Interim Action Work Plan
UST Installation at Seafarers' Memorial Park
Cap Sante Boat Haven Fuel Dock
Former Scott Paper Company Mill Site
Anacortes, Washington

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Prepared for

Port of Anacortes
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1.0 INTRODUCTION

The Port of Anacortes (Port) intends to perform an interim action associated with installation of two 15,000-gallon underground storage tanks (USTs) for the new fuel dock at the Cap Sante Boat Haven in Anacortes, Washington. The new USTs will be located just west of the existing Park building at Seafarers' Memorial Park, which is within the uplands area (Uplands Area) of the northern portion of the former Scott Paper Company mill site (Property) (see Figures 1 and 2).

A Remedial Investigation/Feasibility Study (RI/FS) of the Uplands Area is being conducted under Consent Decree No. 03 2 00492 1 between the Washington State Department of Ecology (Ecology) and the Port for the Property (Consent Decree; Ecology 2003). The RI/FS is currently being implemented by the Port in accordance with the Uplands Area RI/FS Work Plan (RI/FS work plan; Landau Associates 2003) and work plan addendum (Landau Associates 2004). The draft RI report for the Uplands Area (Landau Associates 2005) has been submitted for review by Ecology. A marine area RI/FS will also be implemented in accordance with a work plan approved by Ecology.

The Port is redeveloping portions of the Cap Sante Boat Haven, located north of the former Scott Paper Company mill site. As part of the redevelopment, the existing fuel dock will be demolished and the associated USTs removed. The new fuel dock will be located adjacent to Seafarers' Way, east of the existing A dock (see Figure 3). The planned location for the two new end-to-end USTs is in the asphalt-paved area west of the Park Building, as shown on Figure 3. Because soil contamination is present at depth at the planned location of the new USTs, soil excavation and removal activities required for UST installation will be conducted as an interim action and the excavated material will be disposed at an appropriate upland solid waste landfill facility.

The interim action will be conducted under the Consent Decree after this interim action work plan, prepared in accordance with Ecology's Model Toxics Control Act regulations (MTCA; WAC 173-340-430), is approved by Ecology. Installation of the new USTs is planned for early fall of 2005.

1.1 SITE LOCATION

The site is located on Port property at Section 19, Township 35 North, Range 2 East, (Latitude 48° 30'N, Longitude 122° 36'W) at Seafarers' Memorial Park, which is located along the eastern portion of the Uplands Area and the Cap Sante Waterway in Anacortes, Washington (see Figures 1 and 2).

The Uplands Area is bordered by property owned by MJB Properties, Inc. to the south; Fidalgo Bay to the east; Cap Sante Waterway and Cap Sante Boat Haven to the north; and Q Avenue to the west. The Uplands Area is located on the northern portion of the former Scott Paper Company mill site. The Uplands Area consists of three subareas referred to as Parcels 1, 2, and 3 (see Figure 2). The uplands

portion of Seafarers' Memorial Park, owned by the Port, is located on Parcel 3. Parcel 1, currently undeveloped, is also owned by the Port. Parcel 2 has been subdivided; current owners include Anacortes Concept LLC, Northwest Educational Service District #189, Seafarer's LLP, and ASAP Investments. Parcel 2 is comprised of commercial buildings, parking, landscaped areas and areas proposed for commercial development. Parcel 3, where the interim action will be conducted, consists of Seafarers' Memorial Park and various asphalt-paved roads and parking areas.

1.2 REPORT ORGANIZATION

Section 2.0 of this report presents a summary of project area background information. Section 3.0 presents the evaluation and discussion of the interim action. Section 4.0 summarizes the use of this report. Section 5.0 presents the references for this document.

2.0 BACKGROUND INFORMATION

This section briefly summarizes project area background information, including existing site features, site history, geology and hydrogeology, and environmental site conditions.

2.1 EXISTING SITE FEATURES

The interim action UST installation project is located at Seafarers' Memorial Park, in Parcel 3 of the Uplands Area. As indicated on Figures 2 and 3, the new USTs will be located within the asphalt-paved area just west of the existing Park building, and the associated fuel supply lines will be buried at a relatively shallow depth below the paved roadways to the north and west of the Park Building from the USTs to their connection with the new fuel dock abutment along the north side of Seafarers' Way.

The location of the planned fuel dock facilities relative to the Cap Sante Boat Haven, the Park Building, and other existing site features are shown on Figure 3 and on the preliminary project drawings in Appendix A.

2.2 SITE HISTORY

Historic activities at the Property included sawmill operations and activities related to the pulp mill, which was located on the southern portion of the former Scott Paper Company mill site (Site). Historical activities at the Property and on the southern portion of the Site, including ownership and plant operations, have been described in detail in other documents (ThermoRetec 1999; Ecology & Environment 2000) and are summarized in Section 2.1 of the *Comprehensive Evaluation of Existing Data, Former Scott Paper Mill Site, Anacortes, Washington* (*Comprehensive Evaluation Report;* Anchor 2002). Historical records indicate that features at the Property included two storage sheds, a chip shed, chip bins, fuel bins, a dry kiln, a refuse burner, a boiler room, a smokestack, aboveground petroleum tanks, and numerous docks and piers.

The mill was closed in 1978 and the mill properties subsequently sold. Over time, some development has occurred that included demolition of the buildings, placement of fill material, and removal of pulp and woody debris.

2.3 GEOLOGY AND HYDROLOGY

The subsurface geology and hydrogeology in Parcel 3 of the Uplands Area has been documented in the draft Uplands Area RI report (Landau Associates 2005), which should be referenced for a more complete understanding of subsurface soil and groundwater conditions in the project vicinity. Figures 5

through 10 are reproduced from that draft RI report. Figure 5 indicates the locations of soil explorations in Parcel 3; Figure 6 shows the location of subsurface cross sections in the area, and Figures 7 through 10 present the cross sections. Note that Cross Section C-C' on Figure 9 is a north-south section through the planned UST location, and has been annotated to indicate the approximate location of the planned excavation for the fuel vault that will contain the two USTs and the planned trench excavation for the fuel supply piping. Cross section A-A' on Figure 7 is an east-west section along Seafarers' Way and has been annotated to indicate the approximate location of the planned trench excavation for the fuel supply piping that connects to the new fuel dock off of Seafarers' Way. Selected boring logs and monitoring well construction details are included in Appendix B.

In general, the subsurface materials consist of multiple layers of fill overlying native marine sediment and glacial deposits. The fill layers include a surficial layer of granular fill (silty, gravelly sand), underlain in some areas by a black, sandy silt to silty sand fill layer with varying amounts of wood debris; overlying a relatively thick layer of wood debris (described as sawdust, wood chips, and lumber). The thickness of the wood debris across Parcel 3 ranges from about 4 to 18 ft, as indicated in Table 1. As shown on the cross sections on Figures 7 through 10, the wood debris layer extends below mean lower low water (MLLW) in the project area, and a native gray silt layer is present under the fill material.

Based on data collected during Property investigations, groundwater at the Property generally occurs within the fill material above the native silt deposits (ENSR 1993; ThermoRetec 1999; Anchor 2002; Landau Associates 2005) and is expected to be encountered at a depth of about 7 to 10 ft below ground surface (BGS) in the project vicinity. Groundwater in the vicinity of the Uplands Area generally flows north toward Cap Sante Waterway and northeast toward Fidalgo Bay (ThermoRetec 1999; Ecology & Environment 2000; Anchor 2002; Landau Associates 2005).

2.4 ENVIRONMENTAL SITE CONDITIONS

Available soil and groundwater quality data associated with Uplands Area investigations are summarized in the Uplands Area RI/FS work plan (Landau Associates 2003) and draft Uplands Area RI report (Landau Associates 2005). The work plan includes relevant data obtained during previous investigations and remedial actions at the former Scott Paper Company mill site that were compiled and evaluated in the Comprehensive Evaluation Report (Anchor 2002). The draft Uplands Area RI report documents environmental conditions in Parcel 3 soil and the Uplands Area groundwater, and should be referenced for a more complete understanding of the chemical characterization of subsurface soil and groundwater in the project vicinity.

2.4.1 SOIL

Based on the Uplands Area investigations, contaminants that may be present in Parcel 3 soil at concentrations above preliminary cleanup levels include metals (lead), carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and diesel-range and/or motor oil-range petroleum hydrocarbons. Dioxins/furans have been detected above preliminary cleanup levels at some locations in the Park, but not at locations or depths planned to be excavated for this project. Analytical results for detected constituents are presented in Table 2 (taken from Table 9 of the draft Uplands Area RI report). Note that the results for samples from the explorations in the paved areas where the USTs and associated piping are planned to be installed (borings LSB-5, B-13, and LSB-6) indicate that the upper 6 ft of soil in this area does not contain chemical constituents above the preliminary cleanup level protective of direct human contact.

2.4.2 GROUNDWATER

Based on the Uplands Area groundwater investigations, 4-methylphenol may be present in groundwater in the project vicinity at concentrations above the preliminary cleanup level based on protection of marine surface water. Arsenic, bis(2-ethylhexyl)phthalate, and ammonia have been detected in groundwater at concentrations exceeding preliminary screening levels protective of marine surface water, but not at locations near the project. Analytical results for detected constituents in groundwater are presented in Table 3 (taken from Table 4 of the draft Uplands Area RI report. Analytical results for the product sample collected from well MW-110 during the April 2004 sampling event, and the groundwater surface sample collected from well MW-110 during the August 2004 sampling event (identified as MW-110B), are presented in Table 4 (taken from Table 10 of the draft Uplands Area RI report).

3.0 INTERIM ACTION

This section presents a summary of the evaluation, selection, and details of the interim action fuel dock UST project at the Cap Sante Boat Haven at the Port of Anacortes.

The Port of Anacortes is redeveloping portions of the Cap Sante Boat Haven, located north of the former Scott Paper Company mill site. As part of the redevelopment, the existing fuel dock will be demolished and the associated USTs will be removed. The new fuel dock will be located adjacent to Seafarers' Way, east of the existing A-Dock. The planned location for the two USTs associated with the fuel dock is in the asphalt-paved area west of the Seafarers' Memorial Park building. The locations of the planned fuel dock, USTs, and associated fuel supply lines are shown on Figure 3. Because soil contamination is present at the project location, excavation required for installation of the UST fuel vault and associated fuel supply lines will be conducted as an interim action under Consent Decree No. 03 2 00492 1 and the excavated material that is potentially contaminated will be disposed at an offsite solid waste landfill facility.

Installation of the new USTs and associated fuel supply lines is planned for the fall of 2005. The new fuel dock is planned to be in operation by the end of the first quarter of 2006. Two new 15,000-gallon USTs will be installed within a concrete fuel tank vault, and associated fuel supply lines will be installed in trenches to provide fuel to the new fuel dock. Details of these facilities are shown on Figures 3 and 4, and on the project drawings in Appendix A. The fuel tank vault will be about 16 ft wide and 71 ft long, and the bottom of the tank vault excavation will be about 19 ft BGS. The fuel supply lines (approximately 350 ft of pressurized, double-containment fiberglass piping) will be installed at a relatively shallow depth, approximately 2 to 4 ft BGS, and will connect to the fuel dock abutment sump located in a small, shallow vault below the existing sidewalk along the new fuel dock.

Prior to and/or during the fuel tank vault excavation, dewatering is planned to depress the water level below the planned excavation depth. Given the typical depth to groundwater, dewatering of the shallow trenches for the fuel supply lines and the abutment sump is not anticipated. The fuel tank vault excavation will be made as an open excavation or temporary steel sheetpiles will be installed around the planned tank excavation to provide added stability for the excavation and limit the amount of dewatering necessary for the project. The tank vault will be installed near the location of borings LSB-5, B-13, and B-14 and monitoring well MW-110. Based on soil quality information from these borings, excavated material below the surficial granular fill layer is likely to contain diesel-range and/or motor oil-range petroleum hydrocarbons, cPAHs, and lead at concentrations above preliminary soil cleanup levels identified in the draft Uplands Area RI report. The trench excavations for the fuel supply lines and abutment sump are relatively shallow and are anticipated to primarily encounter clean fill material;

however, any wood waste or potentially contaminated material encountered will be handled as described in Section 3.3.1.

Groundwater extracted during excavation dewatering is likely to contain 4-methylphenol and entrained soil particles with lead, cPAHs, and diesel-range and/or motor oil-range petroleum hydrocarbons. Treatment of extracted groundwater will be conducted prior to discharge to the sanitary sewer to ensure the designated pretreatment limits are met.

3.1 PURPOSE OF THE INTERIM ACTION

The purpose of the interim action fuel dock UST project at Seafarers' Memorial Park is to remove contaminated soil at the planned fuel tank vault location that must be excavated to allow for installation of new USTs as part of development of a new fuel dock at the Cap Sante Boat Haven, and to assure that future operation of the fuel dock USTs will be environmentally sound. This interim action meets the criteria of WAC 173-340-430(1), (2), and (3) for an interim action as described below.

The interim action is technically necessary to install the new fuel dock USTs, and will reduce the threat of further exposure to or migration of contaminated materials at the fuel tank vault location, which could be a threat to human health or the environment.

