCLP Lead	0.1 U	mg/L		0.1 U		0-0		0	
TCLP Silver	0.02 U	mg/L		0.02 U		0-0		0	
Batch 120613 - EPA 1311									
BLK (120613-BLK1 (Soil))			Prepared: 06-Dec-13 Analyzed: 09-Dec-13						
TCLP Chromium	0.02 U	mg/L		0.02 U		0-0		0	
TCLP Lead	0.1 U	mg/L		0.1 U		0-0		0	
DUP (120613-DUP1 (Soil))	**Source: T311208-11**		Prepared: 06-Dec-13 Analyzed: 09-Dec-13						
TCLP Chromium	0.02 U	mg/L		0.02 U		-		20	
TCLP Lead	1.3	mg/L		1.3		-	0	20	
MS (120613-MS1 (Soil))	**Source: T311208-11**		Prepared: 06-Dec-13 Analyzed: 09-Dec-13						
TCLP Chromium	1.02	mg/L	1	0.02 U	102	75-125			
TCLP Lead	5.2	mg/L	4	1.3	97.5	75-125			

Lori A. Zboralski
Reviewed By

CHAIN OF CUSTODY

City of Tacoma Environmental Services
326 East D Street
Tacoma
WA, 98421-1801
phone (253) 502-2130
fax (253) 502-2170

Lab Work Order Number T311208

Client Name: PW Engineering	Project Name: SIte 9 Construction
Client Contact: Tom Rutherford	Project Number: PWK-00552-12
Address: 747 Market Street, Rm 544	Project Description: Site 9 Slope Construction
City: Tacoma	PO Number:
State/Zip: WA, 98402	Sampler Signatures:
Phone: (253) 591-5767 / Fax: (253) 594-7941	
Samplers: Chris Burke, Mike Roper, Nancy Boyle	

Requested Analyses: Total Metals, Semi-VOA; TCLP Metals and Total Mercury; Sample Number

Requested Turn Around: Rush requests subject to additional charge. Rush requests subject to lab approval. Standard (days); Expedited (days); Due Date

Sample Name or Field ID #	Sampled Date	Sampled Time	Sample Type Code	Matrix Code	Container Count	Total Metals, Semi-VOA	TCLP Metals and Total Mercury	Sample Number	Sample Comments
8950001963-01	11/23/13	00:40	G	S	2	1	1	-01	
8950001963-02	11/23/13	00:45	G	S	2	1	1	-02	
8950001963-03	11/23/13	01:50	G	S	2	1	1	-03	
8950001963-04	11/23/13	01:18	G	S	2	1	1	-04	
8950001963-05	11/23/13	01:09	G	S	2	1	1	-05	
8950001963-06	11/23/13	00:53	G	S	2	1	1	-06	
8950001963-07	11/23/13	00:46	G	S	2	1	1	-07	

Relinquished By: Nancy Boyle	Received By: Cooler 136	Date/Time: 11/23/13 02:15
Relinquished By: Cooler 136	Received By: Nicole Riley	Date/Time: 11/25/2013 0830
Relinquished By:	Received By:	Date/Time:

Comments:

Cooler Numbers and Temperatures:

Matrix Codes: S=Soil

Preserv. Codes:

Login Reviewed By:_____

Login Reviewed Date:_____

CHAIN OF CUSTODY

City of Tacoma Environmental Services
326 East D Street
Tacoma
WA, 98421-1801
phone (253) 502-2130
fax (253) 502-2170

Lab Work Order Number T311208

Client Name: PW Engineering	Project Name: SIte 9 Construction
Client Contact: Tom Rutherford	Project Number: PWK-00552-12
Address: 747 Market Street, Rm 544	Project Description: Site 9 Slope Construction
City: Tacoma	PO Number:
State/Zip: WA, 98402	Sampler Signatures:
Phone: (253) 591-5767 / Fax: (253) 594-7941	
Samplers: Chris Banke	

Requested Turn Around: Rush requests subject to additional charge. Rush requests subject to lab approval. Standard (days): Expedited (days): Due Date:

Sample Name or Field ID #	Sampled Date	Sampled Time	Sample Type Code	Matrix Code	Container Count	Total Metals, Semi-VOA	TCLP Metals and Total Mercury								Sample Number	Sample Comments
8950001962 BH-01	11/27/2013	12:45	G	S	2	1	1								-08	
8950001962 BH-02		12:20	G	S	2	1	1								-09	
8950001962 BH-03		12:10	G	S	2	1	1								-10	
8950001962 BH-04		11:55	G	S	2	1	1								-11	
8950001962 BH-05		11:20	G	S	2	1	1								-12	
8950001962 BH-06		11:05	G	S	2	1	1								-13	
8950001962 BH-07		10:30	G	S	2	1	1								-14	
8950001962 BH-08		10:20	G	S	2	1	1								-15	
8950001962 BH-09		10:00	G	S	2	1	1								-16	
8950001962 BH-10		9:05	G	S	2	1	1								-17	
8950001962 BH-11	11/27/2013	8:45	G	S	2	1	1								-18	

Relinquished By	Received By	Date/Time	Comments
	Nicole Riley	11/27/2013 1435	
Relinquished By	Received By	Date/Time	
Relinquished By	Received By	Date/Time	
Cooler Numbers and Temperatures			

Matrix Codes: S=Soil

Preserv. Codes:

Login Reviewed By: _____

Login Reviewed Date: 11/27/13 HZ

City of Tacoma
Public Works — Environmental Services

Send Results & Invoice to:
Environmental Services Laboratory
326 East D Street
Tacoma, WA 98421
(253) 502-2130
PO#:

Page 1 of 1

Chain of Custody Record

SAP Accounting: PWK-00552-12
Project Name: Site 9 Construction
Samplers (Print): Chris Burke
Samples Sent to: T311208

	Work Order	Date	Time	Matrix	Grab	Composite	Sample ID	Total Containers	Analysis/# of Containers: Total Metals	Semi-VOA						Remarks
1	-19	11/27/2013	10:20			X	BH8 28-31"	2	1	1						
2	-20	11/27/2013	2:55			X	Crib Wall 0-4.5'	2	1	1						
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																

Relinquished By (Signature):	Date/Time	Received By (Signature):	Relinquished By (Signature):	Date/Time	Received for Laboratory By (Signature):
[signature]	11/27/2013 14:40				Nicole Riley 11/27/2013 1440

Relinquished By (Signature):	Date/Time	Received for Analysis By (Signature):	Date/Time	Remarks

Distribution: WHITE - Laboratory CANARY - Other PINK - Inorganics GOLDENROD - Organics

11/27/13

PW 523500 001 1111 a

INVOICE

T311208

Invoice To:
Tom Rutherford
PW Engineering
747 Market Street, Rm 544
Tacoma, WA 98402

Invoice Number: T311208-PWENG
Invoiced On: 20-Dec-13
Received: 27-Nov-13
Project: SIte 9 Construction
ARI paid by separate invoice.

PO Number:
Client Contact: Tom Rutherford - PW Engineering
Lab Contact: Lori A. Zboralski - Environmental Services Laboratory

Quantity	Analysis/Description	Matrix	Unit Cost	Extended Cost
Analytical Resources, Inc				
7	ARI_TCLP_Hg - Reruns	Soil	$0.00	$0.00
10	ARI_TCLP_Metals - Reruns	Soil	$0.00	$0.00
7	ARI_Mercury - Reruns	Soil	$0.00	$0.00
Environmental Services Laboratory				
5	NWTPH_DX	Soil	$18.75	$93.75
20	Arsenic, Total 6020A	Soil	$17.00	$340.00
20	Barium, Total 6020A	Soil	$12.00	$240.00
20	Cadmium, Total 6020A	Soil	$17.00	$340.00
20	Chromium, Total 6020A	Soil	$17.00	$340.00
20	Lead, Total 6020A	Soil	$17.00	$340.00
2	NWTPH_DX - Reruns	Soil	$0.00	$0.00
20	Solids, Total SM2540	Soil	$20.00	$400.00
19	NWTPH_DX	Soil	$75.00	$1,425.00
20	S_TotalCPAH - Reruns	Soil	$0.00	$0.00
4	S8270_SIM - Reruns	Soil	$0.00	$0.00
4	S8270_SIM	Soil	$55.00	$220.00
16	S8270_SIM	Soil	$220.00	$3,520.00
20	Selenium, Total 6020A dry soil	Soil	$17.00	$340.00
20	Silver, Total 6020A dry soil	Soil	$17.00	$340.00
13	Mercury, Total 7471 Dry Soil	Soil	$55.00	$715.00
Additional Items				
1	QA/QC Charge			$865.38

INVOICE

T311208

Invoice Total: **$9,519.13**

#145.00

Anthony L-T Chen, MD, MPH, Director of Health

Tacoma - Pierce County
Health Department
Healthy People in Healthy Communities
www.tpchd.org

No. 1743

WASTE DISPOSAL AUTHORIZATION

PAID
PAID DEC 31 2013
ACH PYMT REC'D
12/30/13
DT

( ) Non-Asbestos (XX) New
( ) Asbestos (PSCAA Case # _____) ( ) Amendment

A. Generator Name: City of Tacoma – Environmental Services
B. Generator Address: Thea Foss Waterway Site 9 – 1117 and 1119 Dock Street, Tacoma WA
C. Transporter Name: Contract Hauler, Quigg Brothers
D. Technical Contact: Sue O'Neill, Asst Division Manager, City of Tacoma Environmental Services Phone: (253)591-5789
E. Waste Description: Contaminated Soils
( ) Sludge (X) Solid ( ) PCS ( ) Other
F. Approved Quantity: **5,000 Tons**
G. **Actual Quantity (Filled in upon disposal):** _____
H. Multiple Loads: (X) Yes ( ) No
I. Dates of Disposal: **December 30, 2013 through June 30, 2014**
J. Testing: NWTPH-Dx & -Gx; Total Metals; TCLP Metals; PAH's
K. Reviewed by Department of Ecology: (X) Yes ( ) No
L. Disposal/Transportation Requirements: **A copy of this WDA must be transported with EACH load of waste and presented to the LRI Landfill Scalehouse Operator.** Soils demonstrating excessive odors are not suitable for use as daily cover and shall be directly buried (disposed of) in the landfill. If odors are not excessive and the soils physical characteristics are suitable for utilization as a daily cover then the soils may be used as alternative daily cover. Loads shall be covered during transport to the landfill to prevent fugitive emissions of contaminated soils. Soils to be disposed shall not contain free liquids as defined by the paint filter test (EPA Method #9095). Load sizes shall comply with conditional-use and solid waste permit criteria.
M. Facility: **(X X) LRI Landfill (304th Street LF), 30919 Meridian Street, Eatonville, WA**

CERTIFICATION

I hereby certify that I have personally examined and am familiar with the information submitted in this document and any supporting material. Based on my inquiry of those individuals immediately responsible for obtaining the information, the information submitted is true, accurate and complete to the best of my knowledge and ability and that all known and suspected hazards have been disclosed. I agree that the generator and/or transporter will abide by all conditions specified in line (L) or any attachments thereto.

1/2/14 — Date
Project Manager — Title
Tom Rutherford — Signature

AUTHORIZED BY:

David Bosch — David Bosch, TPCHD (253)798-6574

APPROVED

DEC 30 2013

TACOMA-PIERCE COUNTY HEALTH DEPT.
ENVIRONMENTAL HEALTH DIV.
For Official Use Only

Cc: LRI LF Scalehouse via Fax - 253 875 7205

Capping Material Testing Results

SUBMITTAL TRANSMITTAL FORM

Site 9 Bulkhead Wall Removal
Contract 4600009367

Date: 12/19/2013

To: Lynn Strom
City of Tacoma
Construction Division
747 Market Street, Room 620
Tacoma, WA 98402

From: QUIGG BROS., INC.
P.O. Box 1707
Aberdeen, WA 98520
Phone (360) 533-1530
Fax (360) 532-3449

QBI Job No.: 13053

Submittal Number: 001

Specification Section: Sht C-7

Submittal Description: Aggreagates

Transmitted by:

- ☐ U.S. Mail
- ☐ Pick Up
- ☐ Courier
- ☐ Hand Carry
- ☐ Facsimile
- ☑ E-Mail

Bid Item No.	# of Pages	Description
12-13	9	Sieve Analysis
		ASA Report
		Scale Certs
		Sample of Material picked up by Chad Norman

Type of Submittal:

- ☐ Shop Drawing
- ☐ Samples
- ☐ Certification
- ☑ Product Data
- ☐ Test Report
- ☐ RAM
- ☐ Other

Remarks:

Certify Either A or B:

☐ A. This document has been detail-checked for accuracy of content and for complance with the contract documents **(no exceptions)**. The information contained herein has been fully coordinated with all involved Subcontractors.

☐ B. This document has been detail-checked for accuracy of content and for complance with the contract documents **except for the attached deviations**. The information contained herein has been fully coordinated with all involved Subcontractors.

Certified by: Hans Breivik
Signature

BI 19

MILES
SAND AND GRAVEL COMPANY

ATTN: Hans Breivik

CUSTOMER Quigg Bros. DATE 12/19/13

PROJECT Site #9 Bulkhead Removal PROJ. NO.

LOCATION City of Tacoma Approx. Dock St. & 11th St. E. Tacoma, Wa.

SOURCE Canyon Pit PIT NO. B-329

MATERIAL Slope Cap Material

SPECIFICATION As Submitted

COMMENTS Miles' Prod. No. 1187 #200 wash performed.

PREPARER: S. Ruff

SCREEN	AVERAGE	PASSING	SPECS.
6"	100	100	100
4"	100	100	90-100
1"	87.9	75-90	---
3/4"	71.0	60-80	50-90
1/2"	55.2	50-70	---
#4	45.5	35-50	35-65
#10	36.8	25-40	15-45
#40	16.2	14-17	2-10
#200	1.7	1.0-1.9	0-2

BI 21

MILES
SAND AND GRAVEL COMPANY

ATTN:	Hans Breivik		
CUSTOMER	Quigg Bros.	DATE	12/19/13
PROJECT	Site #9 Bulkhead Removal	PROJ. NO.	
LOCATION	City of Tacoma Approx. Dock St. & 11th St. E. Tacoma, Wa.		
SOURCE	Canyon Pit	PIT NO.	B-329
MATERIAL	Habitat Mix		
SPECIFICATION	As Submitted		
COMMENTS	Miles' Prod. No. 1187	#200 wash performed.	
		PREPARER:	S. Ruff

SCREEN	AVERAGE	PASSING	SPECS.
2"	100	100	100
1-1/2"	98.5	93-99	80-95
1"	87.9	75-90	---
3/4"	71.0	60-80	60-80
1/2"	55.2	50-70	---
#4	45.5	35-50	40-60
#10	36.8	25-40	30-50
#40	16.2	14-17	10-20
#200	1.7	1.0-1.9	0-5 max.