The project area lies within the area currently under the Consent Decree. An RI/FS is being conducted for the Uplands Area; however, the study and final cleanup action plan are not yet completed. The interim action described in this work plan will provide for cleanup of contaminated materials at the new fuel tank vault location, and will not foreclose reasonable alternatives for cleanup of the remaining portions of the Property.

The Port will perform this interim action in accordance with the applicable provisions of the Consent Decree and the MTCA requirements for interim actions in WAC 173-340-430.

3.2 ALTERNATIVE INTERIM ACTIONS CONSIDERED

Alternatives that were considered included: 1) no action; 2) direct burial of the USTs; and 3) enclosure of the USTs in a concrete-lined fuel tank vault (the selected alternative).

The no action alternative was not selected because it is inconsistent with the Port's plans for redevelopment of the Cap Sante Boat Haven. Direct burial of the USTs, which would require excavation of less contaminated material, was not selected because of concerns related to encountering soil contamination near the USTs during any future subsurface operation and maintenance (O&M) activities needed for the USTs, and because use of a vault would facilitate detection and repair of any future leaks from the USTs.

3.3 INTERIM ACTION DESIGN AND CONSTRUCTION DETAILS

The interim action consists of removal of existing pavement sections in the designated work area; installation of a temporary excavation shoring system for the fuel tank vault (if it is determined that an open excavation is not practicable); excavation and offsite disposal of potentially contaminated soil and wood debris encountered in the fuel tank vault excavation; dewatering and treatment of extracted water prior to discharge to the sanitary sewer system; installation of the fuel tank vault, USTs, and associated fuel lines to the fuel dock abutment sump; excavation backfilling; and site restoration activities.

Certain design and construction details for the interim action fuel dock UST project are shown on the drawings in Appendix A. These drawings include details for the fuel dock to be installed near the existing A-Dock at the Cap Sante Boat Haven, which is not considered part of this interim action.

3.3.1 SOIL EXCAVATION AND DISPOSAL

Conventional earthwork equipment (such as excavators, backhoes, dozers, etc.) will be used to perform the site earthwork and soil excavation/disposal activities. Construction will occur from the upland portions of the site, and temporary erosion and sedimentation control measures will be implemented by the contractor as needed during construction.

Following removal of existing pavement, a temporary shoring system will be installed for the deep fuel tank vault excavation if it is determined that an open excavation is not practicable. This decision will be made considering factors that include maintaining the stability of adjacent structures and utilities, and the cost of treating and disposing of larger volumes of potentially contaminated water that would need to be extracted from a deep, open excavation.

The upper portion of the granular fill material that is not contaminated will be excavated and stockpiled for potential reuse if it meets the project requirements for backfill material; otherwise, it will be disposed along with the other materials removed from the excavation. Any granular fill material intermixed with wood debris, silty/sandy fill material with wood debris, wood debris, and native silt encountered in the excavation will be managed as contaminated material and disposed at an appropriate permitted upland solid waste landfill facility. It is currently estimated that about 1,000 yd^3 of excavated material will be disposed at an upland landfill.

The planned depth of the trenches for the fuel supply lines and the fuel dock abutment sump vault is shallow (i.e., 2 to 4 ft BGS); therefore, it is expected that only granular fill will be removed during excavation. However, if other material is encountered, its location will be documented, it will be considered potentially contaminated, and it will be managed as contaminated material. One or more samples of the potentially contaminated material will be collected and submitted for laboratory analysis

for the contaminants most likely to be present, cPAHs using U.S. Environmental Protection Agency (EPA) Method 8270 with selected ion monitoring (SIM), lead using EPA Method 6010, and diesel-range and motor oil-range petroleum hydrocarbons using Ecology Method NWTPH-Dx. The number of samples collected will be determined based on the extent of potentially contaminated material encountered. One sample will be collected for every 40 linear ft of material encountered. If more than one type of potentially contaminated material is encountered that is not granular fill a sample will be collected from each type at a maximum spacing of 40 linear ft along the trench.

Handling of potentially contaminated material will be conducted using conventional health and safety protocols, including provisions for spill containment, dust control, equipment decontamination, and recordkeeping. It is anticipated that excavated material will be loaded directly into trucks or containers that will be transported to the waste transfer station used by the offsite landfill, where the material will be loaded into rail containers and shipped to the landfill for disposal. If required to control free liquids, the excavated material may be temporarily stockpiled in the excavation area (or at a suitably contained stockpile area) and allowed to drain until it meets the landfill's requirements for free liquids. It is anticipated that wetter materials would be mixed with drier materials in lieu of adding absorbent materials to control free liquids.

3.3.2 EXCAVATION DEWATERING AND EXTRACTED WATER TREATMENT/DISPOSAL

As the fuel tank vault will require excavation about 10 ft below the water table, temporary dewatering will be required to depress the water table to below the base of the excavation. The type of excavation dewatering used will be a function of the excavation method used and the preferences of the contractor. If an open excavation is used, it is likely that a well point system would be used for temporary dewatering, and the volume of extracted water would be greater than from a shored excavation. Dewatering from sumps located within the excavation would likely be used if temporary sheet piling was used to shore the sides of the deep excavation.

The City of Anacortes wastewater treatment plant (WWTP) is non-delegated by Ecology for establishment of pre-treatment requirements for discharges other than domestic wastewater. Therefore, Ecology retains the authority to establish water quality limits, frequency of compliance sampling, discharge flow rate, and duration of sewer connection for discharge of water to the WWTP from excavation dewatering activities.

A written request will be submitted to Ecology for sewer discharge authorization. The request will include plans for the UST installation and plans for collecting, treating, and discharging the water generated from construction dewatering. Based on UST area analytical data, dewatering activities

conducted in 1999 for the Sun HealthCare Systems, Inc. excavations at Parcel 2, and Ecology's requirements for pretreatment at that site, the proposed water treatment system will include:

- Large weir settling tank(s) to provide initial solids settling and act as a trap for floating oil, if any. An oil/water separator may be added downstream if it is determined that the weir tank(s) are not providing adequate retention time to remove oil (e.g., to less than approximately 20 mg/L).

- A solution of approximately 35% hydrogen peroxide will be metered into the weir tank as necessary to oxidize hydrogen sulfide and meet the pretreatment requirement.

- Filtration will be performed using sand filters, bag filters, or cartridge filters (or a combination of filtration methods) to achieve total suspended solids concentration less than approximately 50 mg/L.

The Port and its representatives will discuss water treatment requirements with Ecology personnel responsible for approving discharges to the City of Anacortes WWTP to determine if any modification to the proposed water treatment system is warranted. If required by Ecology, additional treatment steps may be added prior to discharge to the sanitary sewer.

Ecology authorized a maximum discharge flow rate of 150 gallons per minute (gpm) for the Sun HealthCare Systems, Inc. site, which had a larger but shallower excavation area than the planned UST installation project. Authorization will be requested for discharge at that same rate, up to 150 gpm.

3.3.3 SITE BACKFILLING AND RESTORATION

Following installation of the fuel tank vault and the associated fuel supply lines, the excavations will be backfilled with suitable granular fill materials, including potential reuse of existing surficial granular fill removed from the excavations.

The paved and unpaved portions of Seafarers' Memorial Park that are disturbed by construction activities will be restored by regrading and paving or placement of sod in currently unpaved areas.

Significant impacts to groundwater flow by the UST vault and associated fuel supply lines are not expected. Groundwater will flow around the vault, but this should only impact groundwater flow in the near vicinity of the vault. Because the depth of the new fuel supply lines is expected to be shallower than the depth to groundwater and because the area will be paved, the fuel supply lines are not expected to create a groundwater preferential pathway. Similarly, significant impacts to groundwater quality are not expected. Because the interim action area is not large compared to the overall site area, replacement of contaminated material with clean backfill during the interim action is not likely to significantly affect any contaminant concentrations in groundwater.

3.4 CONSTRUCTION TIMING

Site earthwork and UST installation is anticipated to take about 2 to 3 months to complete. It is currently anticipated that construction will be completed by the end of 2005.

3.5 INTERIM ACTION CLEANUP LEVELS

The interim action involves removal of contaminated materials associated with the Uplands Area and confirmation sampling at the base of the excavation. However, excavation limits will be determined based on fuel tank vault construction requirements; comparison of remaining soil concentrations with interim action cleanup levels will not be performed. All excavated material other than near-surface granular fill material (from upper 6 ft) will be disposed offsite at an appropriate, permitted solid waste landfill facility.

3.6 HEALTH AND SAFETY PLAN

A health and safety plan has been prepared for the fuel dock UST project because the planned construction activities will involve potential exposure to known contaminated materials. Landau Associates' project health and safety plan is included in Appendix C. The contractor that will conduct the soil excavation/disposal operations and associated temporary dewatering activities will be required to prepare and implement its own site-specific health and safety plan for the project.

3.7 COMPLIANCE MONITORING

The fuel dock UST project involves removal, handling, and disposal of known contaminated materials associated with the Uplands Area. Accordingly, certain MTCA compliance monitoring requirements in WAC 173-340-410 are considered applicable for this interim action

MTCA compliance monitoring activities typically include:

- Protection monitoring to confirm that human health and the environment are adequately protected during construction of the interim action, as described in a health and safety plan
- Performance monitoring to confirm that the interim action has attained the cleanup standards established for the project and other performance standards (such as construction quality control monitoring necessary to demonstrate compliance with project permits)
- Confirmational monitoring to confirm the long-term effectiveness of the interim action once the cleanup standards and other performance standards have been attained.

Protection monitoring is required for this interim action because it will involve exposure to known contaminated materials in Parcel 3 of the Uplands Area. The contractor that will conduct the soil

excavation/disposal operations and associated temporary dewatering activities will be required to prepare and implement a site-specific health and safety plan for the project.

Performance monitoring is applicable because the excavation for the fuel tank vault will be conducted in a manner to remove the potentially contaminated materials down to the bottom of the subgrade layer for the vault. Removal of soil and fill material will be based on the requirements for the fuel tank vault installation; therefore, no soil sampling and analysis is planned to document that the soil remaining at the base of the excavation achieves the preliminary soil cleanup levels identified in the Uplands Area RI report. Sampling and analysis of extracted groundwater will be conducted as required to confirm that the water has been pretreated to meet the requirements for discharge to the sanitary sewer system. Construction quality control measurements will be made by the Contractor and construction quality assurance observations will be made by the Port and its representatives to document the work and confirm the contractor's conformance with the interim action construction requirements and the pertinent requirements of project permits.

Confirmational monitoring will be performed but, as mentioned in Section 3.5, comparison of remaining soil concentrations with interim action cleanup levels will not be performed. The interim action is intended to facilitate installation of the new fuel dock USTs, but is not intended to remove contamination outside of the UST vault area. The Port will complete the Uplands Area RI/FS and other requirements under the Consent Decree including any further confirmational monitoring that may be required. Confirmational monitoring during the interim action will consist of collecting confirmation samples from the base and, if possible, the sidewalls of the excavation prior to backfilling and submitting the samples for laboratory analysis. To collect data representative of the soil remaining at the base of the excavation, the base of the excavation will be divided in half and one soil sample will be collected from the center of each half. Because of the depth of the excavation (19 ft BGS), the excavator bucket will be used to scrape the upper 6 inches of soil in each half of the excavation. Using a decontaminated stainless-steel spoon, a sample of soil not in direct contact with the excavator bucket will be collected and placed in a decontaminated stainless-steel bowl, homogenized, and transferred to the appropriate sample container. Material greater than about ¼ inch will be removed from the sample prior to placing the soil in the sample container.

If full-depth sheet piles are used to support the sidewalls of the deep excavation, it will not be practicable to collect sidewall samples. However, if open excavations are used or it is possible to collect representative sidewall samples during extraction of the sheet piles, then the following sampling will be conducted. To collect samples along the sidewalls of the excavation, the excavator bucket will be used to scrape the portion of the sidewall where wood debris is present. One sample will be collected from each of the north and south sidewalls of the excavation. Two samples will be collected along the east and west

sidewalls of the excavation. Samples will be collected from the excavator bucket using a decontaminated stainless-steel spoon. The sample will be collected from a portion of material that is not in direct contact with the excavator bucket. The sample will be placed in a decontaminated stainless-steel bowl, homogenized, and transferred to the appropriate sample container. Material greater than about ¼ inch will be removed from the sample prior to placing the soil in the sample container.

The confirmation soil samples will be analyzed for cPAHs using EPA Method 8270-SIM, lead using EPA Method 6010, and diesel-range and motor oil-range petroleum hydrocarbons using Ecology Method NWTPH-Dx. Laboratory analysis will be performed by Analytical Resources, Inc., located in Seattle, Washington.

3.8 REPORTING

An interim action completion report will be prepared and submitted to Ecology following construction to document the interim action and the as-built conditions for the Cap Sante Boat Haven fuel dock UST project.

4.0 USE OF THIS REPORT

This work plan has been prepared for the exclusive use of the Port of Anacortes and its project consultants for specific application to the Cap Sante Boat Haven fuel dock UST project at Seafarers' Memorial Park. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

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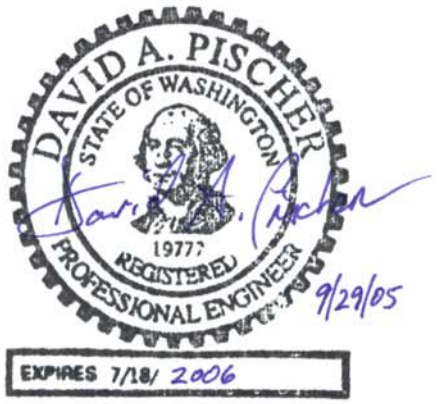

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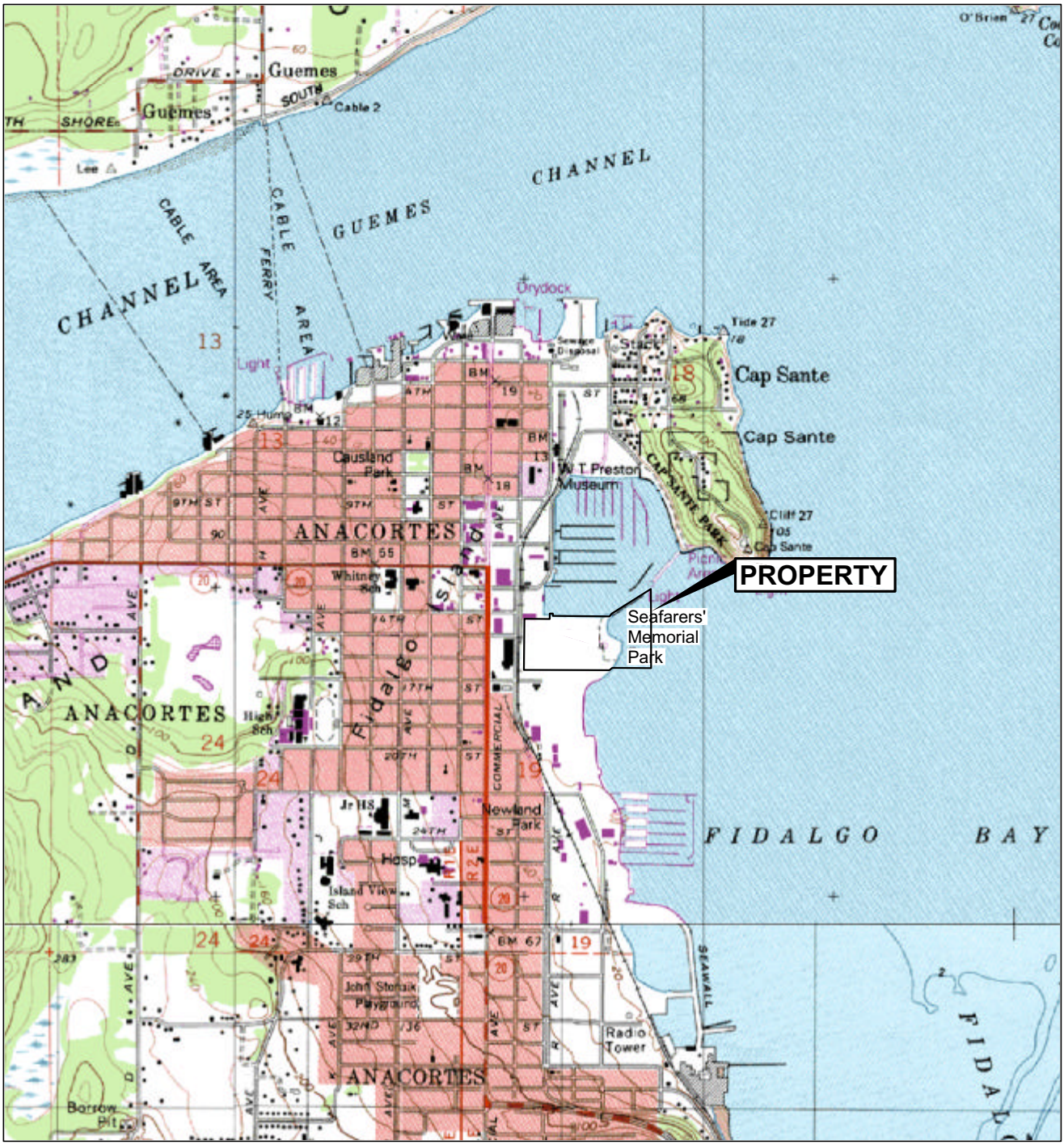

Port of Anacortes/UST Interim Action Work Plan | X:\529\009\600\UST IAWP\Fig1.dwg (A) "Figure 1" 5/10/2005

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Port of Anacortes Anacortes, Washington	**Vicinity Map**	Figure 1

Port of Anacortes
Anacortes, Washington

Upland Area Site Plan

Figure 2

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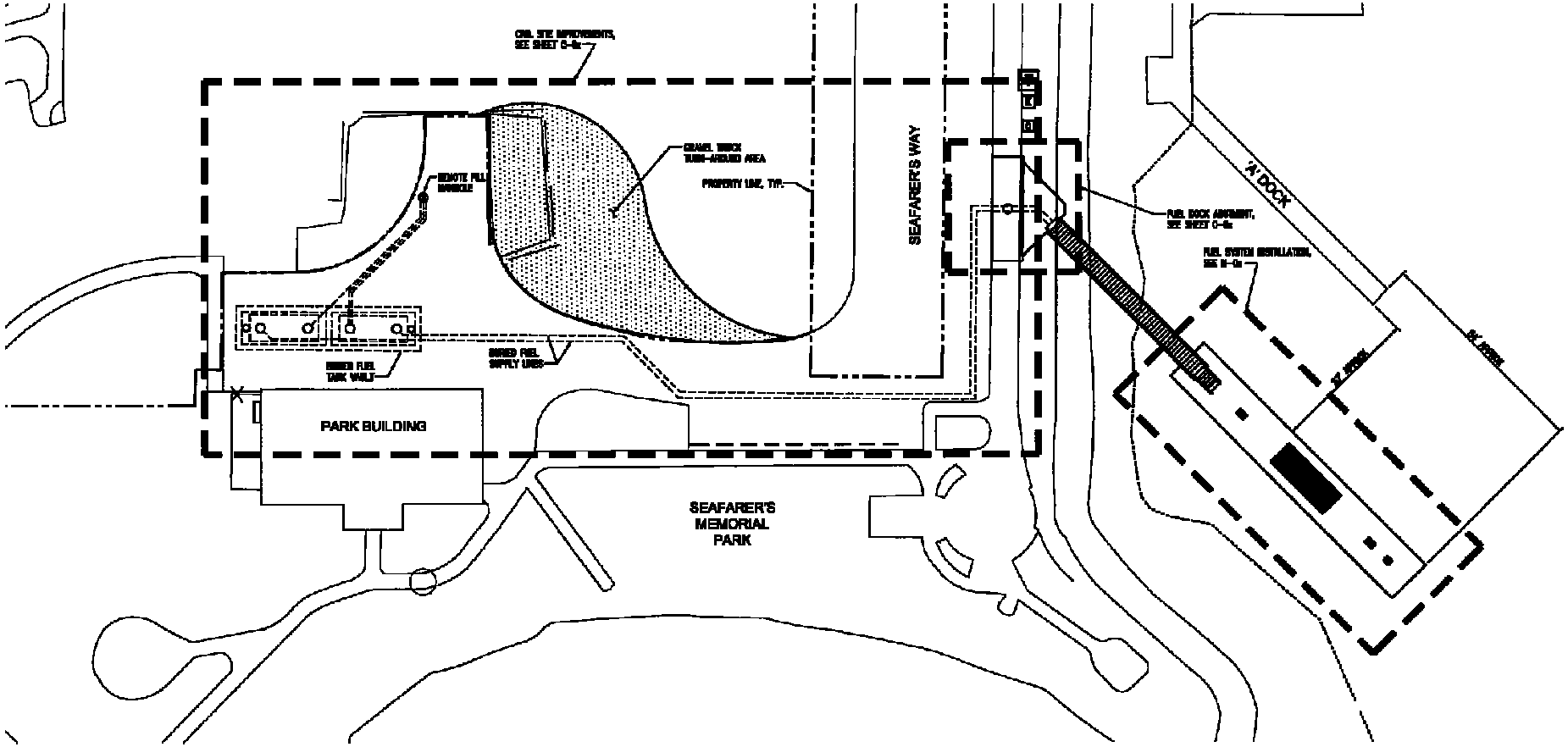
Port of Anacortes/UST Interim Action Work Plan | X:\529\009\600\UST IAWP\Fig2.dwg (A) "Figure 2" 5/10/2005



N

0 40 80

Scale in Feet

Source: KPFF and Floyd|Snider, April 2005

Port of Anacortes Anacortes, Washington	**Fuel Dock Site Plan**	Figure **3**

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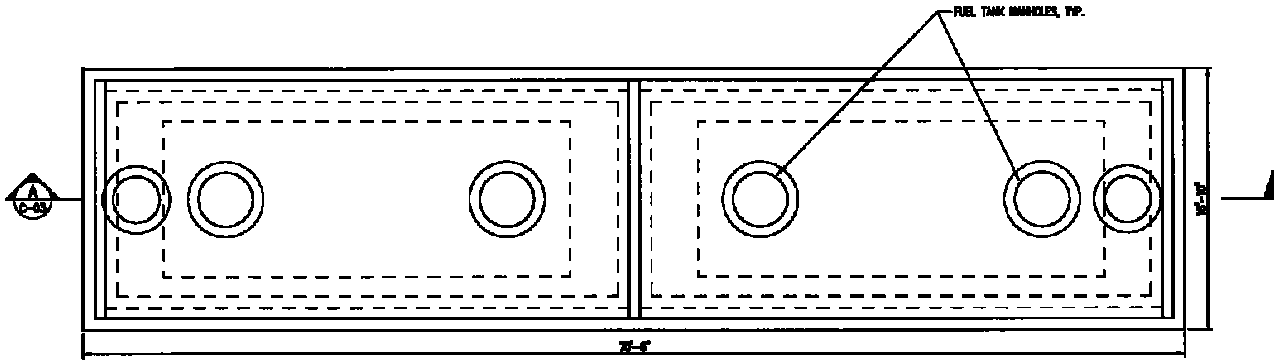
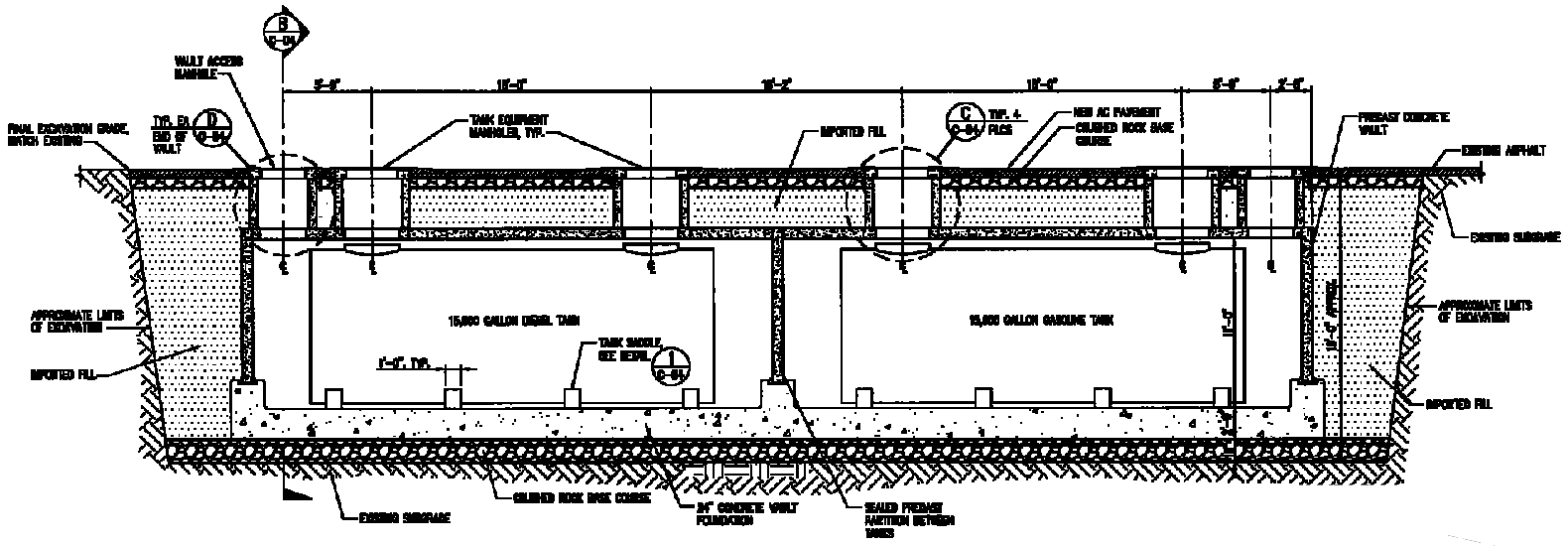
Port of Anacortes/LIST Interim Action Work Plan | X:\529\009\600\LIST IAWP\Fig3.dwg (A) 'Figure 3' 5/10/2005



FUEL VAULT PLAN
SCALE: 1/4"=1'