ALTERNATE BI 21

MILES
SAND AND GRAVEL COMPANY

ATTN: Hans Breivik

CUSTOMER Quigg Bros. DATE 12/19/13

PROJECT Site #9 Bulkhead Removal PROJ. NO.

LOCATION City of Tacoma Approx. Dock St. & 11th St.E. Tacoma, Wa.

SOURCE Roy Pit PIT NO. B-333

MATERIAL Washed Pea Gravel

SPECIFICATION 22c Habitat Gravel Layer & City of Tacoma specs.

COMMENTS Miles' Prod. No. 1100 #200 wash performed.

PREPARER: S. Ruff

SCREEN	AVERAGE	PASSING	SPECS.
1/2"	100	100	100
3/8"	88.0	85-97	90-100
5/16"	77.1	65-85	---
1/4"	41.8	35-55	---
#4	18.0	10-25	10-30
#8	0.5	0.1-0.5	0-10
#16	0.2	0-0.5	0-5
#30	0.2	0-0.3	---
#200	0.1	0-0.2	0-2

Washington State Department of Transportation

WSDOT MATERIALS LAB

04/06/2012

Aggregate Source Approval Report

BI 19, 21

[redacted]

Remarks:
This pit is on the East Side of Canyon Rd. /// Deg Factor for Concrete Aggregate: 79 (08/27/09 MEA).

Pit Run Materials:
At the discretion of the Project Engineer, preliminary samples for Gradation and Sand Equivalent tests may be performed to determine if the material does in fact meet the specification for the intended use:

Backfill for Rock Wall	Backfill for Sand Drains	Bedding Material for Rigid Pipe
Bedding Material for Thermoplastic Pipe	Blending Sand	Foundation Material for Classes A, B or C
Gravel Backfill for Drains and Drywells	Gravel Backfill for Foundation Class B	Gravel Backfill for Pipe Zone Bedding
Gravel Backfill for Walls	Gravel Borrow	Sand Drainage Blanket
Select or Common Borrow		

No Preliminary Tests are required to be performed by the State Materials Lab

Gravel Base: Test Date: 03/01/1988 Expiration Date: [illegible]/01/1995
Drainage: R Value: 73 Swell Pressure: 0

Contact the Regional Materials Office to request PRELIMINARY SAMPLES be acquired. Evaluation and approval of this site as a source of GRAVEL BASE is required prior to use.

Mineral Agg. and Surfacing: Test Date: 11/20/2009 Expiration Date: 11/20/2014

Absorption:	Apparent Sp. G.:	Bulk Sp. G. (SSD): 2.706	Bulk Sp. G.
Deg: 79	LA: 16		

Currently Approved as a source of aggregate for:

ATB	Ballast	BST Crushed Cover Stone
BST Crushed Screenings	Crushed Surfacing Base Course	Crushed Surfacing Key Stone
Crushed Surfacing Top Course	Gravel Backfill for Foundation Class A	HMA Other Courses
HMA Wearing Course	Maintenance Rock	Permeable Ballast

Acceptance tests need to be performed as necessary.

Portland Cement Concrete Aggregates: Test Date: 08/27/2009 Expiration Date: 08/27/2014

ASR - 14 Day: 0.24	ASR - One Year: 0.03	CCA Absorption: 1.09	CCA Sp G: 2.671
FCA Absorption: 1.98	FCA Organics: 1	FCA Sp. G: 2.636	LA: 11
Mortar Strength:	Petrographic Analysis:		

Currently approved for:
Coarse Concrete Aggregates
Fine Concrete Aggregates

Acceptance tests need to be performed as necessary.

Riprap and Quarry Spalls: Test Date: 11/20/2009 Expiration Date:

Absorption:	Apparent Sp. G.:	Bulk Sp. G. (SSD): 2.706	Bulk Sp. G.
Deg: 79	LA: 16		

Contact the Regional Materials Office to request PRELIMINARY SAMPLES be acquired. Evaluation and approval of this site as a source of RIP RAP AND QUARRY SPALLS is required prior to use.

Distribution: Physical Testing | Project Engineer | Region Operations | Region Materials

Aggregate Source Approval System

Washington State Department of Transportation

WSDOT MATERIALS LAB 07/24/2013

Aggregate Source Approval Report

Owner: Washington Rock Quarries Inc.
Lessee:
Located in: SW1/4 SE1 4 Section 5 T17N R5E

Aggregate Source: QS-B-332
Known as: Kapowsin Quarry
County: Pierce

BI 20

Remarks:
Riprap,Quarry Spalls,Rock for Rock Wall evaluated 2/06/2013. Results: Bulk Sp G (SSD): 2.671, Bulk Sp G: 2.635, App Sp G: 2.733, Abs (%): 1.36, LA: 16, Deg:57, Approved for Riprap, Quarry Spalls and Rock for Rock Wall. Expires 2/06/2014..BH

Pit Run Materials:
At the discretion of the Project Engineer, preliminary samples for Gradation and Sand Equivalent tests may be performed to determine if the material does in fact meet the specification for the intended use:

Backfill for Rock Wall	Backfil for Sand Drains	Bedding Material for Rigid Pipe
Bedding Material for Thermoplastic Pipe	Blending Sand	Foundation Material for Classes A, B or C
Gravel Backfill for Drains and Drywells	Gravel Backfill for Foundation Class B	Gravel Backfill for Pipe Zone Bedding
Gravel Backfill for Walls	Gravel Borrow	Sand Drainage Blanket
Select or Common Borrow		

No Preliminary Tests are required to be performed by the State Materials Lab

Gravel Base: Test Date: 11/07/1991 Expiration Date: 11/07/2001

Drainage.	R Value 72	Swell Pressure 0

Contact the Regional Materials Office to request PRELIMINARY SAMPLES be acquired. Evaluation and approval of this site as a source of GRAVEL BASE is required prior to use

Mineral Agg. and Surfacing: Test Date: 12/10/2009 Expiration Date: 12/10/2014

Absorption 1 37	Apparent Sp G 2 703	Bulk Sp. G (SSD) 2 642	Bulk Sp G.: 2.607
Deg 46	LA 14		

Currently approved as a source of aggregate for:

ATB	Ballast	BST Crushed Cover Stone
BST Crushed Screenings	Crushed Surfacing Base Course	Crushed Surfacing Key Stone
Crushed Surfacing Top Course	Gravel Backfil for Foundation Class A	HMA Other Courses
HMA Wearing Course	Maintenance Rock	Permeable Ballast

Acceptance tests need to be performed as necessary.

Portland Cement Concrete Aggregates: Test Date: Expiration Date:

ASR - 14 Day	ASR - One Year	CCA Absorption	CCA Sp G
FCA Absorption	FCA Organics	FCA Sp G	LA
Mortar Strength	Petrographic Analysis		

Contact the Regional Materials Office to request PRELIMINARY SAMPLES be acquired. Evaluation and approval of this site as a source of AGGREGATES for PCC is required prior to use

Truck Scale Report & Certification

Date Tested:	24-May-13

RAYS SCALE CONSULTING
(206) 856-2389 Office
(206) 768-6311 Fax
P.O. Box 46453
Seattle, WA 98146

Company Name and Address:	Washington Rock Quarry Kapowsin Quarry 29104 Camp 1 Rd E

Balance on Arrival:	0	Min Grad:	20 lbs	Size Platform:	80'x10'
SR Loaded:	N/A	CLC:	30 ton	Scale:	Mantle
Make:	Rice Lake	Serial #:	B37368	County:	Pierce
Number of Sections:	4	Scale Serial #:	Mantle PV	Reg Element:	IQ 310

Loaded Postion	Test Weights	Scale Indication	ERROR	Load Position	Test Weights	Scale Indications	ERROR
As Found				As Left			
Section 1	Test Truck	30,560	0	Section 1	Test Truck	30,480	0
Section 2	Test Truck	30,560	0	Section 2	Test Truck	30,480	0
Section 3	Test Truck	30,580	0	Section 3	Test Truck	30,480	0
Section 4	Test Truck	30,680	0	Section 4	Test Truck	30,500	0
Section 1	10,000	10,040	40	Section 1	10000	10,000	0

Strain Load Test			
Empty Truck Weight	20,480		
Total Test Weights Added	10,000		
Scale Indication Truck + Weights	30,480		
Error or Added Test Weights	0		

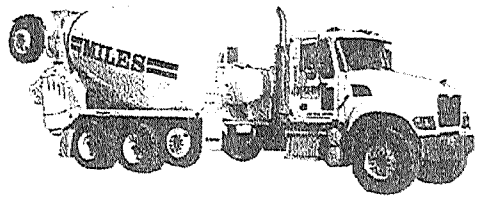
Remarks and / or Instructions

Test is shown after inspection of scale and working parts.

Scale Technician (Signature and Agent #):	Owner / Operator:
Derek Larsen # A0471B	

MILES
SAND AND GRAVEL COMPANY

P.O. BOX 130 AUBURN, WA 98071
Office (253) 833 - 3700 Fax (253) 351 - 6005



CERTIFICATE OF INSPECTION

This is to certify that Miles Sand & Gravel Truck scale(s)

Located at Canyon pit Was (were)

serviced on this 4 day of April 20 13 by an authorized representative of the

Miles Sand and Gravel Corp. Certified Test Weights Traceable to U.S., Government Standards were used.

A record of said imspection is on file at the above address and the offices of Miles Sand and Gravel.

BY: [signature] AU438

253-833-3705

Form No. 24242 GOS Printing Corp. 253-939-3131

MILES
SAND AND GRAVEL COMPANY
P.O. BOX 130 AUBURN, WA 98071
Office (253) 833 - 3700 Fax (253) 351 - 6005

Commercial Scale Test Report

Date Tested 4-4-13

Company Name Miles Sand & Gravel Address Canyon pit Number of Sections 4

Make _____ Serial No. _____ Capacity ___ Size Platform 10'x40'

CLC _____ Balance upon arrival 0 Scale vehicle

Reg. Element _____ Serial No. _____ Country Pierce

Minimum Grad 2016 SR-Zero SR Loaded

Load Position	Test Weights	Scale Indication	Error	Load Position	Test Weights	Scale Indication	Error
As Found	0	0	0	As Found	0	0	0
Sect #1	TT	35,500	0	Sect #1	14,000	49,500	0
#2	|	35,500	0	Sect #2	14,000	49,500	0
#3	|	35,500	0	Sect #3	14,000	49,500	0
#4	TT	35,500	0	Sect #4	14,000	49,500	0
	0	0	0		0	0	0

Strain Load Test

Empty Truck Weight	35,500		
Total Test Weights Added	14,000		
Scale Indication, Truck plus Weights	49,500		
Error on Added Test Weights	0		

Remarks and/or Instructions

Scale Technician Signature

Owner/Operator

Form No. 24241 GOS Printing Corp. 253-939-3131

City of Tacoma
Environmental Services Laboratory

January 03, 2014

Tom Rutherford
PW Engineering
747 Market Street, Rm 544
Tacoma, WA 98402

Subject: Site 9 Preconstruction

Enclosed are the analytical results for the sample collected 12/19/2013.

Due to QC failures, the benzoic acid result for this sample was determined to be unusable. However, there was no evidence benzoic acid is present in this sample. The laboratory is performing a re-analysis of this sample with a modification to the preparation method that should improve QC recoveries for this compound. Revised benzoic acid results will be reported separately at a later date.

If you have any questions concerning this report, call me at (253)502-2130. Please note that remaining samples associated with this report will be discarded 3 months from the date of this report unless we are notified otherwise.

Sincerely,

Stuart Magoon
Assistant Division Manager
Environmental Services Laboratory

cc. Mary Henley

PW Engineering	Project: **Site 9 Preconstruction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	03-Jan-14 14:40

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Quigg Brothers B-329 Canyon	T312167-01	Soil	19-Dec-13 12:00	20-Dec-13 08:38

CHAIN OF CUSTODY

The sample was received under appropriate Chain of Custody procedures.

SAMPLE RECEIPT, PRESERVATION AND STORAGE

The sample was properly preserved and stored in accordance with the applicable method requirements.

HOLDING TIMES

All analyses were performed within the required holding times.

METHODS

The sample was analyzed by the following methods:

Standard Methods 2540 for Total solids
EPA Method 7471 for Total Mercury
EPA Method 6020A for Total Metals
EPA Method 8270 for Semi-Volatile Analysis
EPA Method 9060 Mod for Total Organic Carbon

MINIMUM REPORTING LIMITS

All analytes are reported to the Practical Quantitation Limit (PQL) which is below or no greater than the Minimum Project Reporting Limit.

BLANKS

Blanks were analyzed at the required frequencies of the methods. There was a minimum of one Method Blank for each analytical batch. Blank values were less than the PQL, sample concentrations were greater than 10 times the blank values, or the analytes were not detected in the sample, except for 1,2-Dichlorobenzene at 9 ug/Kg. The sample result for 1,2-Dichlorobenzene is qualified as not detected at the estimated reported value (UJ).

SURROGATE COMPOUNDS

Surrogate compounds were added to each sample to monitor system performance. Surrogate recoveries were within the project control limits.

LABORATORY CONTROL SAMPLES

Laboratory Control Samples were analyzed with these samples. The recoveries for all associated LCS were within the project limits, **except for 2 Semi-Volatile compounds (2,4-Dimethylphenol at 48.2% and Benzoic Acid at 7.51%). The compounds were not detected in the sample. The result for 2,4-Dimethylphenol is qualified as not detected and estimated at the reported value (UJ). Since Benzoic Acid was less than 10% in the LCS the value for Benzoic Acid in the sample is reported as unusable.**

DUPLICATE SAMPLE ANALYSIS

Duplicate analysis was performed with these samples. Relative percent differences were within the project limits.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS

Matrix Spike and/or Matrix Spike Duplicate analysis was performed with these samples. The recoveries were within the project limits.