GRAPHIC SCALE
0 1/8 1/4 1/2 1
1 inch = 1/4 ft



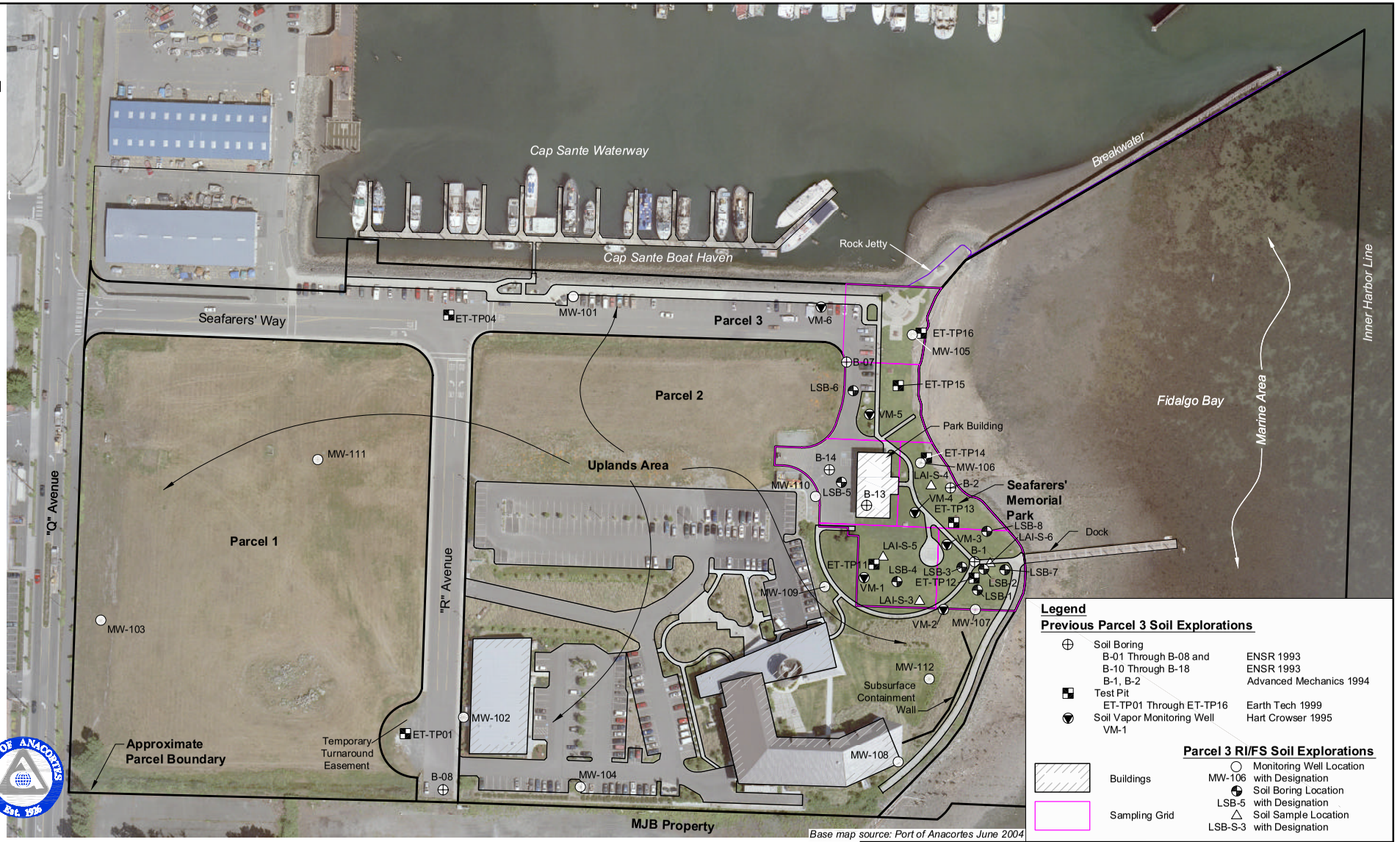
FUEL VAULT SECTION
SCALE: 1/4" = 1'
A
C-03

Source: KPFF and Floyd|Snider, April 2005

Port of Anacortes Anacortes, Washington	**Fuel Dock** **Civil Upland Site Improvements** **Vault Details**	Figure **4**

LANDAU ASSOCIATES

Port of Anacortes\UST Interim Action Work Plan | X:\529\009\600\UST IAWP\Fig4.dwg (A) "Figure 4" 5/10/2005



Port of Anacortes
Anacortes, Washington

Soil Explorations - Parcel 3 Uplands Area RI and Previous Investigations

Figure 5

LANDAU ASSOCIATES

Port of Anacortes\UST Interim Action Work Plan I:\529\009\600\UST IAWP\Fig5.dwg (A) "Figure 5" 5/10/2005

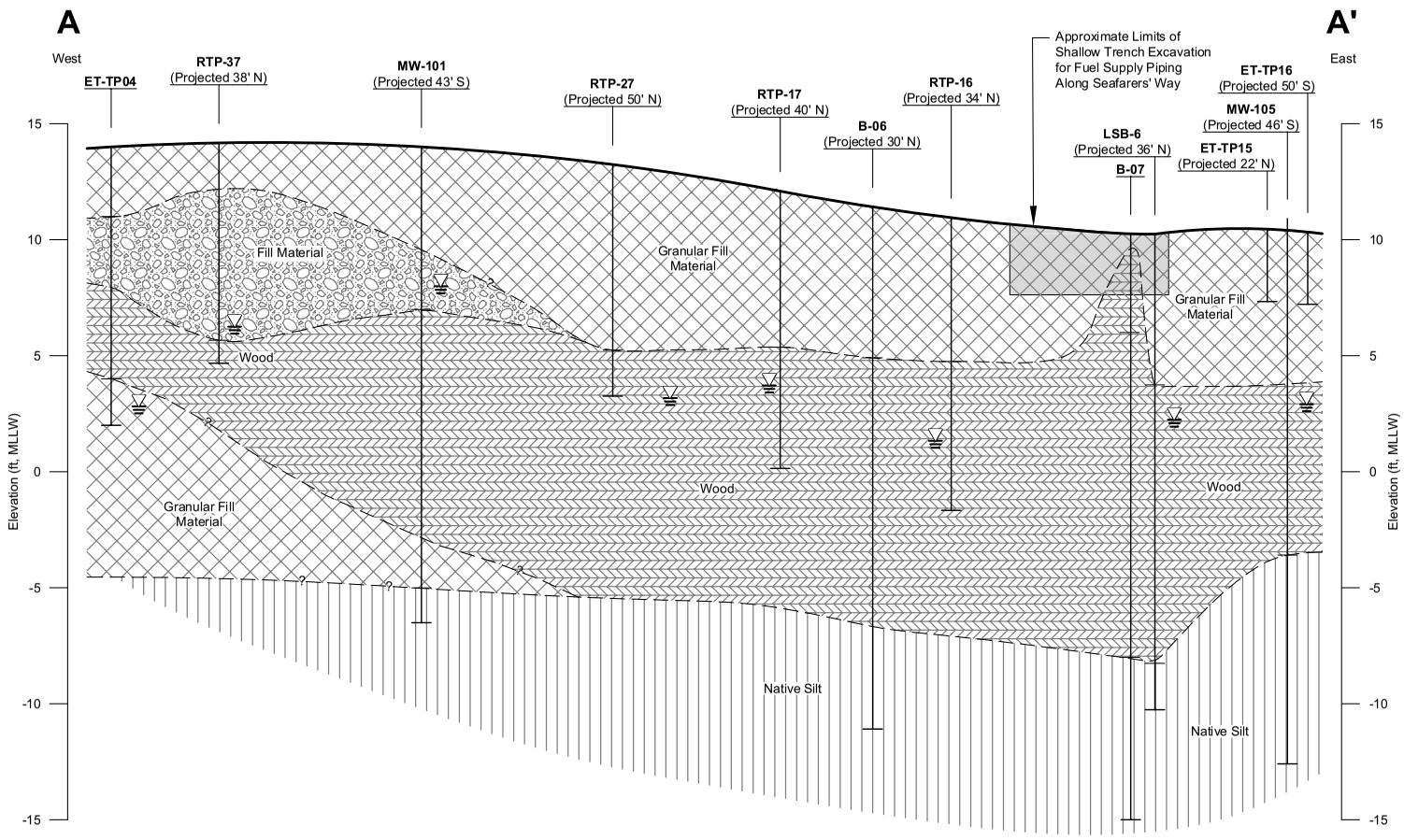
Port of Anacortes
Anacortes, Washington

Cross-Section Locations

Figure 6

LANDAU ASSOCIATES

Port of Anacortes\UST Interim Action Work Plan | X:\529\009\600\UST IAW\PFig6.dwg (A) "Figure 6" 5/10/2005



Legend

- Groundwater Level at Time of Drilling or Excavation
- Granular Fill Material (Silty, Gravelly, Sand) (SP)
- Fill Material (Sandy Silt, Silty Sand, Varying Amounts of Wood Debris) (SM/SP)
- Wood (Lumber, Wood Debris) (WD)
- Native Silt (ML)

0 60 120

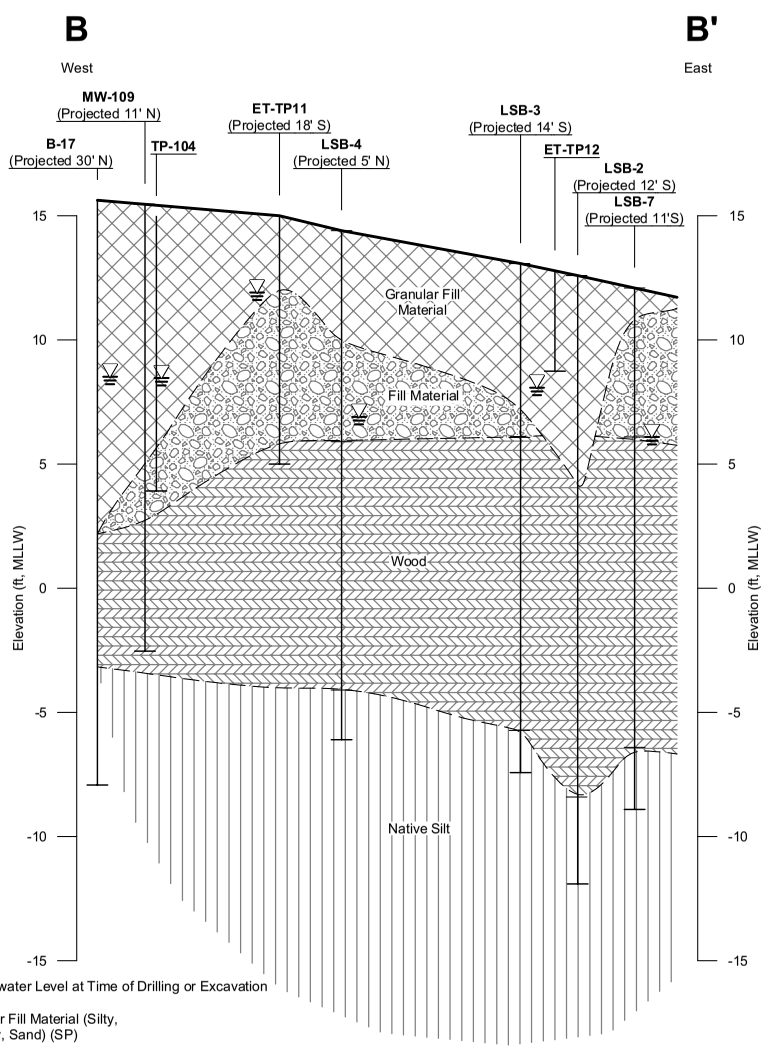
Scale in Feet
Vertical Exaggeration = 12X

Note

This cross section has been interpreted and generalized from project file data. Variations between this cross section and actual conditions may exist. The project boring logs and written reports must be referenced for a proper understanding of the nature of the subsurface conditions.