INTERNAL STANDARDS

Internal Standards were added to these samples for quantitation purposes. The Area counts of these standards must not vary more than a factor of two from the mid-point standard of the calibration curve according to the method. The retention times must not vary by more than 30 seconds. No compounds varied by more than 30 seconds retention time. The internal standard criteria were met for these samples.

DATA AVAILABILITY

All data associated with the samples referenced in this report are archived at the Environmental Services Laboratory and are available upon request

PW Engineering	**Project: Site 9 Preconstruction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	03-Jan-14 14:40

Quigg Brothers B-329 Canyon
T312167-01 (Soil)
Environmental Services Laboratory

Analyte	Result	PQL	Units	1/2 SQO	Prepared	Analyzed
Conventional						
Total Organic Carbon	1000 U	1000	mg/kg		24-Dec-13	24-Dec-13
Total Solids	**93.7**	1.0	%		20-Dec-13	20-Dec-13
Metals						
Antimony	0.397 U	0.397	mg/kg dry		20-Dec-13	30-Dec-13
Arsenic	**2.61**	0.397	mg/kg dry	27	20-Dec-13	30-Dec-13
Cadmium	0.397 U	0.397	mg/kg dry		20-Dec-13	30-Dec-13
Copper	**14.0**	0.397	mg/kg dry	170	20-Dec-13	30-Dec-13
Lead	**2.10**	0.397	mg/kg dry	225	20-Dec-13	30-Dec-13
Mercury	0.0154 U	0.0154	mg/kg dry	0.29	23-Dec-13	24-Dec-13
Nickel	**29.3**	0.397	mg/kg dry		20-Dec-13	30-Dec-13
Silver	0.397 U	0.397	mg/kg dry		20-Dec-13	30-Dec-13
Zinc	**37.0**	0.397	mg/kg dry	205	20-Dec-13	30-Dec-13
Semi-VOA						
Phenol	88 U	88	ug/kg dry	210	20-Dec-13	24-Dec-13
1,3-Dichlorobenzene	35 U	35	ug/kg dry	85	20-Dec-13	24-Dec-13
1,4-Dichlorobenzene	35 U	35	ug/kg dry	55	20-Dec-13	24-Dec-13
Benzyl Alcohol	**11**	9	ug/kg dry	36	20-Dec-13	24-Dec-13
1,2-Dichlorobenzene	**8 UJ**	4	ug/kg dry	25	20-Dec-13	24-Dec-13
2-Methylphenol	4 U	4	ug/kg dry	31	20-Dec-13	24-Dec-13
4-Methylphenol	88 U	88	ug/kg dry	335	20-Dec-13	24-Dec-13
2,4-Dimethylphenol	4 UJ	4	ug/kg dry	14	20-Dec-13	24-Dec-13
Benzoic Acid	Unusable	220	ug/kg dry	325	20-Dec-13	24-Dec-13
1,2,4-Trichlorobenzene	4 U	4	ug/kg dry	25	20-Dec-13	24-Dec-13
Naphthalene	88 U	88	ug/kg dry	1050	20-Dec-13	24-Dec-13
Hexachlorobutadiene	4 U	4	ug/kg dry	5	20-Dec-13	24-Dec-13
2-Methylnaphthalene	88 U	88	ug/kg dry	335	20-Dec-13	24-Dec-13
Dimethyl phthalate	35 U	35	ug/kg dry	80	20-Dec-13	24-Dec-13
Acenaphthylene	88 U	88	ug/kg dry	650	20-Dec-13	24-Dec-13
Acenaphthene	88 U	88	ug/kg dry	250	20-Dec-13	24-Dec-13
Dibenzofuran	88 U	88	ug/kg dry	270	20-Dec-13	24-Dec-13
Diethylphthalate	88 U	88	ug/kg dry	100	20-Dec-13	24-Dec-13
Fluorene	88 U	88	ug/kg dry	270	20-Dec-13	24-Dec-13
N-Nitrosodiphenylamine	9 U	9	ug/kg dry	14	20-Dec-13	24-Dec-13

Reviewed By

PW Engineering	**Project: Site 9 Preconstruction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	03-Jan-14 14:40

Quigg Brothers B-329 Canyon
T312167-01 (Soil)
Environmental Services Laboratory

Analyte	Result	PQL	Units	1/2 SQO	Prepared	Analyzed
Semi-VOA						
Hexachlorobenzene	4 U	4	ug/kg dry	11	20-Dec-13	24-Dec-13
Pentachlorophenol	88 U	88	ug/kg dry	180	20-Dec-13	24-Dec-13
Phenanthrene	88 U	88	ug/kg dry	750	20-Dec-13	24-Dec-13
Anthracene	88 U	88	ug/kg dry	480	20-Dec-13	24-Dec-13
Di-n-butylphthalate	88 U	88	ug/kg dry	700	20-Dec-13	24-Dec-13
Fluoranthene	88 U	88	ug/kg dry	1250	20-Dec-13	24-Dec-13
Pyrene	88 U	88	ug/kg dry	1650	20-Dec-13	24-Dec-13
Butyl benzyl phthalate	88 U	88	ug/kg dry	450	20-Dec-13	24-Dec-13
bis(2-Ethylhexyl)phthalate	88 U	88	ug/kg dry	650	20-Dec-13	24-Dec-13
Benzo(a)anthracene	88 U	88	ug/kg dry	800	20-Dec-13	24-Dec-13
Chrysene	88 U	88	ug/kg dry	1400	20-Dec-13	24-Dec-13
Di-n-Octyl phthalate	88 U	88	ug/kg dry	3100	20-Dec-13	24-Dec-13
Benzo(b,k)fluoranthenes	180 U	180	ug/kg dry	1800	20-Dec-13	24-Dec-13
Benzo(a)pyrene	88 U	88	ug/kg dry	800	20-Dec-13	24-Dec-13
Indeno(1,2,3-c,d)pyrene	88 U	88	ug/kg dry	345	20-Dec-13	24-Dec-13
Dibenz(a,h)anthracene	9 U	9	ug/kg dry	115	20-Dec-13	24-Dec-13
Benzo(g,h,i)perylene	88 U	88	ug/kg dry	360	20-Dec-13	24-Dec-13
Surrogate: 2-Fluorophenol			*62.5 %*	*50-150*		
Surrogate: Phenol-d5			*67.2 %*	*50-150*		
Surrogate: Nitrobenzene-d5			*65.7 %*	*50-150*		
Surrogate: 2-Fluorobiphenyl			*63.8 %*	*50-150*		
Surrogate: 2,4,6-Tribromophenol			*75.9 %*	*50-150*		
Surrogate: Terphenyl-d14			*72.8 %*	*50-150*		
Aroclor-1016	18 U	18	ug/kg dry	40	20-Dec-13	23-Dec-13
Aroclor-1221	18 U	18	ug/kg dry	40	20-Dec-13	23-Dec-13
Aroclor-1232	18 U	18	ug/kg dry	40	20-Dec-13	23-Dec-13
Aroclor-1242	18 U	18	ug/kg dry	40	20-Dec-13	23-Dec-13
Aroclor-1248	18 U	18	ug/kg dry	40	20-Dec-13	23-Dec-13
Aroclor-1254	18 U	18	ug/kg dry	40	20-Dec-13	23-Dec-13
Aroclor-1260	18 U	18	ug/kg dry	40	20-Dec-13	23-Dec-13
Surrogate: 2-Fluorobiphenyl			*65.0 %*	*50-150*		
Surrogate: Terphenyl-d14			*81.2 %*	*50-150*		

Quigg Brothers B-329 Canyon
T312167-01 (Soil)
Environmental Services Laboratory

Analyte	Result	PQL	Units	1/2 SQO	Prepared	Analyzed
GC/MS-Pesticides						
4,4-DDE	8.8 U	8.8	ug/kg dry	4	20-Dec-13	27-Dec-13
4,4-DDD	8.8 U	8.8	ug/kg dry	8	20-Dec-13	27-Dec-13
4,4-DDT	8.8 U	8.8	ug/kg dry	17	20-Dec-13	27-Dec-13
Surrogate: 2-Fluorobiphenyl			*69.5 %*	*50-150*		
Surrogate: Terphenyl-d14			*81.2 %*	*50-150*		

Conventional - Quality Control

Environmental Services Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1350058 - Comb./IR										
Blank (1350058-BLK1)				Prepared & Analyzed: 13-Dec-13						
Total Organic Carbon	ND	1000	mg/kg							
Reference (1350058-SRM1)				Prepared & Analyzed: 13-Dec-13						
Total Organic Carbon	257000	1000	mg/kg	315000		81	0-180			
Batch 1351060 - Conventionals No-Prep										
Blank (1351060-BLK1)				Prepared & Analyzed: 20-Dec-13						
Total Solids	ND	1.0	%							
Duplicate (1351060-DUP1)	**Source: T312167-01**			Prepared & Analyzed: 20-Dec-13						
Total Solids	93.4	1.0	%		93.7			0.3	35	

PW Engineering	Project: Site 9 Preconstruction	
747 Market Street, Rm 544	Project Number: PWK-00552-12	Reported:
Tacoma WA, 98402	Project Manager: Tom Rutherford	03-Jan-14 14:40

Metals - Quality Control

Environmental Services Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1351065 - 3051A										
Blank (1351065-BLK1)				Prepared: 20-Dec-13 Analyzed: 30-Dec-13						
Lead	ND	0.100	mg/kg dry							
Nickel	ND	0.100	mg/kg dry							
Zinc	ND	0.100	mg/kg dry							
Silver	ND	0.100	mg/kg dry							
Cadmium	ND	0.100	mg/kg dry							
Arsenic	ND	0.100	mg/kg dry							
Copper	ND	0.100	mg/kg dry							
Antimony	ND	0.100	mg/kg dry							
Duplicate (1351065-DUP1)		Source: T312167-01		Prepared: 20-Dec-13 Analyzed: 30-Dec-13						
Arsenic	2.61	0.391	mg/kg dry		2.61			0.001	25	
Cadmium	0.0675	0.391	mg/kg dry		0.0688			2	25	
Lead	2.28	0.391	mg/kg dry		2.10			8	25	
Zinc	32.4	0.391	mg/kg dry		37.0			13	25	
Copper	13.7	0.391	mg/kg dry		14.0			2	25	
Antimony	0.208	0.391	mg/kg dry		0.200			4	25	
Silver	ND	0.391	mg/kg dry		ND				25	
Nickel	29.9	0.391	mg/kg dry		29.3			2	25	
Matrix Spike (1351065-MS1)		Source: T312167-01		Prepared: 20-Dec-13 Analyzed: 30-Dec-13						
Copper	165	0.391	mg/kg dry	156	14.0	97	75-125			
Silver	149	0.391	mg/kg dry	156	ND	96	75-125			
Lead	152	0.391	mg/kg dry	156	2.10	96	75-125			
Zinc	182	0.391	mg/kg dry	156	37.0	93	75-125			
Antimony	136	0.391	mg/kg dry	156	0.200	87	75-125			
Cadmium	149	0.391	mg/kg dry	156	0.0688	95	75-125			
Arsenic	150	0.391	mg/kg dry	156	2.61	95	75-125			
Nickel	182	0.391	mg/kg dry	156	29.3	98	75-125			

PW Engineering	Project: **Site 9 Preconstruction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	03-Jan-14 14:40

Metals - Quality Control

Environmental Services Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1351065 - 3051A										
Reference (1351065-SRM1)				Prepared: 20-Dec-13 Analyzed: 30-Dec-13						
Cadmium	231	2.50	mg/kg dry	225		103	73-127			
Lead	291	2.50	mg/kg dry	266		109	76-124			
Copper	442	2.50	mg/kg dry	418		106	76-124			
Silver	84.3	2.50	mg/kg dry	75.9		111	54-146			
Nickel	223	2.50	mg/kg dry	206		108	74-126			
Antimony	72.9	2.50	mg/kg dry	74.4		98	0-264			
Zinc	950	2.50	mg/kg dry	927		102	69-126			
Arsenic	89.7	2.50	mg/kg dry	88.4		101	78-130			
Batch 1352014 - Waterbath										
Blank (1352014-BLK1)				Prepared: 23-Dec-13 Analyzed: 24-Dec-13						
Mercury	ND	0.0040	mg/kg dry							
Duplicate (1352014-DUP1)		Source: T312167-01		Prepared: 23-Dec-13 Analyzed: 24-Dec-13						
Mercury	ND	0.0159	mg/kg dry		ND				35	
Matrix Spike (1352014-MS1)		Source: T312167-01		Prepared: 23-Dec-13 Analyzed: 24-Dec-13						
Mercury	0.659	0.0149	mg/kg dry	0.746	ND	88	75-125			
Matrix Spike Dup (1352014-MSD1)		Source: T312167-01		Prepared: 23-Dec-13 Analyzed: 24-Dec-13						
Mercury	0.697	0.0154	mg/kg dry	0.769	ND	91	75-125	6	35	
Reference (1352014-SRM1)				Prepared: 23-Dec-13 Analyzed: 24-Dec-13						
Mercury	30.1	0.995	mg/kg dry	25.0		121	11-289			