Port of Anacortes Anacortes, Washington	**Cross Section A-A'**	Figure 7

LANDAU ASSOCIATES



Legend

- Groundwater Level at Time of Drilling or Excavation
- Granular Fill Material (Silty, Gravelly, Sand) (SP)
- Fill Material (Sandy Silt, Silty Sand, Varying Amounts of Wood Debris) (SM/SP)
- Wood (Lumber, Wood Debris) (WD)
- Native Silt (ML)

0 60 120

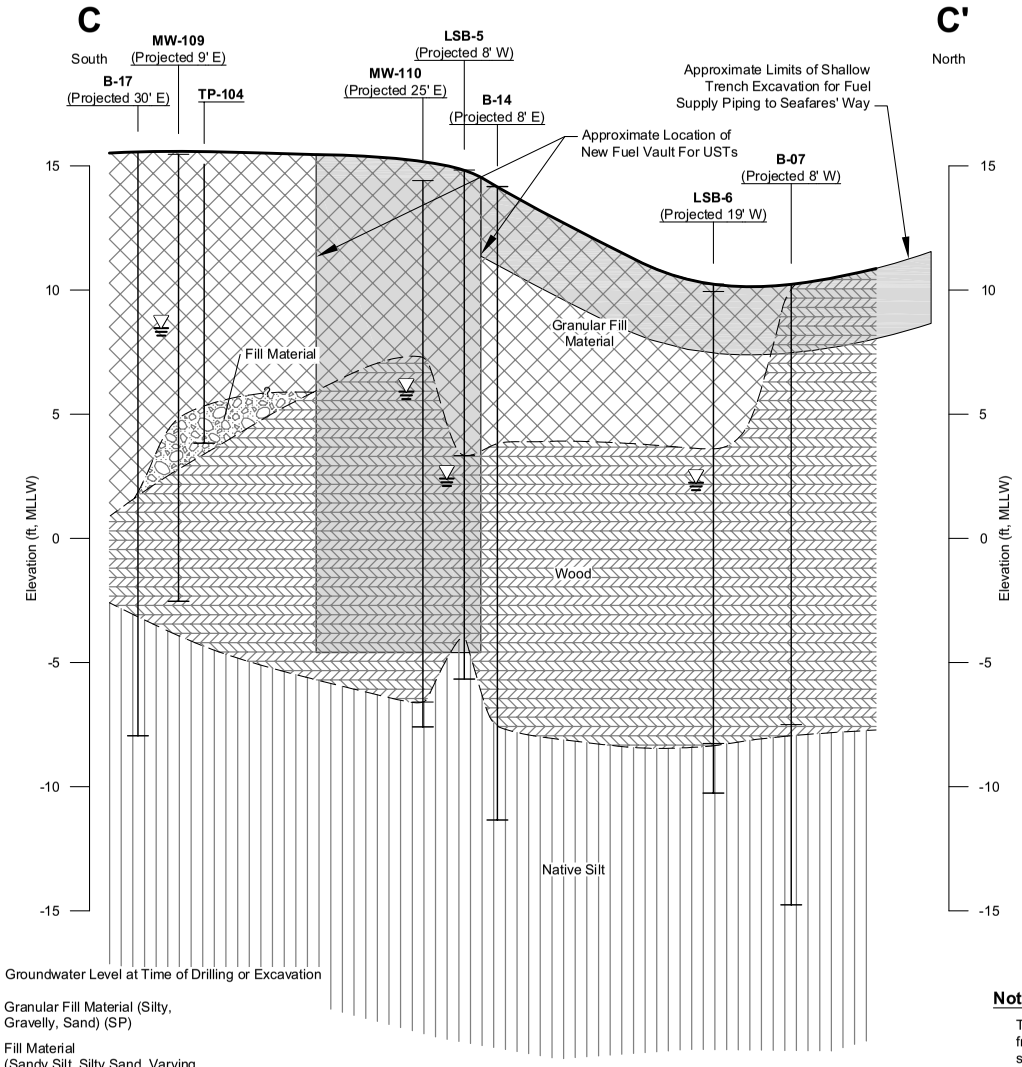
Scale in Feet
Vertical Exaggeration = 12X

Note

This cross section has been interpreted and generalized from project file data. Variations between this cross section and actual conditions may exist. The project boring logs and written reports must be referenced for a proper understanding of the nature of the subsurface conditions.

Port of Anacortes Anacortes, Washington	**Cross Section B-B'**	Figure 8

LANDAU ASSOCIATES



Legend

- Groundwater Level at Time of Drilling or Excavation
- Granular Fill Material (Silty, Gravelly, Sand) (SP)
- Fill Material (Sandy Silt, Silty Sand, Varying Amounts of Wood Debris) (SM/SP)
- Wood (Lumber, Wood Debris) (WD)
- Native Silt (ML)

0 60 120

Scale in Feet
Vertical Exaggeration = 12X

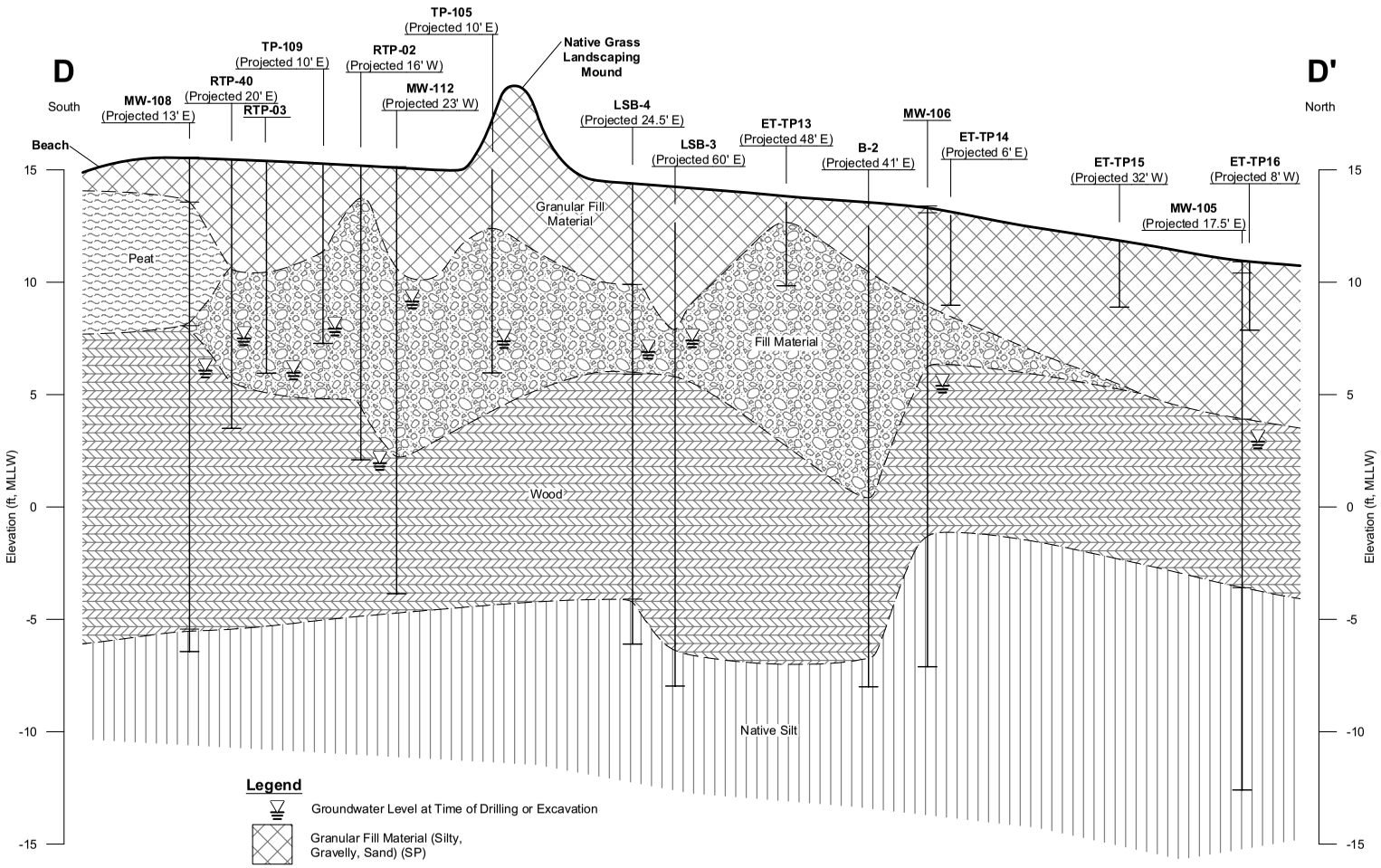
Note

This cross section has been interpreted and generalized from project file data. Variations between this cross section and actual conditions may exist. The project boring logs and written reports must be referenced for a proper understanding of the nature of the subsurface conditions.

Port of Anacortes Anacortes, Washington	**Cross Section C-C'**	Figure **9**

Port of Anacortes

LANDAU ASSOCIATES



Legend

- Groundwater Level at Time of Drilling or Excavation
- Granular Fill Material (Silty, Gravelly, Sand) (SP)
- Peat (with Silt, Sand and Gravel) Material (PT)
- Fill Material (Sandy Silt, Silty Sand, Varying Amounts of Wood Debris) (SM/SP)
- Wood (Lumber, Wood Debris) (WD)
- Native Silt (ML)

0 60 120

Scale in Feet
Vertical Exaggeration = 12X

Note

This cross section has been interpreted and generalized from project file data. Variations between this cross section and actual conditions may exist. The project boring logs and written reports must be referenced for a proper understanding of the nature of the subsurface conditions.

Port of Anacortes
Anacortes, Washington

Cross Section D-D'

Figure
10

Port of Anacortes\UST Interim Action Work Plan [X:\5291009\600\UST IAWP\Fig7_8_9_10.dwg (A) "Figure 10" 5/10/2005

LANDAU ASSOCIATES

TABLE 1
EXPLORATIONS AND FILL MATERIAL SUMMARY, PARCEL 3
NORTHERN PORTION OF THE FORMER SCOTT PAPER COMPANY MILL SITE

Location	Exploration Date		Total Depth of Exploration (ft)	Sandy and/or Silty Fill Material Thickness (ft)	Wood Debris Thickness (ft)
LSB-1	4/1/2004		20.5	7	11
LSB-2	4/1/2004		24.5	8.5	12.5
LSB-3	4/2/2004		20.5	7	12
LSB-4	4/2/2004		20.5	8.5	10
LSB-5	3/31/2004		20.5	11.5	7.5
LSB-6	3/31/2004		20.5	6.5	12
LSB-7	4/2/2004		21	6	12.5
LSB-8	4/2/2004		20.5	11.5	6
MW-101	3/29/2004		20.5	7	10.5
MW-102	3/30/2004		14	8.5	Not Encountered
MW-105	3/31/2004		23.5	7	7.5
MW-106	3/31/2004		20.5	7	7.5
B-7	3/15/1993	*	21.5	None	18
B-8	3/16/1993	*	21.5	None	Not Encountered
B-13	6/16/1993	*	24.5	None	18.5
B-14	3/15/1993	*	25	10.5	11.5
B-1	12/13/1993	*	10	2	>8
B-2	12/13/1993	*	16	1.5	14.5
ET-TP01	11/17/1998		15	12	>3
ET-TP04	11/17/1998		12	6	4
ET-TP11	11/19/1998		10	9	>1
ET-TP12	11/19/1998		4	>4	Not Encountered
ET-TP13	11/19/1998		4	>4	Not Encountered
ET-TP14	11/19/1998		4	>4	Not Encountered
ET-TP15	11/19/1998		3	>3	Not Encountered
ET-TP16	11/19/1998		3	>3	Not Encountered

> indicates base of fill or wood not encountered.

* = Boring was completed prior to placement of preload material at Property and construction of Seafarers' Memorial Park.

TABLE 2
RI/FS SOIL ANALYTICAL DETECTION SUMMARY, PROJECT AREA
NORTHERN PORTION OF FORMER SCOTT PAPER MILL SITE

PARK PAVED AREA

		2-6 ft			6-10 ft					10-15 ft					
	MTCA Method B Protective of Direct Human Contact (a)	LAI LSB-5,4-5 GM58O 03/31/04	LAI LSB-6,4-5 GM58T 03/31/04	ENSR B-13-3.5-5 ATI 06/16/93	LAI LSB-5,7-8 GM58P 03/31/04	LAI LSB-5,9-10 GM58Q 03/31/04	LAI LSB-6,6-7 GM58U 03/31/04	ENSR B-13-6.0-7.5 ATI 06/16/93	ENSR B-13-8.5-10.0 ATI 06/16/93	LAI LSB-5,10-11 GM58R 03/31/04	LAI LSB-5,14-15 GM58S 03/31/04	LAI LSB-6,14-15 GM58V 03/31/04	ENSR B-14-10-11.5 ATI 06/17/93	ENSR B-7-18 ATI 03/15/93	ENSR B-14-28.5-30 ATI 06/17/93
Total Metals (mg/kg)															
Method 6000/7000 series															
Arsenic	20 (b)	2.5	4.1	NA	4.4	8	9.6	NA	NA	6.4	11	4.4	NA	0.73	NA
Cadmium	80	1 U	0.7 U	NA	0.8 U	0.8 U	0.9 U	NA	NA	1 U	2.6	0.6 U	NA	1.6 U	NA
Copper	2960	52	54.4	NA	63.6	76.0	139	NA	NA	84	26.6	54.5	NA	35	NA
Lead	250 (c)	10 U	9	NA	18	12	69	NA	NA	40	257	37	NA	4.5	NA
Mercury	24	0.06 U	0.05 U	NA	0.07 U	0.08 U	0.07 U	NA	NA	0.1	0.2 U	0.1 U	NA	0.11 U	NA
Nickel	1,600	39	28	NA	31	43	29	NA	NA	46	12	23	NA	34	NA
Chromium	120,000 (d)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	33	NA
NWTPH-Dx (mg/kg)															
Si/Acid Cleaned NWTPHD															
Diesel-Range Petroleum Hydrocarbons	2,000 (c)	5.0 U	5.0 U	--	8.3	9.0	14	--	--	1300	1700	98	--	--	--
Motor Oil-Range Petroleum Hydrocarbons	2,000 (c)	14	10 U	--	32	13	72	--	--	1900	4200	670	--	--	--
TPH 418.1		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diesel-Range Hydrocarbons (WTPH-D)		--	--	19 U	--	--	--	54	1600	--	--	--	4900	12 U	13 U
TPH Diesel (method unknown)		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Motor Oil-Range Hydrocarbons (method unknown)		--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs (µg/kg)															
SW8270C-SIM															
Naphthalene	4460	8.5 U	23	160 U	10 U	20	57 U	NA	340	57 U	160 U	23 U	NA	0.19 U	NA
2-Methylnaphthalene	--	8.5 U	10 U	330 U	10 U	64	57 U	NA	330 U	440	160 U	23 U	NA	0.19 U	NA
Acenaphthylene	--	8.5 U	10 U	330 U	10 U	15 U	57 U	NA	330 U	57 U	160 U	23 U	NA	0.19 U	NA
Acenaphthene	4,800,000	8.5 U	10 U	330 U	10 U	15 U	57 U	NA	330 U	86	160 U	23 U	NA	0.19 U	NA
Fluorene	3,200, 000	8.5 U	10 U	33 U	10 U	17	57 U	NA	33 U	140	160 U	23 U	NA	0.19 U	NA
Phenanthrene	--	8.5 U	10 U	16 U	11	20	86	NA	460 B	480	160 U	33	NA	0.19 U	NA
Anthracene	24,000,000	8.5 U	10 U	16 U	10 U	15 U	57 U	NA	70	130	160 U	23 U	NA	0.19 U	NA
Fluoranthene	3,200,000	8.5 U	10 U	33 U	10 U	15 U	69	NA	1500	120	160 U	40	NA	0.19 U	NA
Pyrene	2,400,000	8.5 U	10 U	33 U	10 U	15 U	69	NA	1800	600	190	35	NA	0.19 U	NA
Benzo(a)anthracene	see total cPAHs	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	810	200	160 U	23 U	NA	0.19 U	NA
Chrysene	see total cPAHs	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	750	460	160 U	23 U	NA	0.19 U	NA
Benzo(b)fluoranthene	see total cPAHs	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	830	66	160 U	23 U	NA	0.19 U	NA
Benzo(k)fluoranthene	see total cPAHs	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	440	66	160 U	26	NA	0.19 U	NA
Benzo(a)pyrene	see total cPAHs	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	1000	180	160 U	35	NA	0.19 U	NA
Indeno(1,2,3-cd)pyrene	see total cPAHs	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	120	57 U	160 U	23 U	NA	0.19 U	NA
Dibenz(a,h)anthracene	see total cPAHs	8.5 U	10 U	65 U	10 U	15 U	57 U	NA	67 U	57 U	160 U	23 U	NA	0.19 U	NA
Total CPAH - TEQ (e)	140	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	1228	218	160 U	38	NA	0.19 U	NA
VOLATILES (µg/kg)															
SW8260															
Acetone	8,000,000	NA	NA	NA	66	15		NA	NA	16	100	NA	NA	NA	NA
Carbon Disulfide	8,000,000	NA	NA	NA	4.5	1.4 U		NA	NA	1.7 U	4.9 U	NA	NA	NA	NA
m,p-Xylene	16,000,000	NA	NA	NA	5.0	1.4 U		NA	NA	1.7 U	9.5	NA	NA	NA	NA
PCBs (µg/kg)															
SW8082															
Aroclor 1254	1600	43 U	51 U	NA	51 U	77 U	58 U	NA	NA	58 U	170 U	120 U	NA	NA	NA
Aroclor 1260	--	43 U	51 U	NA	51 U	77 U	58 U	NA	NA	58 U	170 U	120 U	NA	NA	NA

TABLE 2
RI/FS SOIL ANALYTICAL DETECTION SUMMARY, PROJECT AREA
NORTHERN PORTION OF FORMER SCOTT PAPER MILL SITE

PARK PAVED AREA

		2-6 ft			6-10 ft					10-15 ft					
	MTCA Method B Protective of Direct Human Contact (a)	LAI LSB-5,4-5 GM58O 03/31/04	LAI LSB-6,4-5 GM58T 03/31/04	ENSR B-13-3.5-5 ATI 06/16/93	LAI LSB-5,7-8 GM58P 03/31/04	LAI LSB-5,9-10 GM58Q 03/31/04	LAI LSB-6,6-7 GM58U 03/31/04	ENSR B-13-6.0-7.5 ATI 06/16/93	ENSR B-13-8.5-10.0 ATI 06/16/93	LAI LSB-5,10-11 GM58R 03/31/04	LAI LSB-5,14-15 GM58S 03/31/04	LAI LSB-6,14-15 GM58V 03/31/04	ENSR B-14-10-11.5 ATI 06/17/93	ENSR B-7-18 ATI 03/15/93	ENSR B-14-28.5-30 ATI 06/17/93
DIOXINS AND FURANS (ng/kg															
SW8290															
2,3,7,8-TCDF	see total	0.200 U	0.32 J	NA	0.200 U	0.27 J	14.0	NA	NA	1.00	2.2	3.4	NA	NA	NA
Total TCDF	see total	0.200 U	2.10	NA	0.200 U	3.50	250.0	NA	NA	6.00	11.0	57.0	NA	NA	NA
2,3,7,8-TCDD	see total	0.200 U	0.200 U	NA	0.250 U	0.200 U	4.8	NA	NA	0.55 U	2.30 U	1.1	NA	NA	NA
Total TCDD	see total	0.45 J	10.00	NA	0.30 J	4.20	750.0	NA	NA	0.47 J	16.0	110.0	NA	NA	NA
1,2,3,7,8-PeCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	13 U	NA	NA	0.97 U	1.70 U	1.3 J	NA	NA	NA
2,3,4,7,8-PeCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	13.0	NA	NA	0.97 U	1.20 U	2.6 J	NA	NA	NA
Total PeCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	170.0	NA	NA	2.70 J	2.9 J	26.0	NA	NA	NA
1,2,3,7,8-PeCDD	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	21.0	NA	NA	0.97 U	1.7 J	3.6 J	NA	NA	NA
Total PeCDD	see total	0.990 U	2.60 J	NA	0.990 U	1.20 J	800.0	NA	NA	4.40 J	16.0	95.0	NA	NA	NA
1,2,3,4,7,8-HxCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	3.9 J	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA
1,2,3,6,7,8-HxCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	6.0	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA
2,3,4,6,7,8-HxCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	6.8	NA	NA	1.20 J	1.2 J	1.1 J	NA	NA	NA
1,2,3,7,8,9-HxCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	1.7 J	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA
Total HxCDF	see total	0.990 U	1.000 U	NA	0.990 U	6.40	64.0	NA	NA	7.40	1.2 J	9.1	NA	NA	NA
1,2,3,4,7,8-HxCDD	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	11.0	NA	NA	0.97 U	1.20 U	1.8 J	NA	NA	NA
1,2,3,6,7,8-HxCDD	see total	0.990 U	1.000 U	NA	0.990 U	2.10 J	23.0	NA	NA	1.00 J	1.6 J	3.9 J	NA	NA	NA
1,2,3,7,8,9-HxCDD	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	15.0	NA	NA	1.20 J	1.2 J	2.2 J	NA	NA	NA
Total HxCDD	see total	0.990 U	2.00 J	NA	0.990 U	9.60	750.0	NA	NA	17.00	29.0	82.0	NA	NA	NA
1,2,3,4,6,7,8-HpCDF	see total	0.990 U	1.000 U	NA	0.990 U	4.40 J	12.0	NA	NA	7.80	5.9	3.3 J	NA	NA	NA
1,2,3,4,7,8,9-HpCDF	see total	0.990 U	1.000 U	NA	0.990 U	1.000 U	1.5 J	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA
Total HpCDF	see total	0.990 U	1.000 U	NA	0.990 U	24.00	25.0	NA	NA	14.00	11.0	7.9 J	NA	NA	NA
1,2,3,4,6,7,8-HpCDD	see total	2.30 J	1.50 J	NA	2.90 J	55.00	150.0	NA	NA	15.00	19.0	19.0	NA	NA	NA
Total HpCDD	see total	5.90 J	3.10 J	NA	6.90 J	99.00	260.0	NA	NA	33.00	40.0	35.0	NA	NA	NA
Octa-Dibenzofuran	see total	2.000 U	2.000 U	NA	2.000 U	12.00	11.0	NA	NA	8.70 J	7.0 J	5.6 J	NA	NA	NA
Octa-Dibenzodioxin	see total	27.00	8.30 J	NA	45.00	530.00	360.0	NA	NA	110.00	82.0	64.0	NA	NA	NA
Total 2,3,7,8-TCDD TEQ	6.67	0.050	0.055	NA	0.074	1.4	32	NA	NA	0.79	1.8	5.7	NA	NA	NA

NA = Not analyzed.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U = Indicates compound was undetected at the reported concentration.
[ ] = Values exceed cleanup levels.

(a) Applies to upper 15 ft of soil only.
(b) MTCA Method A value shown.
(c) MTCA Method A value shown. No MTCA Method B value available.
(d) Listed value is for Chromium (III).
(e) Toxicity equivalency methodology in WAC 173-340-708(8).

TABLE 3
RI/FS GROUNDWATER ANALYTICAL DETECTIONS SUMMARY, UPLANDS AREA
NORTHERN PORTION OF THE FORMER SCOTT PAPER COMPANY MILL SITE