Semi-VOA - Quality Control

Environmental Services Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1351063 - 3545										
Blank (1351063-BLK1)				Prepared: 20-Dec-13 Analyzed: 24-Dec-13						
Phenol	ND	100	ug/kg wet							
1,3-Dichlorobenzene	ND	40	ug/kg wet							
1,4-Dichlorobenzene	ND	40	ug/kg wet							
Benzyl Alcohol	ND	10	ug/kg wet							
1,2-Dichlorobenzene	9	5	ug/kg wet							
2-Methylphenol	ND	5	ug/kg wet							
4-Methylphenol	ND	100	ug/kg wet							
2,4-Dimethylphenol	ND	5	ug/kg wet							
Benzoic Acid	ND	250	ug/kg wet							
1,2,4-Trichlorobenzene	ND	5	ug/kg wet							
Naphthalene	ND	100	ug/kg wet							
Hexachlorobutadiene	ND	5	ug/kg wet							
2-Methylnaphthalene	ND	100	ug/kg wet							
Dimethyl phthalate	ND	40	ug/kg wet							
Acenaphthylene	ND	100	ug/kg wet							
Acenaphthene	ND	100	ug/kg wet							
Dibenzofuran	ND	100	ug/kg wet							
Diethylphthalate	ND	100	ug/kg wet							
Fluorene	ND	100	ug/kg wet							
N-Nitrosodiphenylamine	ND	10	ug/kg wet							
Hexachlorobenzene	ND	5	ug/kg wet							
Pentachlorophenol	ND	100	ug/kg wet							
Phenanthrene	ND	100	ug/kg wet							
Anthracene	ND	100	ug/kg wet							
Di-n-butylphthalate	ND	100	ug/kg wet							
Fluoranthene	ND	100	ug/kg wet							
Pyrene	ND	100	ug/kg wet							
Butyl benzyl phthalate	ND	100	ug/kg wet							
bis(2-Ethylhexyl)phthalate	ND	100	ug/kg wet							
Benzo(a)anthracene	ND	100	ug/kg wet							
Chrysene	ND	100	ug/kg wet							
Di-n-Octyl phthalate	ND	100	ug/kg wet							
Benzo(b,k)fluoranthenes	ND	200	ug/kg wet							
Benzo(a)pyrene	ND	100	ug/kg wet							
Indeno(1,2,3-c,d)pyrene	ND	100	ug/kg wet							
Dibenz(a,h)anthracene	ND	10	ug/kg wet							
Benzo(g,h,i)perylene	ND	100	ug/kg wet							
Surrogate: 2-Fluorophenol	*3300*		*ug/kg wet*	*5000*		*65.4*	*50-150*			
Surrogate: Phenol-d5	*3500*		*ug/kg wet*	*5000*		*69.0*	*50-150*			

Semi-VOA - Quality Control

Environmental Services Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1351063 - 3545										
Blank (1351063-BLK1)				Prepared: 20-Dec-13 Analyzed: 24-Dec-13						
Surrogate: Nitrobenzene-d5	*3200*		*ug/kg wet*	*5000*		*63.8*	*50-150*			
Surrogate: 2-Fluorobiphenyl	*3200*		*ug/kg wet*	*5000*		*64.8*	*50-150*			
Surrogate: 2,4,6-Tribromophenol	*3800*		*ug/kg wet*	*5000*		*76.9*	*50-150*			
Surrogate: Terphenyl-d14	*3700*		*ug/kg wet*	*5000*		*73.3*	*50-150*			
Blank (1351063-BLK2)				Prepared: 20-Dec-13 Analyzed: 23-Dec-13						
Aroclor-1016	ND	20	ug/kg wet							
Aroclor-1221	ND	20	ug/kg wet							
Aroclor-1232	ND	20	ug/kg wet							
Aroclor-1242	ND	20	ug/kg wet							
Aroclor-1248	ND	20	ug/kg wet							
Aroclor-1254	ND	20	ug/kg wet							
Aroclor-1260	ND	20	ug/kg wet							
Surrogate: 2-Fluorobiphenyl	*3200*		*ug/kg wet*	*5000*		*64.8*	*50-150*			
Surrogate: Terphenyl-d14	*4100*		*ug/kg wet*	*5000*		*82.4*	*50-150*			

PW Engineering	Project: **Site 9 Preconstruction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	03-Jan-14 14:40

GC/MS-Pesticides - Quality Control
Environmental Services Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1351063 - 3545										
Blank (1351063-BLK3)				Prepared: 20-Dec-13 Analyzed: 27-Dec-13						
4,4-DDE	ND	10	ug/kg wet							
4,4-DDD	ND	10	ug/kg wet							
4,4-DDT	ND	10	ug/kg wet							
Surrogate: 2-Fluorobiphenyl	*3400*		*ug/kg wet*	*5000*		*67.0*	*50-150*			
Surrogate: Terphenyl-d14	*4000*		*ug/kg wet*	*5000*		*80.1*	*50-150*			

PW Engineering	Project: **Site 9 Preconstruction**	
747 Market Street, Rm 544	Project Number: PWK-00552-12	**Reported:**
Tacoma WA, 98402	Project Manager: Tom Rutherford	03-Jan-14 14:40

Notes and Definitions

UJ	Analyte not detected at or above the associated estimated value
R	The Result is unusable.
J	The result is an estimated concentration.
U	Analyte Not Detected at or above the associated value
UJ	Analyte Not Detected at or above the associated estimated value
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

1/1

10:20:44 a.m. 12-20-2013

CHAIN OF CUSTODY

City of Tacoma Environmental Services
326 East D Street
Tacoma
WA, 98421-1801
phone (253) 502-2130
fax (253) 502-2170

Lab Work Order Number T312167

Client Name: PW Engineering	Project Name: Site 9 Preconstruction
Client Contact: Tom Rutherford	Project Number: PWK-00552-12
Address: 747 Market Street, Rm 544	Project Description: Site 9 Preconstruction
City: Tacoma	PO Number: 61000043761
State/Zip: WA, 98402	Sampler Signatures
Phone: (253) 591-5767 / Fax: (253) 594-7941	
Samplers: Chad Norman	

Requested Analyses: EPA 6020A::EPA 7471B::EPA 8270D::EPA 9060A::SM 2540 G

Requested Turn Around: Rush requests subject to additional charge. Rush requests subject to lab approval. Standard (days) | Expedited (days) | Due Date: 1/3/2014 15:00

Sample Name or Field ID #	Sampled Date	Sampled Time	Sample Type Code	Matrix Code	Container Count	Sample Number	Sample Comments
Quigg Bros B-329 Canyon	12/19/2013	12:00	G	S	2	-01	

Relinquished By:	Received By:	Date/Time: 12/29/13 0830 ~~12-19-13 12:00~~
Relinquished By:	Received By: Jerici Zboralski	Date/Time: 12/20/13 0830
Relinquished By:	Received By:	Date/Time:

Cooler Numbers and Temperatures:

Comments: Two sandbag containers were received; sub-sampled into 3-8oz jars one of which immediately stored in freezer. NP 12/20/2013

Matrix Codes: S=Soil

Preserv. Codes:

Login Reviewed By: Nick Kiley

Login Reviewed Date: 12/20/2013 1200

2535915533

INVOICE

T312167

Invoice To:
Mary Henley
PW Science and Engineering
326 East D Street
Tacoma, WA 98421

Invoice Number: T312167-PWSED **Project:** Site 9 Preconstruction
Invoiced On: 03-Jan-14
Received: 20-Dec-13

PO Number: 61000043761 **Client Contact:** Tom Rutherford - PW Science and Engineering
Lab Contact: Lori A. Zboralski - Environmental Services Laboratory

Quantity	Analysis/Description	Matrix	Unit Cost	Extended Cost
Environmental Services Laboratory				
1	Zinc, Total 6020A dry soil	Soil	$17.00	$17.00
1	Solids, Total SM2540	Soil	$20.00	$20.00
1	Silver, Total 6020A dry soil	Soil	$17.00	$17.00
1	S8270_PEST	Soil	$120.00	$120.00
1	S8270_PCB	Soil	$85.00	$85.00
1	S8270_BNA	Soil	$295.00	$295.00
1	Organic Carbon, Total 9060 Mod	Soil	$50.00	$50.00
1	Nickel, Total 6020A dry soil	Soil	$12.00	$12.00
1	Mercury, Total 7471 Dry Soil	Soil	$35.00	$35.00
1	Lead, Total 6020A	Soil	$17.00	$17.00
1	Copper, Total 6020A dry soil	Soil	$17.00	$17.00
1	Cadmium, Total 6020A	Soil	$17.00	$17.00
1	Arsenic, Total 6020A	Soil	$17.00	$17.00
1	Antimony, Total 6020A	Soil	$17.00	$17.00
Additional Items				
1	QA/QC Charge			$92.00

Invoice Total: **$1,012.00**

APPENDIX E
Regulated Building Material Survey Report

PACIFIC RIM ENVIRONMENTAL, INC.

June 14, 2013

Layne Alfonso
GeoEngineers
1101 Fawcett Ave., Ste. 200
Tacoma, WA 98402

RE: Regulated Material Abatement Scope of Work, Costs and Specifications, Project Management, Oversight and Clearance Inspections – Dock Street Property Tacoma WA.

Dear Layne,

This letter has been prepared to provide anticipated abatement costs and consulting costs for this project. Pacific Rim Environmental (PacRim) submitted initial service would include regulated materials inspection for asbestos, lead based paint and universal waste associated with the building materials. The intent of the initial inspection would be to determine the rough order of magnitude cost for abatement of the regulated materials

Based upon information in our report and assuming the roofing is asbestos (roofing has not been samples to date) the following abatement estimate is provided:

Permits, Mobilization and Notifications for Abatement	$ 1,500.00
Window Abatement	$12,900.00
Roofing Abatement (TBD)	$26,250.00
Universal Waste Recycling or Hazardous Disposal	$ 1,800.00
Pacific Rim Fees (see details below)	$12,360.00
Total Budget	**$54,810.00**

The fee for the Abatement scope of services is to develop an abatement/removal project specification and design documents to be used for project bidding to certified abatement contractors.
The Project Management service is anticipated to perform oversight and clearance inspection during future Abatement activities and to provide clearance inspections and authorization to Demo Letter.

6510 Southcenter Blvd., Ste. #4
Seattle, WA 98188
www.pacrimenv.com
Phone: (206) 244-8965
Fax: (206) 244-9096

Scope of Remaining PacRim Services

Scope of Work and Project Specification		Lump Sum	$ **3,500.00**
Project Management Service:			
On-site Air Sampling Professional (estimated)	10 shifts @	$680.00 per shift	$ 6,800.00
Sr. Project Manager	8 hours @	$95.00 per hour	$ 760.00
Air Samples	25 PCM @	$20.00 Ea.	$ 500.00
Project Close Out Manuals		Lump Sum	$ 800.00
Total Estimated Fee for onsite monitoring			$ **8,860.00**

The fee for Project Specifications includes a pre-bid project meeting and job walk with pre-qualified asbestos abatement contractors, preparation of all addenda as needed, bid evaluation and award recommendation. Abatement contractor will contract directly with client.

Fee for Project Management and Air Sampling is an estimate and will be billed according to the number of shifts the contractors need to complete the project.

Sincerely,

Jeff Lewis
President
Pacific Rim Environmental, Inc.

PACIFIC RIM ENVIRONMENTAL, INC.

Regulated Building Material Survey

Foss Waterway Development – Sites 8 & 9
1129 Dock Street
Tacoma, WA

Performed for:
GeoEngineers, Inc.
1101 Fawcett Avenue, Suite 200
Tacoma, WA 98402

Prepared By:

Todd P. Carter, AHERA Inspector
WA State Lead Risk Assessor

Date Prepared: 04/22/2013
PacRim#: 14867

6510 Southcenter Blvd., Ste. #4
Seattle, WA 98188

www.pacrimenv.com

Phone: (206) 244-8965
Fax: (206) 244-9096

Table of Contents

Foss Waterway Development – 1129 Dock Street, Tacoma WA

Section 1.0 Scope of Work
Foss Waterway Development – 1129 Dock Street, Tacoma WA

On April 8, 2013 Todd P. Carter of Pacific Rim Environmental, Inc. (PacRim) performed the initial inspection for asbestos and lead-based paint at the subject Property located at 1129 Dock Street in Tacoma WA.

Site: The subject Property is occupied by two adjoining wood timber construction industrial buildings. The age of construction and square footage was not determined.

Limitations: The preliminary inspection and testing was limited to accessible interior building materials and finishes. No roof inspection or testing was performed.

Field inspection, data collection, and report generation were performed according to the following **Scope of Work**:

Provide AHERA Certified Building Inspector to perform a building inspection in accordance with Washington Administrative Code (WAC) 296-62-07721 and current PSCAA regulations. Provide a State of Washington Department of Commerce Lead Risk Assessor to perform a building inspection in accordance with WAC code 365-230-200.

Asbestos-Containing Materials (ACM)

1. Bulk sampling and analysis of suspect asbestos-containing materials (ACM).
2. Analysis of suspect ACM by a NVLAP accredited laboratory.
3. Quantity estimates of ACM.
4. Written report including recommendations based on the technician's observations, abatement (removal) cost estimates, sample descriptions, and sample location.
5. Statement of Compliance with W.A.C. 296-62-07721 Sign-off form.

Lead-Based Paints (LBP)

6. Perform screening of suspect lead-based paints both interior, utilizing a XRF portable sampling device.
7. Written report including: Sample descriptions, conditions, locations, analytical results, and recommendations.

Universal Waste Inventory

8. Inspect and inventory lights and equipment to identify fixture and lamp type to determine presence of PCB and/or mercury.

The survey was intended to identify possible asbestos-containing materials (ACM) on the interior and exterior of the building. This inspection covered only those areas, which were exposed and/or physically accessible to the inspector. Materials uncovered during the course of demolition, renovation, or maintenance activities that are not identified in this inspection report must be presumed to contain asbestos until PLM analysis proves that the material is not asbestos-containing.

This survey is not intended for, nor should be used as a design specification. The Asbestos in Schools Hazard Amendment and Reauthorization Act (ASHARA), effective November 20, 1990, expanded accreditation requirements to apply to persons who work with asbestos in public and commercial buildings as well as schools. Specifically, ASHARA expanded the Toxic Substances

Control Act (TSCA) Section 206 (a) (1) and (3) to require accreditation for any person who designs or conducts a response action with respect to friable ACM in a building. TSCA Section 207 provides for civil penalties of $5,000 for each day of a violation for not employing accredited individuals to design and conduct response actions. Sampling of suspect asbestos-containing materials was conducted as prescribed in 40 CFR 763.86.

Suspect asbestos-containing materials within the structure were identified and classified as a surfacing material, thermal system insulation, or miscellaneous materials. Surfacing materials are those, which are either spray applied or troweled-on for acoustical, decorative, or fireproofing purposes. Thermal system insulation (TSI) is insulation used to inhibit heat transfer or to prevent condensation on pipes, boilers, tanks, ducts and various other components. Miscellaneous materials include all other materials not included in the above categories such as floor tile, ceiling tile, roofing felt, cementitious materials, wallboard systems and products such as caulking, mastics and putties.

A total of fourteen (14) bulk samples were collected and submitted for PLM laboratory analysis. Two (2) of these samples were found to contain greater than 1% asbestos.