	Preliminary Cleanup Level Protective of Marine Surface Water (or Other Water Quality Info) (a)	MW-101 GO20A/F 4/20/2004	MW-101 HA23A 8/30/2004	MW-101 HJ95B 11/22/2004	MW-102 GO34F/L 4/21/2004	MW-102 HA44A 8/31/2004	Dup of MW-102 MW-202 HA44H 8/31/2004	MW-102 HJ95G 11/23/2004	Dup of MW-102 MW-202 HJ95F 11/23/2004	MW-103 GO20B/G 4/20/2004	MW-103 HA23B 8/30/2004	MW-103 HJ95I 11/23/2004	MW-104 GO56A/E 4/22/2004	MW-104 HA44B 8/31/2004	MW-104 HJ95H 11/23/2004	MW-105 GO34E/K 4/21/2004	MW-105 HA23C 8/30/2004	MW-105 HJ95C 11/22/2004	MW-106 GO34D/J 4/21/2004	MW-106 HA23D 8/30/2004	MW-106 HJ95D 11/22/2004
cPAHs (µg/L)																					
SW8270C-SIM																					
Chrysene	0.031	0.010 U	0.010 U	0.020 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
cPAH TEQ	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL METALS (mg/L)																					
Antimony	1.037	0.05 U	0.0002	0.0003	0.05 U	0.0005 U	0.0005 U	0.0005	0.0005	0.05 U	0.0005 U	0.0004	0.05 U	0.0005 U	0.0005	0.2 U	0.0005 U	0.001 U	0.2 U	0.0005 U	0.0002 U
Arsenic	0.008 (b)	0.003	**0.0084**	0.0014	0.006	**0.046 J**	**0.063 J**	**0.0313 J**	**0.0549** J	0.002	0.0038	0.0023	0.001 U	0.0021	0.0017	0.01 U	0.0026	0.005 U	0.01 U	0.002	0.0017
Copper	0.02 (b)	0.002 U	0.0045	0.0026	0.002 U	0.002	0.002	0.0018	0.0015	0.002 U	0.002	0.0013	0.002 U	0.001	0.0013	0.01 U	0.006	0.014	0.01	0.008	0.0048
Lead	0.0081	0.02 U	0.002 U	0.001 U	0.02 U	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.001 U	0.001 U	0.02 U	0.001 U	0.001 U	0.1 U	0.002 U	0.005 U	0.1 U	0.002 U	0.001 U
Nickel	0.034 (c)	0.01 U	0.017	0.0053	0.02	0.0156	0.0187	0.011	0.0115	0.01 U	0.0122	0.008	0.01 U	0.0094	0.0025	0.05 U	0.017	0.015	0.05 U	0.012	0.0061
DISSOLVED METALS (mg/L)																					
Antimony	1.037	0.05 U	0.0005 U	0.0002 U	0.05 U	0.0005 U	0.0005 U	0.0005	0.0005	0.05 U	0.0005 U	0.0004	0.05 U	0.0005 U	0.0005	0.2 U	0.0005 U	0.0005 U	0.2 U	0.0005 U	0.0005 U
Arsenic	0.008 (b)	0.001	0.004	0.002	**0.015**	**0.067 J**	**0.039 J**	**0.031**	**0.0276**	0.003	0.0033	0.0025	0.002	0.002	0.0018	0.002	0.0019	0.005 U	0.002	0.0048	0.004
Copper	0.02 (b)	0.002 U	0.004	0.0019	0.002 U	0.001	0.002	0.0014	0.0015	0.002 U	0.002	0.0014	0.002 U	0.001 U	0.0005 U	0.01 U	0.007	0.008	0.01 U	0.005	0.0008
Nickel	0.034 (c)	0.01 U	0.016	0.0057	0.02	0.0191	0.0156	0.0099	0.0103	0.01 U	0.0147	0.0111	0.01 U	0.0094	0.001 U	0.05 U	0.017	0.01	0.05 U	0.012	0.014
VOLATILES (µg/L)																					
SW8260B																					
Acetone	---	5.0 U	3.8	2.30 U	6.5	13 UJ	12 U	9.0 UJ	5.50 UJ	5.0 U	13	9.30 U	5.0 U	5.6 U	2.30 U	5.0 U	7.6	3.50 U	5.0 U	7.8	3.30 U
Carbon Disulfide	---	1.0 U	0.2 U	0.20 U	1.0 U	0.4 J	0.3	0.70	0.60	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U
2-Butanone	---	5.0 U	1.5	1.0 U	5.0 U	3.2 J	1.4 J	1.0 U	1.00 U	5.0 U	1.6	1.0 U	5.0 U	1.0 U	1.0 U	5.0 U	2.1	1.0 U	5.0 U	2.0	1.0 U
Toluene	48,460	1.0 U	0.2 U	0.20 U	1.0 U	0.2 UJ	0.2 U	0.20 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U
Styrene	---	1.0 U	0.2 U	0.20 U	1.0 U	0.2 UJ	0.2 U	0.20 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U
4-Isopropyltoluene	4,400; 48,000 (d)	1.0 U	0.2 U	0.20 U	1.0 U	0.2 UJ	0.2 U	0.20 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.5	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U
SEMIVOLATILES (µg/L)																					
SW8270C																					
4-Methylphenol	30 (e)	4.3	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	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
Benzoic Acid	180,000 (f)	10 U	10 U	10.0 U	10 U	10 U	10 U	10.0 U	10.0 U	10 U	10 U	10.0 U	10 U	10 U	10.0 U	10 U	10 U	10.0 U	10 U	10 U	10.0 U
bis(2-Ethylhexyl)phthalate	5.9	1.0 U	1.0 U	**7.4**	1.0 U	1.0 U	1.0 U	1.1	1.1	1.0 U	1.0 U	1.3	1.0 U	1.0 U	2.0	**19**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(g,h,i)perylene	300 (g)	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	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
SEMIVOLATILES (µg/L)																					
SW8270RA (Resin Acids)																					
Sandaracopimaric Acid	---	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Isopimaric Acid	400 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Dehydroabietic Acid	1,100 (h)	31	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	9.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Abietic Acid	700 (h)	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 UJ	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 UJ	2.0 U
CONVENTIONALS AND																					
OTHER ORGANICS (mg/L)																					
Chloride (EPA 325.2)	--	4,730	9,540	3,770	1,920	2,680 J	1,780 J	3,010 J	1,720 J	187	688	540	85	43	24	16,400	14,900	2,000 U	16,200	9,880	2,000 U
N-Ammonia (mg-N/L)	(i)	7.25	7.34	7.98	12.2	14.4	14.8	11.5 J	15.7 J	5.32	8.09	9.21	4.14	6.55	3.58	0.605	0.206	0.214	0.481	0.560	0.522
N-Nitrate (mg-N/L, Calculated)	--	0.010 U	0.010 UJ	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 UJ	0.010 U	0.010 U	0.010 U	0.010 U	0.015	0.010 UJ	0.013	0.010 U	0.010 J	0.011
N-Nitrite (mg-N/L, EPA 353.2)	--	0.049	0.041 J	0.072	0.010 U	0.049 J	0.010 UJ	0.010	0.010 U	0.010 U	0.014 J	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 J	0.010 U	0.010 U	0.010 UJ	0.010 U
Nitrate + Nitrite (NO3+NO2) (mg-N/L, EPA 353.2)	--	0.033	0.029 J	0.045	0.010 U	0.042 J	0.010 UJ	0.011	0.010 U	0.010 U	0.010 UJ	0.010 U	0.010 U	0.010 U	0.010 U	0.015	0.010 UJ	0.013	0.010 U	0.010 J	0.011
Sulfate (EPA 375.2)	--	528	191	310	125	118	108	117 J	37.2 J	114	125	37.1	3.6	9.2	3.60	1960	730	2,180	1880	1270	187
Sulfide (EPA 376.2)	--	47.5	18.6	17.3	0.05 U	0.05 U	0.05 U	0.050 U	0.050 U	0.05 U	0.05 U	0.050 U	0.05 U	0.05 U	0.050 U	17.5	9.12	16.7	1.56	1.82	2.24
Phenol (EPA 420.1)	1,100	0.52 J	0.10	0.040 U	1.35	0.04 UJ	0.09 UJ	0.040 U	0.040 U	0.96	0.04 U	0.040 U	0.03 U	0.04 U	0.040 U	0.03 U	0.09	0.040 U	0.03 U	0.04 U	0.040 U
Tannins and Lignins (SM18 5550B)	--	8.52	21.6	10.2	11.2	12.3	12.1	15.8	14.2	6.93	6.47	6.21	2.77	4.03	2.71	0.969	1.81	0.501	1.70	2.96	0.913
DIOXINS AND FURANS (ng/L)																					
Total TCDF	--	0.038	NA	NA	0.00210 U	NA	NA	NA	NA	0.00210 U	NA	NA	0.00220 U	NA	NA	0.00210 U	NA	NA	0.00210 U	NA	NA
Total PeCDF	--	0.016 J	NA	NA	0.01100 U	NA	NA	NA	NA	0.01000 U	NA	NA	0.01100 U	NA	NA	0.01000 U	NA	NA	0.01000 U	NA	NA
Total HxCDF	--	0.014 J	NA	NA	0.01100 U	NA	NA	NA	NA	0.01000 U	NA	NA	0.01100 U	NA	NA	0.01000 U	NA	NA	0.01000 U	NA	NA
1,2,3,4,6,7,8-HpCDF	--	0.015 J	NA	NA	0.01100 U	NA	NA	NA	NA	0.01000 U	NA	NA	0.01100 U	NA	NA	0.01000 U	NA	NA	0.01000 U	NA	NA
Total HpCDF	--	0.015 J	NA	NA	0.01100 U	NA	NA	NA	NA	0.01000 U	NA	NA	0.01100 U	NA	NA	0.01000 U	NA	NA	0.01000 U	NA	NA
OCDF	--	0.02200 U	NA	NA	0.02100 U	NA	NA	NA	NA	0.02100 U	NA	NA	0.035 J	NA	NA	0.02100 U	NA	NA	0.02100 U	NA	NA
OCDD	--	0.038 J	NA	NA	0.02100 U	NA	NA	NA	NA	0.02100 U	NA	NA	0.046 J	NA	NA	0.02100 U	NA	NA	0.02100 U	NA	NA
Total 2,3,7,8-TCDD Equivalence	0.00014	0.00019 J*	NA	NA	0.00	NA	NA	NA	NA	0.00	NA	NA	0.000080 J*	NA	NA	0.00	NA	NA	0.00	NA	NA
FIELD PARAMETERS																					
pH		6.66	6.52	6.79	6.50	6.23	NM	6.89	NM	6.45	6.41	6.74	6.48	6.62	6.94	6.62	6.68	7.095	6.67	6.85	7.13
Temperature (deg C)		11.9	16.1	13.0	14.5	19.4	NM	13.47	NM	12.6	17.5	12.2	11.5	19.0	13.0	11.5	17.0	11.3	10.5	18.9	12.3
Conductivity (µS)		1773	31350	10225	622	7410	NM	6540	NM	242	4430	3710	1450	1690	1035	4563	40425	31225	4400	21050	28425
Dissolved Oxygen (mg/L)		1.13	-0.18	0.71	0.00	0.00	NM	0.43	NM	1.09	0.18	0.74	0.00	2.02	0.78	0.00	0.04	1.46	0.00	1.58	0.27
Turbidity (NTU)		3	3	2	2	2	NM	9	NM	18	20	26	2	7	23	3	0	12	23	4	7
Calculated Salinity (g/L) = Chloride in mg/L * 1.8/1,000 mg/g (j)		8.5	17.2	6.8	3.5	4.8	3.2	5.4	3.1	0.3	1.2	1.0	0.2	0.1	0.0	29.5	26.8	3.6	29.2	17.8	3.6
Total Ammonia (mg-N/L)	Preliminary Ammonia Cleanup Level Expressed as Total Ammonia for shoreline wells (k)	14-20	9.4-14	14-20												15-22	9.7-15	8.7-20	14-22	9.4-14	8.7-20

TABLE 3
RI/FS GROUNDWATER ANALYTICAL DETECTIONS SUMMARY, UPLANDS AREA
NORTHERN PORTION OF THE FORMER SCOTT PAPER COMPANY MILL SITE