Bulk samples collected were submitted for sample analysis in accordance with method EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk building Materials". Analyses were performed in Pacific Rim Environmental Inc.'s NVLAP Accredited Laboratory (Lab Code 101631-0). Materials are positive for asbestos if they are found to contain greater than 1% or 1% asbestos.

Thermal Systems Insulation (TSI)

No suspect asbestos-containing **TSI** material was identified on the subject property.

If during the course of work in the crawl space or wall, ceiling or floor demolition, any TSI materials that are not listed in this report are uncovered, sampling ***must*** be performed prior to disturbing these materials.

Surfacing Materials

Suspect asbestos-containing **coating on concrete floor** was identified in the warehouse, east bay. The material was sampled and ***no asbestos was detected***. (Sample # 7)

If during the course of wall, ceiling or floor demolition, any surfacing materials not identified in this report are uncovered, sampling ***must*** be performed prior to disturbing these materials.

Miscellaneous Materials

Suspect asbestos-containing **12"x12" ceiling tile and mastic** was identified in the mezzanine office. The material was sampled and ***no asbestos was detected***. (Sample # 1)

Suspect asbestos-containing **subfloor and mastic** was identified in the mezzanine office. The material was sampled and ***no asbestos was detected***. (Sample # 2)

Suspect asbestos-containing **window putty** was identified in the mezzanine office exterior and office interior. The materials were sampled and ***no asbestos was detected***. (Sample # 3, # 5)

Suspect asbestos-containing **window putty** was identified in the mezzanine office and east wall. The materials were sampled and found to contain ***1-3% Chrysotile asbestos***. (Sample # 4, # 6)

Suspect asbestos-containing **fire hose** was identified in the warehouse, south end, middle bay. The materials were sampled and ***no asbestos was detected***. (Sample # 8, # 9)

Suspect asbestos-containing **12"x12" ceiling tile** was identified in the office. The material was sampled and ***no asbestos was detected***. (Sample #10)

Suspect asbestos-containing **rolled roofing** (inventory) was identified in the warehouse, middle bay. The materials were sampled and ***no asbestos was detected***. (Sample #11, #12, #13, #14)

If during the course of wall, ceiling or floor demolition, any miscellaneous materials that are not listed in this report are uncovered, sampling ***must*** be performed prior to disturbing these materials.

Section 3.0 Asbestos Abatement Cost Estimate
Foss Waterway Development – 1129 Dock Street, Tacoma WA

The following abatement costs are "best-effort" estimates and are based on current industry averages. The following estimates are subject to many variables beyond the control of PRE. Such variables include, but are not limited to: project duration, contractor work schedule, hours of work allowed by the owner, contractor performance, regulatory agency interpretation of changing regulations, logistics of removal of material and miscellaneous delays. The estimate is meant only as a guideline to assist in the selection of an abatement contractor and may not reflect the actual final costs of asbestos removal. They do not include owner costs such as abatement project oversight and monitoring for compliance to law, and compliance to project plans and/or specifications. These estimates assume that adequate, professional plans and specifications are prepared. Generally, abatement costs are minimized by professional project management as well as utilizing the same asbestos abatement contractor to remove all asbestos containing materials during a single project. It is in no way intended to serve as, or replace, a comprehensive abatement specification. Estimates include permitting, removal and disposal.

Window Putty Mezzanine office	6 Windows	@	$ 150.00 per window	$ 900.00
Window Putty East Wall	80 Windows	@	$ 150.00 per window	$ 12,000.00
			TOTAL	**$ 12,900.00**

Section 4.0 Statement of Compliance
Foss Waterway Development – 1129 Dock Street, Tacoma WA

In accordance with W.A.C. 296-62-07721 and PSCAA Regulation III, Article 4, Pacific Rim Environmental, Inc. performed an asbestos survey of the subject Property located at 1129 Dock Street in Tacoma WA. Should employees or contract personnel encounter any suspect asbestos-containing materials (ACM) it is their responsibility to:

1. Contact a representative of the owner.
2. Consult the inspection report to determine whether or not the suspect material contains asbestos.
3. If the suspect material does not appear in the inspection report, then that material was not sampled and must be presumed to contain asbestos until proven otherwise by sampling and PLM analysis.
4. Ensure that all employees and contractors are informed and advised of the location and type of materials that contain asbestos.

- **Window putty (Mezzanine office and east wall)**

I Hereby Attest:

The inspection report has been made available to me. I will inform all subcontractors of the location and types of materials containing asbestos. I am authorized to sign on behalf of my company.

Contractor:	_____	Owner's Rep:	_____
Signature:	_____	Signature:	_____
Print Name:	_____	Print Name:	_____
Title:	_____	Title:	_____
Date:	_____	Date:	_____

The inspection and testing performed on the exterior and interior painted surfaces of the subject Property did identify lead-based paint at or above the EPA/HUD standard of 1.0 mg/m^2 on the following tested components.

PRE#	Substrate	Component/ Side	Description / Location	Color	Result	Pbc mg/cm2
4	Wood	Exterior siding	East wall 1129	Green	Positive	7.8
5	Wood	Exterior trim	East wall 1129	Green	Positive	10.5
6	Wood	Window trim	East wall 1129	Green	Positive	9.2
7	Wood	Exterior siding	East wall 1131	Green	Positive	6.8
8	Wood	Exterior trim	East wall 1131	Green	Positive	6.7
10	Wood	Exterior siding	West wall 1129	Green	Positive	3.5
11	Wood	Exterior siding	West wall 1131	Green	Positive	10.1
20	Wood	Cabinets	Inside shed	Ivory	Positive	6.8

The XRF sample results are provided in Appendix D.

If the building is to be renovated or remodeled there are procedures regarding the disturbance or removal of the lead-based paints that **can** be followed (i.e. initial air monitoring, clearance sampling, etc.). These procedures can be found in *HUD-0006700 Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing.* It is not required that these regulations/procedures be utilized on this project, however because these are the only available guidelines for the removal of lead-based paints PRE feels it necessary to inform you of these guidelines.

The only state rules or regulations that currently apply to lead-based paints are WAC 296-155-17603 Scope* and WAC 296-155-17607 Permissible Exposure Limit**. The WAC code states that if lead is detectable in the workplace in any quantity, initial air monitoring must be performed on employees doing demolition, renovation or remodeling work in areas found to have materials containing lead. Also, workers performing lead removal must be trained in accordance with WAC 296-155-17625.

The EPA/HUD standard uses a criterion of 5,000 parts per million (PPM) dry weight or 1.0 milligrams per square centimeter (1.0 mg/cm2) for lead-based paint. However, if lead is detected in any concentration, Federal OSHA and Washington State Department of Labor and Industries regulations will still apply, since neither agency has established a concentration of lead in paint below which the lead in construction standards do not apply.

Universal Waste Rules

The Universal Waste Rule (UWR) establishes alternative, streamlined waste management standards in place of most of the Dangerous Waste Regulations, Chapter 173-303 WAC, except for, WAC 173-303-050, 173-303-145 and 173-303-960.

The following lamp types may be characterized as universal waste: fluorescent tubes, high intensity discharge (HID) lamps (mercury vapor, metal halide, high pressure sodium) and compact fluorescent.

The following Universal Waste was identified:

- **Approximately seventy-four (74) 4-foot fluorescent fixtures and ballasts**
- **Approximately ten (10) 8-foot fluorescent fixtures and ballasts**
- **Approximately eight (8) 4-foot mini fluorescent tubes**

The universal waste must be removed and properly disposed of or recycled prior to building demolition.

Disposal of individual lamps is not regulated. However disposal of large quantities of lamps is subject to dangerous waste regulations (WAC 173-303) and the waste stream must be subjected to TCLP (Toxicity Characteristic Leaching Procedure) analysis to determine the amount of mercury that could leach out of the waste. The TCLP limit for mercury is 0.2 mg/L.

A copy of the Washington State Department of Ecology *Universal Waste Rule for Dangerous Waste Lamps WAC 173-303-573*, Publication # 00-04-020 is provided in the Appendix F.

PCBs belong to a broad family of organic chemicals known as chlorinated hydrocarbons. PCBs are produced by the combination of one or more chlorine atoms and a biphenyl molecule. PCBs range in consistency from heavy oily liquids to waxy solids. Prior to 1979, PCBs were widely used in electrical equipment such as transformers, capacitors, switches, and voltage regulators.

Appendix A: **Asbestos Sample Summary**

Pacific Rim Environmental, Inc

Asbestos Summary

Project Name / Address: Foss Waterway Development - Sites 8 & 9 / Dock Street Property, Tacoma

Project ID	Sample #	Sample Location	AHERA Category	Sample Description	Asbestos Type/%	Approximate Quant.
14867	01	Mezzanine office, ceiling	Miscellaneous	12"x12" ceiling tile and mastic	None Detected (Both Layers)	N/A
14867	02	Mezzanine office, floor	Miscellaneous	Subfloor and mastic under carpet	None Detected (All Layers)	N/A
14867	03	Mezzanine office, exterior windows	Miscellaneous	Putty on window frames	None Detected	N/A
14867	04	Mezzanine office, interior windows	Miscellaneous	Putty on wood frames	Layer 1 (Putty): None Detected, Layer 2 (Putty): Chrysotile 1-3%	6 Windows
14867	05	Office, interior window	Miscellaneous	Putty on wood frames	None Detected	N/A
14867	06	Warehouse windows, east wall	Miscellaneous	Putty on wood frames	Chrysotile 1-3%	80 Windows
14867	07	Warehouse, east bay	Surfacing	Coating on concrete floor	None Detected	N/A
14867	08	Warehouse, south end, middle bay	Miscellaneous	Fire hose	None Detected	N/A
14867	09	Warehouse, south end, middle bay	Miscellaneous	Fire hose	None Detected	N/A
14867	10	Office ceiling	Miscellaneous	12"x12" tile, splined	None Detected	N/A
14867	11	Warehouse, middle bay	Miscellaneous	Rolled roofing inventory	None Detected	N/A
14867	12	Warehouse, middle bay	Miscellaneous	Rolled roofing inventory	None Detected	N/A
14867	13	Warehouse, middle bay	Miscellaneous	Rolled roofing inventory	None Detected	N/A
14867	14	Warehouse, middle bay	Miscellaneous	Rolled roofing inventory	None Detected	N/A

Appendix B: **Bulk Sample Analysis Report**

PACIFIC RIM ENVIRONMENTAL, INC.

BULK SAMPLE ANALYSIS REPORT

CLIENT:	**GeoEngineers Inc.**	**PACRIM # :**	**14867**
	1101 Fawcett Avenue, Suite 200	**REPORT # :**	2013-04-0073
	Tacoma, WA 98402	**DATE RECEIVED :**	4/9/2013
		ANALYST :	William F. Golloway
PROJECT:	Foss Waterway Development	**DATE ANALYZED :**	4/9/2013, 4/10/2013
	1129 Dock Street	**REPORT BY :**	Sarah Kreiner
	Tacoma, WA	**REPORT DATE :**	4/10/2013
		TURNAROUND:	5 Days
SAMPLE DATE:	4/8/2013	**PAGE :**	1 of 5

Attached are the results of analysis of 14 bulk samples submitted for asbestos identification: Lab ID #2013-04-0073 through 2013-04-0086.

Samples were analyzed in accordance with method EPA-600/R-93/116: "Method for the Determination of Asbestos in Bulk Building Materials".

Unless otherwise noted, samples were inhomogeneous; subsamples of components were analyzed to achieve representative analysis. Separate layers of layered samples are analyzed and reported separately. Unless otherwise stated, asbestos content was quantified by calibrated visual estimation (CVES). CVES concentrations are reported in 2 to 3 percent ranges for fiber concentrations ranging from 1-10%, and 5 percent ranges for concentrations greater than 10%. Samples in which asbestos was not observed are reported as "none detected".

Limitations and Uncertainty:

Factors such as sample quality, sample size, interfering matrix material, fiber size, and fiber concentration contribute to the uncertainty of asbestos concentration measurements in bulk materials. Relative errors exceeding 100% may occur in samples containing <1-10% asbestos. Relative errors are typically below 30% in samples with greater than 10% asbestos, and approach zero as the asbestos concentration approaches 100%.

Asbestos fibers with diameters below approximately 0.25 micrometers are not detectable by PLM. These extremely fine fibers may occur in such products as floor tile, adhesives, and cement products. This limitation can be overcome, however, by the use of alternate analytical methods, such as Transmission Electron Microscopy (TEM).

This report cannot be represented by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. Test results pertain only to the samples submitted for analysis.

NVLAP Accredited LAB #: 101631-0
Samples submitted by: PacRim

Reports Reviewed By: *Approved Signatory*

6510 Southcenter Blvd., Ste. #4
Seattle, WA 98188

www.pacrimenv.com

Phone: (206) 244-8965
Fax: (206) 244-9096

Pacific Rim Environmental, Inc.
BULK SAMPLE ANALYSIS REPORT

CLIENT:	GeoEngineers Inc. 1101 Fawcett Avenue, Suite 200 Tacoma, WA 98402	PACRIM # :	14867
		REPORT # :	2013-04-0073
		DATE RECEIVED :	4/9/2013
		ANALYST :	William F. Golloway
PROJECT:	Foss Waterway Development 1129 Dock Street Tacoma, WA	DATE ANALYZED :	4/9/2013, 4/10/2013
		REPORT BY :	Sarah Kreiner
		REPORT DATE :	4/10/2013
		TURNAROUND:	5 Days
SAMPLE DATE:	4/8/2013	PAGE :	2 of 5

Client/Lab ID Number	Sample Location and Description	Asbestos Type(s) / %	Other Material(s)	Date Analyzed
1 2013-04-0073	**Mezzanine office, ceiling (12"x12" ceiling tile and mastic).** White-painted, brown, fibrous ceiling tile (layer 1) with brown brittle mastic (layer 2).	**Layer 1** (Ceiling tile): None Detected **Layer 2** (Mastic): None Detected	**Layer 1:** Cellulose (90-95%), Binder, Paint. **Layer 2:** Cellulose (<1%), Adhesive, Mineral Aggregate.	4/9/13
2 2013-04-0074	**Mezzanine office, floor (Subfloor and mastic under carpet).** Light brown foam (layer 1) on white mastic (layer 2) on brown fiber board material (layer 3) with brown mastic (layer 4).	**Layer 1** (Foam): None Detected **Layer 2** (Mastic): None Detected **Layer 3** (Fiber board): None Detected **Layer 4** (Mastic): None Detected	**Layer 1:** Cellulose (<1%), Foam, Mineral Aggregate. **Layer 2:** Cellulose (1-3%), Adhesive, Mineral Aggregate. **Layer 3:** Cellulose (80-85%), Binder. **Layer 4:** Cellulose (1-3%), Adhesive.	4/9/13
3 2013-04-0075	**Mezzanine office, exterior windows (Putty on window frames exterior).** Light grey, brittle window putty with grey surface residue.	None Detected	Cellulose (<1%), Binder, Mineral Aggregate.	4/9/13

Pacific Rim Environmental, Inc.
BULK SAMPLE ANALYSIS REPORT

CLIENT:	GeoEngineers Inc. 1101 Fawcett Avenue, Suite 200 Tacoma, WA 98402	PACRIM # :	**14867**
		REPORT # :	2013-04-0073
		DATE RECEIVED :	4/9/2013
		ANALYST :	William F. Golloway
PROJECT:	Foss Waterway Development 1129 Dock Street Tacoma, WA	DATE ANALYZED :	4/9/2013, 4/10/2013
		REPORT BY :	Sarah Kreiner
		REPORT DATE :	4/10/2013
		TURNAROUND:	5 Days
SAMPLE DATE:	4/8/2013	PAGE :	3 of 5

Client/Lab ID Number	Sample Location and Description	Asbestos Type(s) / %	Other Material(s)	Date Analyzed
4 2013-04-0076	**Mezzanine office, interior windows (Putty on wood frames).** Grey-blue-painted, light brown, brittle window putty (layer 1) and grey-blue-painted, light grey, brittle window putty (layer 2).	**Layer 1** (Putty): None Detected **Layer 2** (Putty): **Chrysotile 1-3%**	**Layer 1:** Cellulose (<1%), Binder, Mineral Aggregate, Paint. **Layer 2:** Cellulose (<1%), Binder, Mineral Aggregate, Paint.	4/9/13
5 2013-04-0077	**Office, interior window (Putty on wood frames).** Light brown-painted, light brown, brittle window putty.	None Detected	Cellulose (<1%), Binder, Mineral Aggregate, Paint, Wood.	4/10/13
6 2013-04-0078	**Warehouse windows, east wall (Putty on wood frames).** White to light brown, brittle window putty.	**Chrysotile 1-3%**	Cellulose (<1%), Binder, Mineral Aggregate.	4/10/13
7 2013-04-0079	**Warehouse, east bay (Coating on concrete floor).** White/red/blue/white paint with dark brown to black residue.	None Detected	Cellulose (<1%), Paint, Mineral Aggregate, Binder.	4/10/13

Pacific Rim Environmental, Inc.
BULK SAMPLE ANALYSIS REPORT

CLIENT:	GeoEngineers Inc. 1101 Fawcett Avenue, Suite 200 Tacoma, WA 98402	PACRIM # :	14867
		REPORT # :	2013-04-0073
		DATE RECEIVED :	4/9/2013
		ANALYST :	William F. Golloway
PROJECT:	Foss Waterway Development 1129 Dock Street Tacoma, WA	DATE ANALYZED :	4/9/2013, 4/10/2013
		REPORT BY :	Sarah Kreiner
		REPORT DATE :	4/10/2013
		TURNAROUND:	5 Days
SAMPLE DATE:	4/8/2013	PAGE :	4 of 5

Client/Lab ID Number	Sample Location and Description	Asbestos Type(s) / %	Other Material(s)	Date Analyzed
8 2013-04-0080	**Warehouse, south end, middle bay (Fire hose).** Light brown, fibrous material. **Note:** Sample appears homogeneous.	None Detected	Cellulose (98%+), Binder.	4/10/13
9 2013-04-0081	**Warehouse, south end, middle bay (Fire hose).** Light brown, fibrous material with tar residue.	None Detected	Cellulose (98%+), Binder, Tar.	4/10/13
10 2013-04-0082	**Office ceiling (12"x12" tile, splined).** Brown/white-painted, light brown, fibrous ceiling tile material.	None Detected	Cellulose (75-80%), Perlite, Binder, Paint.	4/10/13
11 2013-04-0083	**Warehouse, middle bay (Rolled roofing inventory).** Black tar roofing with grey gravel.	None Detected	Cellulose (<1%), Fiberglass (7-10%), Mineral Aggregate, Tar.	4/10/13
12 2013-04-0084	**Warehouse, middle bay (Rolled roofing inventory).** Black tar roofing with grey gravel.	None Detected	Cellulose (<1%), Fiberglass (20-25%), Mineral Aggregate, Tar.	4/10/13

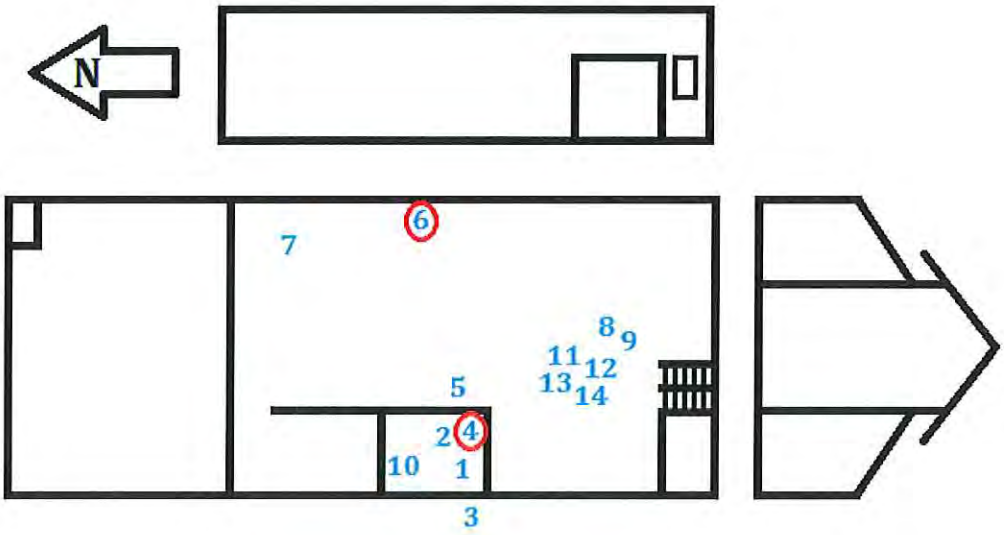
Pacific Rim Environmental, Inc.
BULK SAMPLE ANALYSIS REPORT

CLIENT:	GeoEngineers Inc. 1101 Fawcett Avenue, Suite 200 Tacoma, WA 98402	PACRIM # :	14867
		REPORT # :	2013-04-0073
		DATE RECEIVED :	4/9/2013
		ANALYST :	William F. Golloway
PROJECT:	Foss Waterway Development 1129 Dock Street Tacoma, WA	DATE ANALYZED :	4/9/2013, 4/10/2013
		REPORT BY :	Sarah Kreiner
		REPORT DATE :	4/10/2013
		TURNAROUND:	5 Days
SAMPLE DATE:	4/8/2013	PAGE :	5 of 5

Client/Lab ID Number	Sample Location and Description	Asbestos Type(s) / %	Other Material(s)	Date Analyzed
13 2013-04-0085	**Warehouse, middle bay (Rolled roofing inventory).** Black tar roofing material.	None Detected	Cellulose (<1%), Fiberglass (10-15%), Tar, Mineral Aggregate.	4/10/13
14 2013-04-0086	**Warehouse, middle bay (Rolled roofing inventory).** Black tar roofing with white gravel.	None Detected	Cellulose (<1%), Fiberglass (10-15%), Tar, Mineral Aggregate.	4/10/13

Appendix C: **Site Sketch**

Site Sketch



Positive samples **circled in red on drawing** and **bold in table below**.

Sample #	Sample Location	Sample Description
01	Mezzanine office, ceiling	12"x12" ceiling tile and mastic
02	Mezzanine office, floor	Subfloor and mastic under carpet
03	Mezzanine office, exterior windows	Putty on window frames exterior
04	**Mezzanine office, interior windows**	**Putty on wood frames**
05	Office, interior window	Putty on wood frames
06	**Warehouse windows, east wall**	**Putty on wood frames**
07	Warehouse, east bay	Coating on concrete floor
08	Warehouse, south end, middle bay	Fire hose
09	Warehouse, south end, middle bay	Fire hose
10	Office ceiling	12"x12" tile, splined
11	Warehouse, middle bay	Rolled roofing inventory
12	Warehouse, middle bay	Rolled roofing inventory
13	Warehouse, middle bay	Rolled roofing inventory
14	Warehouse, middle bay	Rolled roofing inventory

GeoEngineers, Inc.

Foss Waterway Development
Sites 8 & 9
1129 Dock Street
Tacoma, WA 98402

Pacific Rim Environmental, Inc.
6510 Southcenter Boulevard, #4
Tukwila, WA 98188

Tel. (206) 244-8965 FAX (206) 244-9096

Project #: 14867
Drawing #: 01 of 01
Sampling Date: 04/08/2013
Drawing By: Robin Sandstrom
Drawing Not To Scale

Appendix D: **XRF Data Sheets**

PacRim

Client: **GeoEngineers, Inc.**
1101 Fawcett Avenue, Suite 200
Tacoma, WA 98402

Project: **Foss Waterway Development - Sites 8 & 9**
1129 & 1131 Dock Street
Tacoma, WA 98402

XRF Serial #: **XLP300-80662**
Inspection Date: **8-Apr-2013**
Inspection By: **Todd P. Carter**

PRE Job#: **14867**

PRE#	Test #	Substrate	Component / Side	Description / Location	Color	Result	Pbc mg/cm2
1	2280	*First calibration check*				Positive	1
2	2281	*First calibration check*				Positive	1.1
3	2282	*First calibration check*				Positive	1.1
4	2283	Wood	Exterior siding	East wall 1129	Green	Positive	7.8
5	2284	Wood	Exterior trim	East wall 1129	Green	Positive	10.5
6	2285	Wood	Window trim	East wall 1129	Green	Positive	9.2
7	2286	Wood	Exterior siding	East wall 1131	Green	Positive	6.8
8	2287	Wood	Exterior trim	East wall 1131	Green	Positive	6.7
9	2288	Wood	Exterior sheeting	North wall 1129	Green	Negative	0.06
10	2289	Wood	Exterior siding	West wall 1129	Green	Positive	3.5
11	2290	Wood	Exterior siding	West wall 1131	Green	Positive	10.1
12	2291	Brick	Interior wall	North wall 1131	White	Negative	0.02
13	2292	Wood	Column	West wall 1131	White	Negative	0.01
14	2293	Concrete	Floor	West bay 1131	Gray	Null	0.25
15	2294	Wood	Interior wall	East wall 1131	White	Negative	0.02
16	2295	Wood	Interior wall	Office wall 1131	White	Negative	0.5
17	2296	Wood	Interior wall	South wall 1129	White	Negative	0.6
18	2297	Concrete	Floor		Gray	Negative	0.09
19	2298	Wood	Exterior siding	Shed	Green	Negative	0.02
20	2299	Wood	Cabinets	Inside shed	Ivory	Positive	6.8
21	2300	Last calibration check				Positive	1.2
22	2301	Last calibration check				Positive	1.1
23	2302	Last calibration check				Positive	1.1

Report by: Robin K. Sandstrom
Date: 04/09/13

Appendix E: **XRF Performance Characteristic Sheet**

Performance Characteristic Sheet

EFFECTIVE DATE: **September 24, 2004** **EDITION NO.:** 1

MANUFACTURER AND MODEL:

Make: *Niton LLC*
Tested Model: *XLp 300*
Source: ^{109}Cd
Note: This PCS is also applicable to the equivalent model variations indicated below, for the Lead-in-Paint K+L variable reading time mode, in the XLi and XLp series:

XLi 300A, XLi 301A, XLi 302A and XLi 303A.
XLp 300A, XLp 301A, XLp 302A and XLp 303A.
XLi 700A, XLi 701A, XLi 702A and XLi 703A.
XLp 700A, XLp 701A, XLp 702A, and XLp 703A.

Note: The XLi and XLp versions refer to the shape of the handle part of the instrument. The differences in the model numbers reflect other modes available, in addition to Lead-in-Paint modes. The manufacturer states that specifications for these instruments are identical for the source, detector, and detector electronics relative to the Lead-in-Paint mode.

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Lead-in-Paint K+L variable reading time mode.

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm^2 (inclusive)

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm^2 in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm^2 film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION:

For XRF results using Lead-in-Paint K+L variable reading time mode, substrate correction is not needed for:

Brick, Concrete, Drywall, Metal, Plaster, and Wood

INCONCLUSIVE RANGE OR THRESHOLD:

K+L MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm^2)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted in August 2004 on 133 testing combinations. The instruments that were used to perform the testing had new sources; one instrument's was installed in November 2003 with 40 mCi initial strength, and the other's was installed June 2004 with 40 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Substrate correction is not needed for brick, concrete, drywall, metal, plaster or wood when using Lead-in-Paint K+L variable reading time mode, the normal operating mode for these instruments. If substrate correction is desired, refer to Chapter 7 of the HUD Guidelines for guidance on correcting XRF results for substrate bias.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use the K+L variable time mode readings.

Conduct XRF retesting at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

Compute the Retest Tolerance Limit by the following steps:

Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family housing a result is defined as the average of three readings. In multifamily housing, a result is a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.

Calculate the average of the original XRF result and retest XRF result for each testing combination.

Square the average for each testing combination.

Add the ten squared averages together. Call this quantity C.

Multiply the number C by 0.0072. Call this quantity D.

Add the number 0.032 to D. Call this quantity E.

Take the square root of E. Call this quantity F.

Multiply F by 1.645. The result is the Retest Tolerance Limit.

Compute the average of all ten original XRF results.

Compute the average of all ten re-test XRF results.

Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

For the Lead-in-Paint K+L variable reading time mode, the instrument continues to read until it is moved away from the testing surface, terminated by the user, or the instrument software indicates the reading is complete. The following table provides testing time information for this testing mode. The times have been adjusted for source decay, normalized to the initial source strengths as noted above. Source strength and type of substrate will affect actual testing times. At the time of testing, the instruments had source strengths of 26.6 and 36.6 mCi.

Testing Times Using K+L Reading Mode (Seconds)						
	All Data			Median for laboratory-measured lead levels (mg/cm^2)		
Substrate	25^{th} Percentile	Median	75^{th} Percentile	Pb < 0.25	0.25 ≤ Pb<1.0	1.0 ≤ Pb
Wood Drywall	4	11	19	11	15	11
Metal	4	12	18	9	12	14
Brick Concrete Plaster	8	16	22	15	18	16

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than or equal to the threshold, and negative if they are less than the threshold.

DOCUMENTATION:

A document titled *Methodology for XRF Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD.

This XRF Performance Characteristic Sheet was developed by the Midwest Research Institute (MRI) and QuanTech, Inc., under a contract between MRI and the XRF manufacturer. HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing.*

Appendix F: Universal Waste Rules for Dangerous Waste Lamps WAC 173-303-573

The Universal Waste Rule for Lamps
WAC 173-303-573(5)

Any business that generates dangerous waste must follow the dangerous waste rules, Chapter 173-303 WAC. In Washington State the Universal Waste Rule allows less burdensome management of the following wastes:

- Batteries *(#98-407.a)*
- Thermostats *(#98-407.b)*
- Lamps *(#98-407.c)*
- Mercury-containing equipment *(#98-407.b)*

Businesses have the choice of managing these wastes as universal waste (UW) or dangerous waste. UW requirements for storage, transportation and collection are less stringent.

This publication focuses on the UW requirements for lamps. Publication number 98-407, *The Universal Waste Rule* provides more details on these requirements and the advantages of UW management.

What types of lamps are considered Universal Waste?

The types of lamps that may be Universal Waste include:

- Fluorescent
- High Intensity Discharge (HID) (e.g., mercury vapor, metal halide, high pressure sodium)
- Compact fluorescent
- Neon[1]
- Any other lamps that are dangerous waste

How can I tell if my lamps are dangerous waste?

The process of determining if a waste is hazardous is called designation. Through EPA test procedures, lamps have been shown to designate as dangerous waste because of their mercury and/or lead content. A generator has three choices when determining if their spent lamps are a dangerous waste:

1. Assume that their lamps are a dangerous waste;
2. Use manufacturer's information, MSDS and other available information to designate by knowledge;
3. Designate by sampling and testing.

[1] "Neon" lamp manufacturers sometimes use gases other than neon, and lamps have been manufactured that contained up to 600 milligrams of mercury per tube.

Certain "green tip" lamps pass the EPA test and are not dangerous waste. Ask your lamp manufacturer or supplier for product testing information that shows these particular lamps are not a dangerous waste.

Some local governments may have landfill bans on disposal of mercury-containing lamps or other mercury-containing items. Check with your local health department, solid waste agency, or landfill for specific requirements, as well as recycling or disposal options.

What are the requirements for Universal Waste management of lamps?

Manage Universal Waste lamps the same as the other Universal Wastes, except for a few specific handling requirements. Because glass bulbs are easily broken, Universal Waste rules require specific handling procedures. Universal waste management requirements for lamps include:

Accumulation start date:

Both used and unused lamps become waste on the date the handler decides to discard them.

Accumulation and dating of Universal Waste lamps:

You can only accumulate lamps for one year from the date they are generated. To document this, the collection container or individual UW lamp is typically marked with the first date of accumulation. An extension to the one year accumulation limit is allowed if the facility needs more time to collect enough items to facilitate proper recovery, treatment, or disposal.

Labeling and Marking:

Clearly label or mark individual lamps or containers with one of the following phrases:

- *Universal Waste – Lamps*
- *Waste Lamps*
- *Used Lamps*

Packaging:

Contain lamps in structurally sound containers such as cardboard boxes or fiber drums. In addition, keep containers closed when not adding lamps.

Clean up procedures:

Immediately clean up broken lamps and store debris in a closed container.

Large Quantity Handlers[2] of Universal Waste (LQHUW)

When a handler exceeds 11,000 pounds (or 2,200 pounds for lamps), they become an LQHUW and are subject to extra requirements, including:

- Notification to Ecology of LQHUW status, and which specific types of UW they manage.
- Tracking type and quantity of universal wastes received and shipped.
- Obtaining a RCRA Site Identification Number.

[2] Handlers are either the original generators of the UW or businesses that receive and consolidate UW from other handlers before shipping to another handler or to a destination facility.

Lamp crushing prohibited:
Lamps cannot be crushed under Universal Waste regulations. Lamp crushing is allowed as a dangerous waste treatment-by-generator activity, but not as a Universal Waste option.

Transporting Universal Waste lamps:
You may self-transport UW lamps, complying with applicable U.S. Department of Transportation regulations. Refer to Ecology publication number 98-407 "The Universal Waste Rule" for details.

Does the rule apply to me?

The following types of businesses may generate dangerous waste lamps and can take advantage of the Universal Waste regulations:

- Regulated generators[3] of dangerous waste (Medium Quantity and Large Quantity Generators)
- Businesses that generate or accumulate dangerous waste lamps in regulated quantities (this category may include commercial building/property owners that maintain the lighting for tenants)
- Businesses that provide collection and management services (e.g., lighting contractors)

A dangerous waste generator has the choice of managing lamps as UW or under the more stringent dangerous waste requirements. In most cases UW management is much easier and the preferable alternative to dangerous waste management. Note that businesses that generate and manage dangerous wastes and UWs are considered both a dangerous waste generator and a UW handler. Regardless if you are a generator or a handler, you are liable for ensuring your waste is properly managed once it leaves your site.

Where do I send them?

Universal wastes may be sent to either another handler (acting as a collection point) or to a destination facility. Another handler could include any business that is already managing UW, government-sponsored collections, or hazardous waste management firms. Businesses that recycle or dispose of UW are called destination facilities. Ultimately, all UW must go to a destination facility. They are subject to dangerous waste regulations for recyclers and hazardous waste disposal facilities. A facility that only accumulates UW would not be a destination facility.

For a list of firms that offer waste management services, visit http://www.ecy.wa.gov/apps/hwtr/hwsd/default.htm.

Why do we care about lamps?

[3] Regulated generators of dangerous waste are those that generate over 220 pounds of dangerous waste per month or batch (or 2.2 pounds of extremely hazardous waste), or accumulate greater than 2,200 pounds of dangerous waste (or 2.2 pounds of extremely hazardous waste) at any time. As a point of reference, 4-four-foot long, linear fluorescent tubes weigh approximately 2.2 pounds. It would take about 400 of those tubes to equal 220 pounds and approximately 4,000 tubes to equal 2,200 pounds.

Nationally, about 680 million lamps are disposed of annually, most to solid waste disposal facilities, including landfills and solid waste incinerators. Fluorescent lamps contain a small amount of mercury which is released when the lamp is broken. During waste handling and disposal, many lamps break, releasing mercury vapor and potentially exposing waste handlers to inhalation of those vapors. Waste incineration (not common in Washington State) of mercury-containing lamps also releases the mercury into the atmosphere. Mercury in the atmosphere is ultimately deposited back to the earth, rivers and lakes. From that point, mercury is then available to enter the food chain and eventually accumulates in fish.

The mercury content in newer fluorescent tubes ranges from 3.5 milligrams to 8 milligrams or more. Some older fluorescent tubes (pre-1999) contain up to 50 milligrams of mercury. HID lamps may contain up to 250 milligrams, depending on the lamp wattage.

Some lamps contain lead in the glass and lead solder in the base. Lead is a toxic metal that may leach from solid waste landfills into the ground water. Manufacturers are eliminating the lead by using non-leaded glass and solders in new lamps.

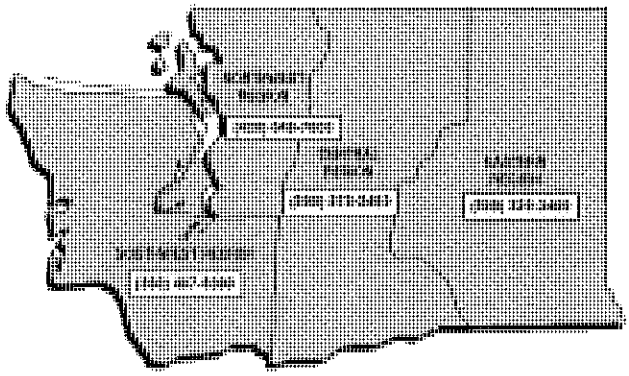
Although fluorescent and HID lamps contain toxic mercury and should be recycled, people are encouraged to continue using them because they use much less electricity and last much longer than other types of lighting. For this reason, fluorescents are a better long-term choice for the environment.

How do I manage lamps at home?

Homeowners are not required to manage their lamps as Universal Waste. They are strongly encouraged to take them to a local household hazardous waste collection facility or other appropriate recycling alternative, if available.

For More Information

Questions on this topic may be directed to your nearest regional office Dangerous Waste Specialist.



If you need this information in an alternate format, please call the Hazardous Waste and Toxics Reduction Program at 360-407-6700. If you are a person with a speech or hearing impairment, call 711, or 800-833-6388 for TTY.

Appendix G: **Inspector / Laboratory Certifications**

Certificate of Completion

This is to certify that

Todd P. Carter

has satisfactorily completed
4 hours of refresher training as an

Asbestos Building Inspector

to comply with the training requirements of
TSCA Title II / 40 CFR 763 (AHERA)

137000
Certificate Number

Instructor

EPA Provider Cert. Number: 1085

ARGUS PACIFIC
TRAINING • CONSULTING

May 23, 2012
Date(s) of Training

Exam Score: NA

Expiration Date: May 23, 2013

Argus Pacific, Inc. • 1900 W. Nickerson, Suite 315 • Seattle, Washington • 98119 • 206.285.3373 • fax 206.285.3927

STATE OF WASHINGTON

Department of Commerce

Lead-Based Paint Program

Todd P Carter

Has fulfilled the certification requirements of Washington Administrative code (WAC) 365-230 and has been certified to conduct lead-based paint activities pursuant to WAC 365-230-200 as a:

Risk Assessor

Certification #	Issuance Date	Expiration Date
0340	4/12/2012	4/10/2015

NITON LLC

Certificate of Achievement

Todd Carter

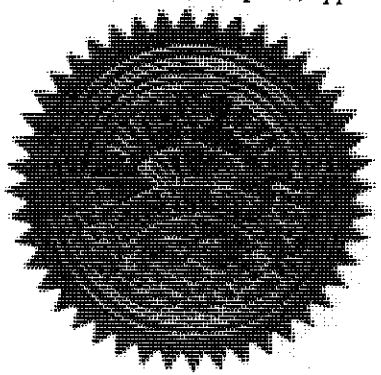
Pacific Rim Environmental Inc

has successfully completed the Manufacturer's Training Course for the **NITON Spectrum Analyzer** *and is now certified in radiation safety and monitoring, measurement technology, and machine maintenance of the* **NITON XRF Spectrum Analyzer.**

(CIH's – The ABIH Awards 1 CM point, approval # 05-396)

A5030239600
Certificate Number

04/06/05 Seattle, WA
Date & Site of Course



Victoria Grzybinski
Training Coordinator

Kenneth P. Wyatt
Director of Training

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101631-0

Pacific Rim Environmental, Inc.

Tukwila, WA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

BULK ASBESTOS FIBER ANALYSIS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2013-04-01 through 2014-03-31

Effective dates

DEPARTMENT OF COMMERCE ★ UNITED STATES OF AMERICA ★

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Pacific Rim Environmental, Inc.
6510 Southcenter Boulevard
Suite #4
Tukwila, WA 98188
Mr. William F. Golloway
Phone: 206-244-8965 Fax: 206-244-9096
E-Mail: fgolloway@pacrimenv.com

BULK ASBESTOS FIBER ANALYSIS (PLM) **NVLAP LAB CODE 101631-0**

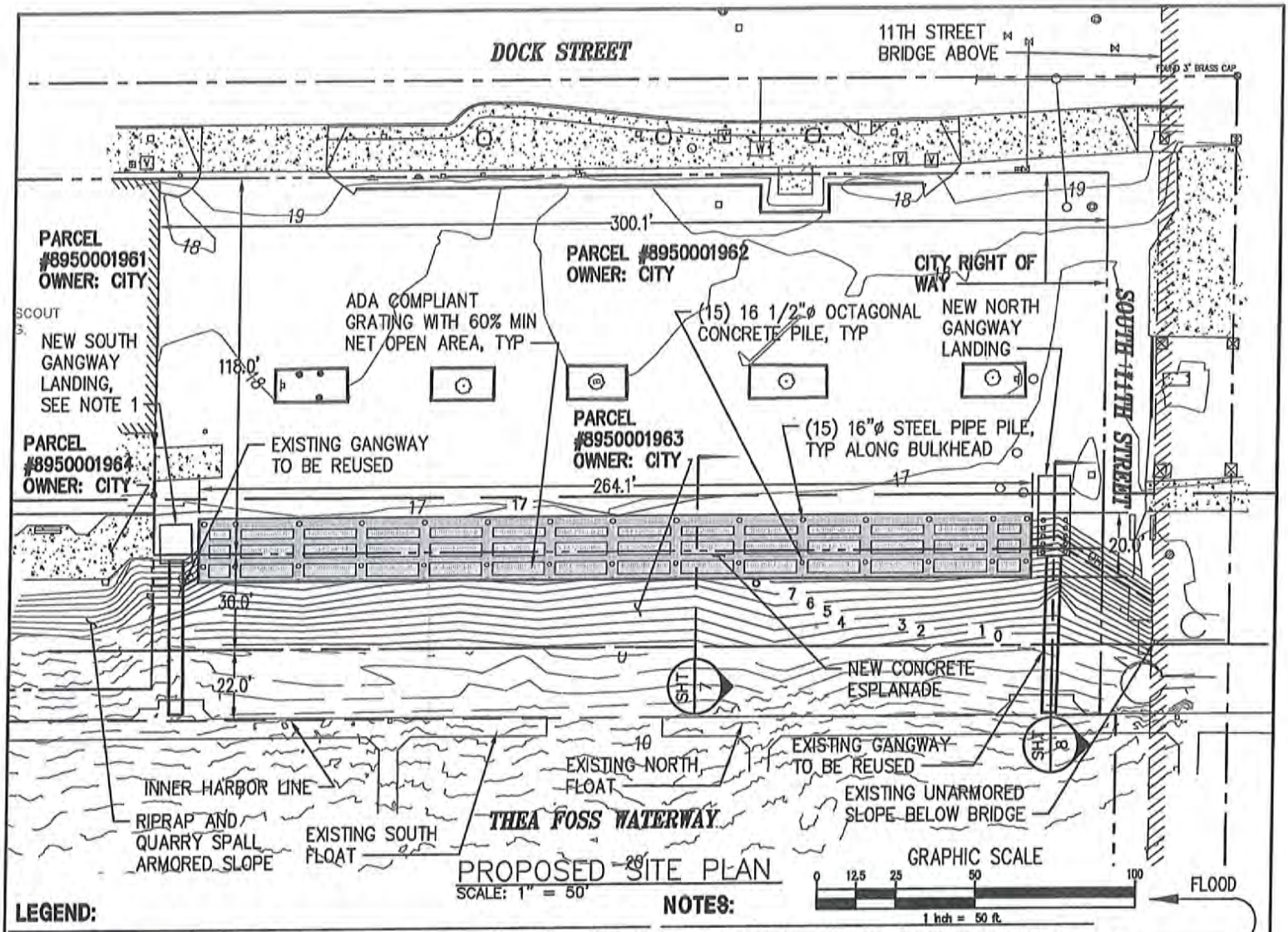
NVLAP Code	*Designation / Description*
18/A01	EPA 600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

2013-04-01 through 2014-03-31

Effective dates

For the National Institute of Standards and Technology

APPENDIX F
Replacement Esplanade Plans for Development Site 9



PROPOSED SITE PLAN

SCALE: 1" = 50'

GRAPHIC SCALE

0 12.5 25 50 100

1 inch = 50 ft.

FLOOD

EBB

PROJECT NORTH

LEGEND:

- PROPOSED CONCRETE ESPLANADE
- PROPOSED MARINA FLOAT
- MHHW (EL = +11.85)
- OHWM (EL = +13.20)
- PROPOSED GRADING CONTOUR

NOTES:

1. THE NEW SOUTH GANGWAY LANDING IS POSITIONED ABOVE THE TOP OF THE SLOPE AND THEREFORE NOT CONSIDERED IN OVER WATER COVERAGE CALCULATIONS.

PROPOSED QUANTITIES

	ABOVE MHHW		BELOW MHHW		ABOVE OHWM		BELOW OHWM	
	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)	PROPOSED QUANTITIES	PROPOSED OVER WATER AREA (SF)
CONCRETE PILES	1		14		0		15	
STEEL PILES	15		0		15		0	
STEEL PIN PILES	6		4		4		6	
NORTH LANDING		220		30		193		57
GROSS CONCRETE ESPLANADE AREA		3,253		2,028		2,377		2,904
GRATED AREA		1,351		923		742		1,532
TOTAL (SEE NOTE 1)	22	2,662*	18	1,504*	19	2,125*	21	2,042*

*TOTAL AREA = (GROSS AREA) – 0.6(GRATED AREA) + NORTH LANDING AREA

Tacoma

US ARMY CORPS OF ENGINEERS PERMIT

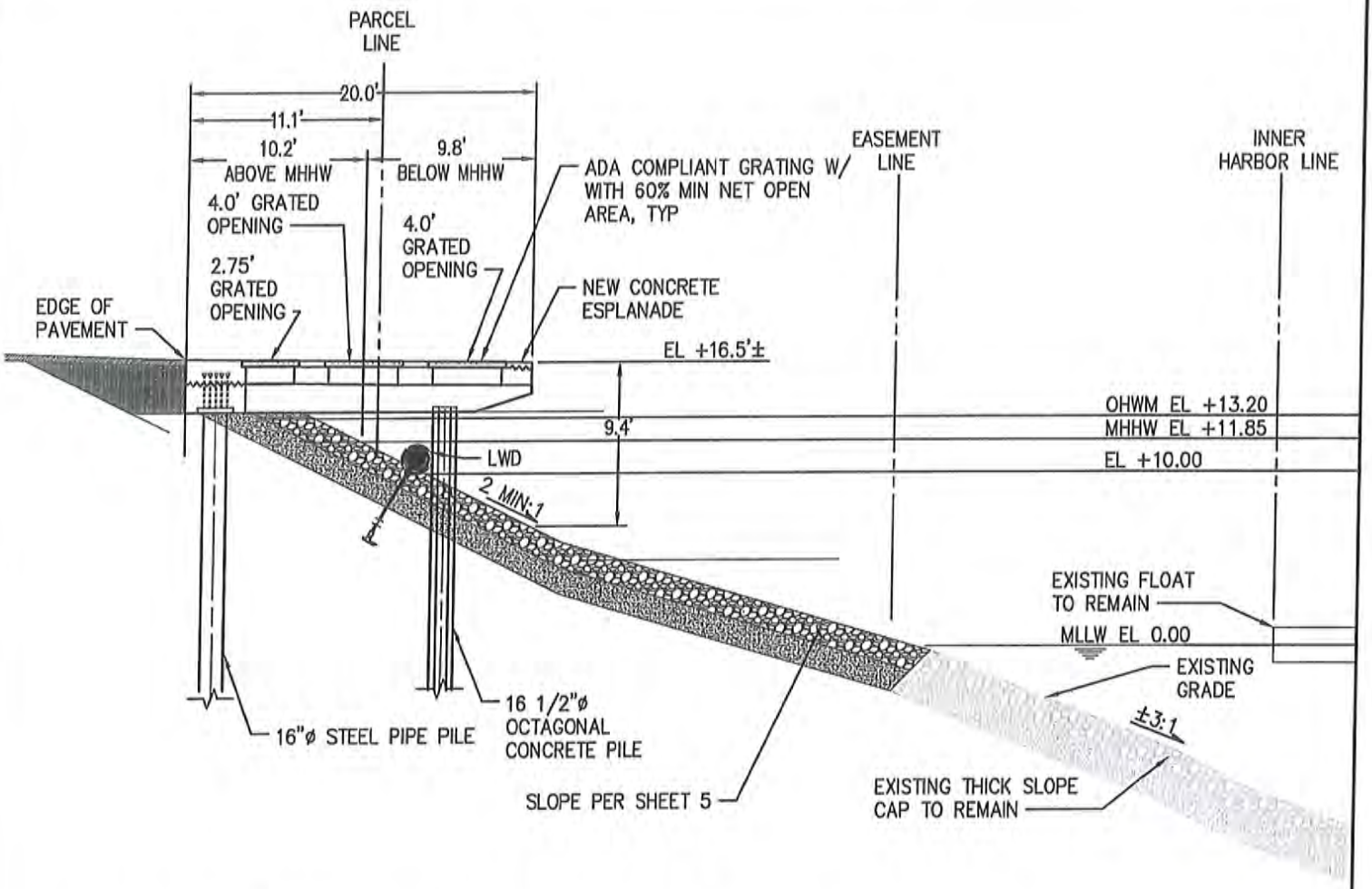
PROPOSED SITE PLAN

REFERENCE:
APPLICANT: CITY OF TACOMA (CITY)

PROPOSED PROJECT:
BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION

LOCATION (PARCEL#):
8950001962 & 8950001963

SHEET 6 OF 8 DATE: 10/29/13



GRAPHIC SCALE

0 5 10 20 40

1 Inch = 10 ft.

PROPOSED SECTION

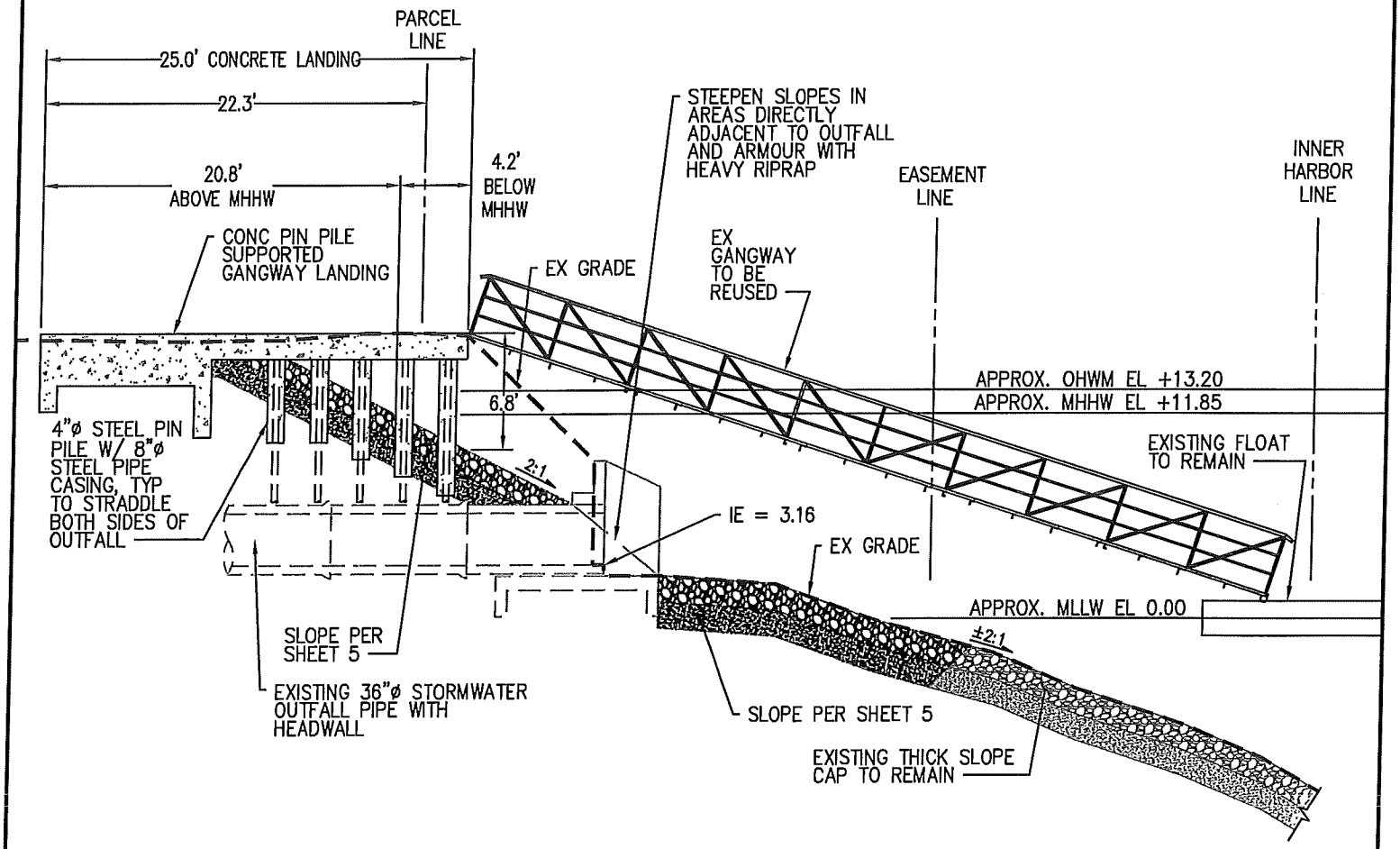
SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

LIGHT RIPRAP FILL MATERIAL

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED SITE SECTION	**REFERENCE:** **APPLICANT:** CITY OF TACOMA (CITY)	**PROPOSED PROJECT:** BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION **LOCATION (PARCEL#):** 8950001962 & 8950001963 **SHEET 7 OF 8 DATE:** 10/29/13



GRAPHIC SCALE

0 5 10 20 40

1 inch = 10 ft.

PROPOSED SECTION AT NORTH GANGWAY LANDING

SCALE: 1" = 10'

LEGEND:

CAP FILTER FILL MATERIAL

LIGHT RIPRAP FILL MATERIAL

US ARMY CORPS OF ENGINEERS PERMIT PROPOSED GANGWAY LANDING SECTION	REFERENCE: APPLICANT: CITY OF TACOMA (CITY)	PROPOSED PROJECT: BULKHEAD REMOVAL & ESPLANADE CONSTRUCTION LOCATION (PARCEL#): 8950001962 & 8950001963 SHEET 8 OF 8 DATE: 10/29/13

APPENDIX G
Report Limitations and Guidelines for Use

APPENDIX G
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report. Please confer with GeoEngineers if you need to know more about how these "Report Limitations and Guidelines for Use" apply to your project or property.

Read These Provisions Closely

It is important to recognize that environmental engineering and geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce the risk of misunderstandings or unrealistic expectations that lead to disappointments, claims and disputes.

Environmental Services Are Performed for Specific Purposes, Persons and Projects

GeoEngineers has prepared this Site Specific Cleanup Action Plan for Development Sites 8 and 9 in Tacoma, Washington in general accordance with the scope and limitations of our proposal, dated February 28, 2013. This report has been prepared for the exclusive use of the Foss Waterway Development Authority. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures its services to meet the specific needs of its clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. Use of this report is not recommended for any purpose or project other than as expressly stated in this report.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Foss Waterway Development Authority for Development Sites 8 and 9 in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this Project. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your Project,
- not prepared for the specific site explored, or
- completed before Project changes were made.

1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

If changes to the Project or property occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations in the context of such changes. Based on that review, we can provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the party(ies) to whom this report is addressed. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed Project scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations Change and Evolve

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, new information or technology that become available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Soil and Groundwater End Use

The cleanup levels referenced in this report are site- and situation-specific. The cleanup levels may not be applicable for other properties or for other on-site uses of the affected soil and/or groundwater. Note that hazardous substances may be present in some of the on-site soil and/or groundwater at detectable concentrations that are less than the referenced cleanup levels. GeoEngineers should be contacted prior to the export of soil or groundwater from the subject property or reuse of the affected soil or groundwater on-site to evaluate the potential for associated environmental liabilities. GeoEngineers will not assume responsibility for potential environmental liability arising out of the transfer of soil and/or groundwater from the subject property to another location, or the reuse of such soil and/or groundwater on-site in any instances that we did not recommend, know of, or control.

Most Environmental Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the subject property. Site exploration identifies

subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed previous reports and then applied its professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ significantly from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this Project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.