	Preliminary Cleanup Level Protective of Marine Surface Water (or Other Water Quality Info) (a)	MW-107 GO34C/I 4/21/2004	MW-107 HA23E 8/30/2004	MW-107 HJ95E 11/22/2004	MW-108 GO56C/G 4/22/2004	MW-108 HA44C 8/31/2004	MW-108 HJ95J 11/23/2004	MW-109 GO34B/H 4/21/2004	Dup of MW-109 MW-119 GO34A/G 4/21/2004	MW-109 HA44D 8/31/2004	MW-109 HJ95L 11/23/2004	MW-110 HA44E 8/31/2004	MW-110 HJ95M 11/23/2004	MW-111 GO20C/H 4/20/2004	MW-111 HA44F 8/30/2004	MW-111 HJ95A 11/22/2004	MW-112 GO56B/F 4/22/2004	MW-112 HA44G 8/31/2004	MW-112 HJ95K 11/23/2004
cPAHs (µg/L)																			
SW8270C-SIM																			
Chrysene	0.031	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.022	0.028	0.010 U	0.010 UJ	0.010 U	0.010 U	0.010 U	0.010 U
cPAH TEQ	---	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00022	0.00028	ND	ND	ND	ND	ND	ND
TOTAL METALS (mg/L)																			
Antimony	1.037	0.05 U	0.0005 U	0.0005	0.05 U	0.0005 U	0.0002	0.05 U	0.05 U	0.0005 U	0.0002	0.0005 U	0.0002 U	0.05 U	0.0005 U	0.0002 U	0.05 U	0.0005 U	0.0003
Arsenic	0.008 (b)	0.005	0.0024	0.0011	0.001 U	0.001 U	0.0005 U	0.001	0.001	0.0018	0.0016	0.007	0.0044	0.003	0.007	0.0068	0.002	0.0076	0.0069
Copper	0.02 (b)	0.002	0.003	0.0016	0.002 U	0.004	0.0033	0.002 U	0.002 U	0.001	0.0024	0.005	0.0012	0.002 U	0.002	0.0022	0.003	0.008	0.0031
Lead	0.0081	0.02 U	0.001 U	0.001 U	0.02 U	0.001	0.001	0.02 U	0.02 U	0.001 U	0.001 U	0.002	0.001 U	0.02 U	0.001 U	0.001 U	0.02 U	0.001 U	0.001 U
Nickel	0.034 (c)	0.01 U	0.0078	0.0048	0.01 U	0.0029	0.0028	0.01 U	0.01 U	0.0147	0.0066	0.0156	0.0044	0.01 U	0.0064	0.0032	0.01 U	0.0058	0.0022
DISSOLVED METALS (mg/L)																			
Antimony	1.037	0.05 U	0.0005 U	0.0004	0.05 U	0.0005 U	0.0002 U	0.05 U	0.05 U	0.0005 U	0.0002 U	0.0005 U	0.0002 U	0.05 U	0.0005 U	0.0002 U	0.05 U	0.0005 U	0.0002
Arsenic	0.008 (b)	0.002	0.0022	0.0013	0.001 U	0.001 U	0.0005 U	0.001	0.001 U	0.001 U	0.0012	0.004	0.0038	0.005	0.0079	**0.0087**	0.001	0.0075	0.0065
Copper	0.02 (b)	0.002 U	0.002	0.0016	0.002 U	0.001 U	0.0007	0.002 U	0.002 U	0.001 U	0.001	0.002 U	0.0009	0.002 U	0.002	0.0016	0.002 U	0.002	0.0006
Nickel	0.034 (c)	0.01 U	0.0083	0.007	0.01 U	0.0028	0.001	0.01 U	0.01 U	0.0142	0.002	0.0126	0.0046	0.01 U	0.0062	0.0031	0.01 U	0.0066	0.0032
VOLATILES (µg/L)																			
SW8260B																			
Acetone	---	5.0 U	7.6 J	3.50 U	7.4 U	1.0 U	3.10 U	5.0 U	5.0 U	53 J	8.0 U	53	3.60 U	5.0 U	10 U	2.80 U	10 U	7.1 U	3.20 U
Carbon Disulfide	---	1.0 U	0.3 J	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	1.0 U	0.2 UJ	0.20 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2	0.20 U
2-Butanone	---	5.0 U	1.9 J	1.0 U	5.0 U	1.0 U	1.00 U	5.0 U	5.0 U	1.0 UJ	1.0 U	1.0 U	2.70	5.0 U	1.3	1.0 U	5.0 U	1.0 U	1.0 U
Toluene	48,460	1.0 U	0.2 UJ	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	1.0 U	0.2 UJ	0.20 U	0.2 U	1.60	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U
Styrene	---	1.0 U	0.2 J	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	1.0 U	0.2 UJ	0.20 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U	1.0 U	0.2 U	0.20 U
4-Isopropyltoluene	4,400; 48,000 (d)	7.6	1.2 J	0.20 U	1.0 U	0.2 U	0.20 U	21	20	16 J	3.30	15	0.20 U	1.0 U	0.2 U	0.20 U	8.4	0.2 U	0.20 U
SEMIVOLATILES (µg/L)																			
SW8270C																			
4-Methylphenol	30 (e)	15	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.2	1.0 U	**43**	7.5	1.0 U	1.0 U	1.0 U	4.3	1.0 U	1.0 U
Benzoic Acid	180,000 (f)	10 U	10 U	10.0 U	10 U	10 U	10.0 U	10 U	10 U	10 U	10.0 U	10 U	10.0 U	10 U	10 U	10.0 U	79	10 U	10.0 U
bis(2-Ethylhexyl)phthalate	5.9	5.0	1.0 U	1.0 U	1.0 U	1.0 U	**64.0**	1.0 U	1.0 U	1.0 U	2.2	1.0 U	3.9	1.0 U	1.0 U	1.0 U	3.6	1.0 U	2.4
Benzo(g,h,i)perylene	300 (g)	1.0	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	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SEMIVOLATILES (µg/L)																			
SW8270RA (Resin Acids)																			
Sandaracopimaric Acid	---	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.5	2.0 U	2.0 U
Isopimaric Acid	400 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	5.4	3.5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.4	2.0 U	2.0 U
Dehydroabietic Acid	1,100 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	33 J	20 J	18	2.0 U	9.5	2.0 U	2.0 U	2.0 U	2.0 U	56	2.0 U	2.0 U
Abietic Acid	700 (h)	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 UJ	2.0 U	6.7	5.9	2.0 UJ	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 UJ	2.0 U	5.2	2.0 UJ	2.0 U
CONVENTIONALS AND																			
OTHER ORGANICS (mg/L)																			
Chloride (EPA 325.2)	--	4,250	698	848	157	361	262	501	512	739	324	1,680	1,790	986	1,130	1,100	889	293	176
N-Ammonia (mg-N/L)	(i)	0.837	0.72	2.06	1.42	2.35	1.81	8.27	8.31	7.03	7.10	26.4	15.2	3.19	3.89	3.70	4.26	3.01	2.67
N-Nitrate (mg-N/L, Calculated)	--	0.010 U	0.035 J	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.508	0.010 U	0.010 U
N-Nitrite (mg-N/L, EPA 353.2)	--	0.026	0.013 J	0.010 U	0.021	0.022	0.010	0.010 U	0.010 U	0.010 U	0.010 U	0.021	0.018	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Nitrate + Nitrite (NO3+NO2) (mg-N/L, EPA 353.2)	--	0.011	0.048 J	0.010 U	0.013	0.017	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.016	0.014	0.010 U	0.010 U	0.010 U	0.508	0.010 U	0.010 U
Sulfate (EPA 375.2)	--	494	86.4	58.9	8.8	38.5	33.4	8.0	8.4	21.7	9.50	49	19.0	318	249	225	10.9	16.8	4.60
Sulfide (EPA 376.2)	--	14.6	0.05 U	0.50	2.86	4.48	3.37	0.50 U	0.50 U	0.07	0.050	3.81	4.91	0.50 U	0.05 U	0.050 U	2.82	0.05 U	0.050 U
Phenol (EPA 420.1)	1,100	0.03 U	0.04 U	0.040 U	0.03 U	0.04 U	0.040 U	0.03 U	0.03 U	0.04 U	0.040 U	0.09	0.040 U	0.45	0.04 U	0.040 U	0.74	0.04 U	0.040 U
Tannins and Lignins (SM18 5550B)	--	5.66	1.88	2.09	5.22	7.40	5.43	5.66	5.52	6.58	6.40	17.2	12.3	4.91	5.86	5.39	15.3	2.67	3.13
DIOXINS AND FURANS (ng/L)																			
Total TCDF	--	0.00210 U	NA	NA	0.00220 U	NA	NA	0.00220 U	NA	NA	NA	NA	NA	0.00220 U	NA	NA	0.00230 U	NA	NA
Total PeCDF	--	0.01100 U	NA	NA	0.01100 U	NA	NA	0.01100 U	NA	NA	NA	NA	NA	0.01100 U	NA	NA	0.01200 U	NA	NA
Total HxCDF	--	0.01100 U	NA	NA	0.01100 U	NA	NA	0.01100 U	NA	NA	NA	NA	NA	0.01100 U	NA	NA	0.01200 U	NA	NA
1,2,3,4,6,7,8-HpCDF	--	0.01100 U	NA	NA	0.01100 U	NA	NA	0.01100 U	NA	NA	NA	NA	NA	0.01100 U	NA	NA	0.01200 U	NA	NA
Total HpCDF	--	0.01100 U	NA	NA	0.01100 U	NA	NA	0.01100 U	NA	NA	NA	NA	NA	0.01100 U	NA	NA	0.01200 U	NA	NA
OCDF	--	0.02100 U	NA	NA	0.02200 U	NA	NA	0.02200 U	NA	NA	NA	NA	NA	0.02200 U	NA	NA	0.02300 U	NA	NA
OCDD	--	0.02100 U	NA	NA	0.047 J	NA	NA	0.02200 U	NA	NA	NA	NA	NA	0.02200 U	NA	NA	0.041 J	NA	NA
Total 2,3,7,8-TCDD Equivalence	0.00014	0.00	NA	NA	0.000047 J*	NA	NA	0.00	NA	NA	NA	NA	NA	0.00	NA	NA	0.000041 J*	NA	NA
FIELD PARAMETERS																			
pH		6.22	6.89	7.148	6.40	6.17	6.64	6.63	6.63	6.40	6.86	6.42	6.82	6.57	6.77	6.73	6.74	6.78	7.02
Temperature (deg C)		13.6	17.8	13.6	11.8	15.2	12.8	12.2	12.2	16.2	13.5	15.9	13.2	11.9	18.7	12.85	13.8	15.7	13.5
Conductivity (µS)		1226	4365	4900	737	1810	1342	372	372	4410	3420	6310	7600	422	5540	4917.5	4140	2220	1560
Dissolved Oxygen (mg/L)		0.19	0.99	0.35	0.00	0.24	0.90	0.00	0.00	1.01	0.52	0.00	0.79	0.00	1.27	1.20	0.00	1.04	1.05
Turbidity (NTU)		6	0	9	6	0	46	5	5	89	4	15	12	13	42	11	12	0	7
Calculated Salinity (g/L) = Chloride in mg/L * 1.8/1,000 mg/g (j)		7.7	1.3	1.5	0.3	0.6	0.5	0.9	0.9	1.3	0.6	3.0	3.2	1.8	2.0	2.0	1.6	0.5	0.3
Total Ammonia (mg-N/L)	Preliminary Ammonia Cleanup Level Expressed as Total Ammonia for shoreline wells (k)	14-20	9.4-14	14-20	14-20	14	14-20												

TABLE 3
RI/FS GROUNDWATER ANALYTICAL DETECTIONS SUMMARY, UPLANDS AREA
NORTHERN PORTION OF THE FORMER SCOTT PAPER COMPANY MILL SITE

NA = Not analyzed.
NM = Not measured.
U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.

(a) Based on ambient water quality criteria for protection of aquatic life (WAC 173-201A-040) and for protection of human health (Chapter 173-201A-WAC and 40 C.F.R. Part 131) unless otherwise indicated.
(b) Value adjusted upward to natural background based on "Draft Report, Sections 1-7 Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State" (PTI 1989).
(c) Value adjusted upward to PQL.
(d) LC50 Opossum shrimp, SW = 4,400; LC50 sheepshead minow, SW = 48,000; from U.S. EPA EcoTox Database.
(e) Water quality objective, 6-month median, from "A Compilation of Water Quality Goals" (California Environmental Protection Agency, August 2000).
(f) Fresh water ecological LC50 from U.S. EPA Superfund Chemical Data Matrix.
(g) NOAA SQUIRT Screening Quick Reference Tables.
(h) LC50 for rainbow trout from "Biological Degradation of Resin Acids in Wood Chips by Wood-Inhabiting Fungi" (Applied and Environmental Microbiology, Jan. 1995, p. 22-225).
(i) Water quality criteria for unionized ammonia is 0.035 mg N/L. Expressed as total ammonia, this criteria would be 8.7 - 22 mg N/L, using the temperature, pH, and chloride concentrations measured in the shoreline wells. See below for ammonia cleanup level expressed as total ammonia for each monitoring event in each shoreline well.
(j) Chloride is assumed to be approximately 55 percent of total salinity.
(k) Ammonia preliminary cleanup level expressed as total ammonia derived from Text Table 3, US Environmental Protection Agency *Ambient Water Quality Criteria for Ammonia (Saltwater),* 1989, EPA 440/5-88-004, April 1989.

Note: Bolded values exceed preliminary cleanup levels.

TABLE 4
PRODUCT SAMPLE
ANALYTICAL RESULTS, UPLANDS AREA
NORTHERN PORTION OF THE FORMER SCOTT PAPER COMPANY MILL SITE

Analysis	MW-110B GO20D 4/20/2004	MW-110B HA23F 8/30/2004
NWTPH-HCID (mg/kg)		
Diesel-Range Hydrocarbons	200000 J	
Motor Oil-Range Hydrocarbons	390000 J	
Gasoline-Range Hydrocarbons	2400 U	
PCBs (µg/L)		
SW8082		
Aroclor 1016		0.015 U
Aroclor 1242		0.015 U
Aroclor 1248		0.015 U
Aroclor 1254		0.015 U
Aroclor 1260		0.015 U
Aroclor 1221		0.015 U
Aroclor 1232		0.015 U
Total PCBs		ND

U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

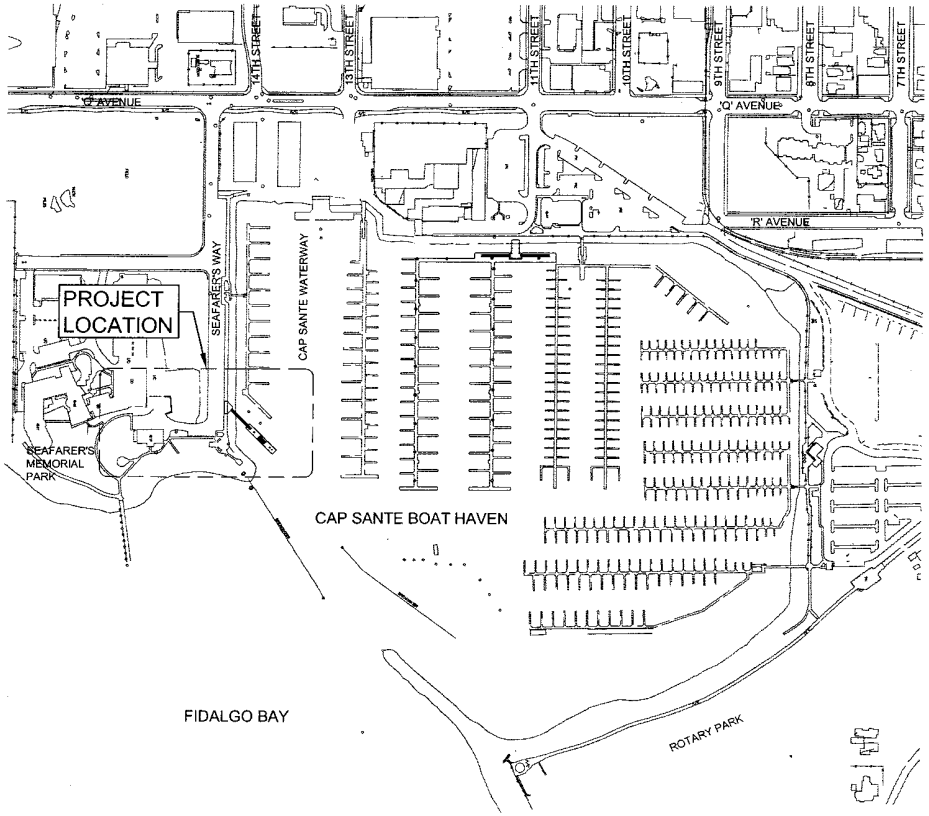
APPENDIX A

Fuel Dock Facility Drawings

PORT OF ANACORTES

CAP SANTE BOAT HAVEN
WEST BASIN REDEVELOPMENT PROJECT

PROJECT #044-00e



SITE MAP N

No.	SHEET TITLE
	GENERAL
G-01	PROJECT TITLE & SHEET LIST
G-02	SITE PLAN
	CIVIL
C-01	CIVIL UPLAND SITE IMPROVEMENTS - GENERAL SITEWORK AND DEMOLITION PLAN
C-02	CIVIL UPLAND SITE IMPROVEMENTS - PAVING AND GRADING PLAN
C-03	CIVIL UPLAND SITE IMPROVEMENTS - VAULT DETAILS
C-04	CIVIL UPLAND SITE IMPROVEMENTS - VAULT DETAILS
C-05	CIVIL UPLAND SITE IMPROVEMENTS - UPLAND CIVIL DETAILS
	MECHANICAL
M-01	FUEL DOCK PLAN AND ELEVATION
M-02	PIPING AND INSTRUMENTATION DIAGRAM (PENDING)
M-03	TANK AND EQUIPMENT DETAILS
M-04	MISCELLANEOUS DETAILS
	ELECTRICAL
	(PENDING)

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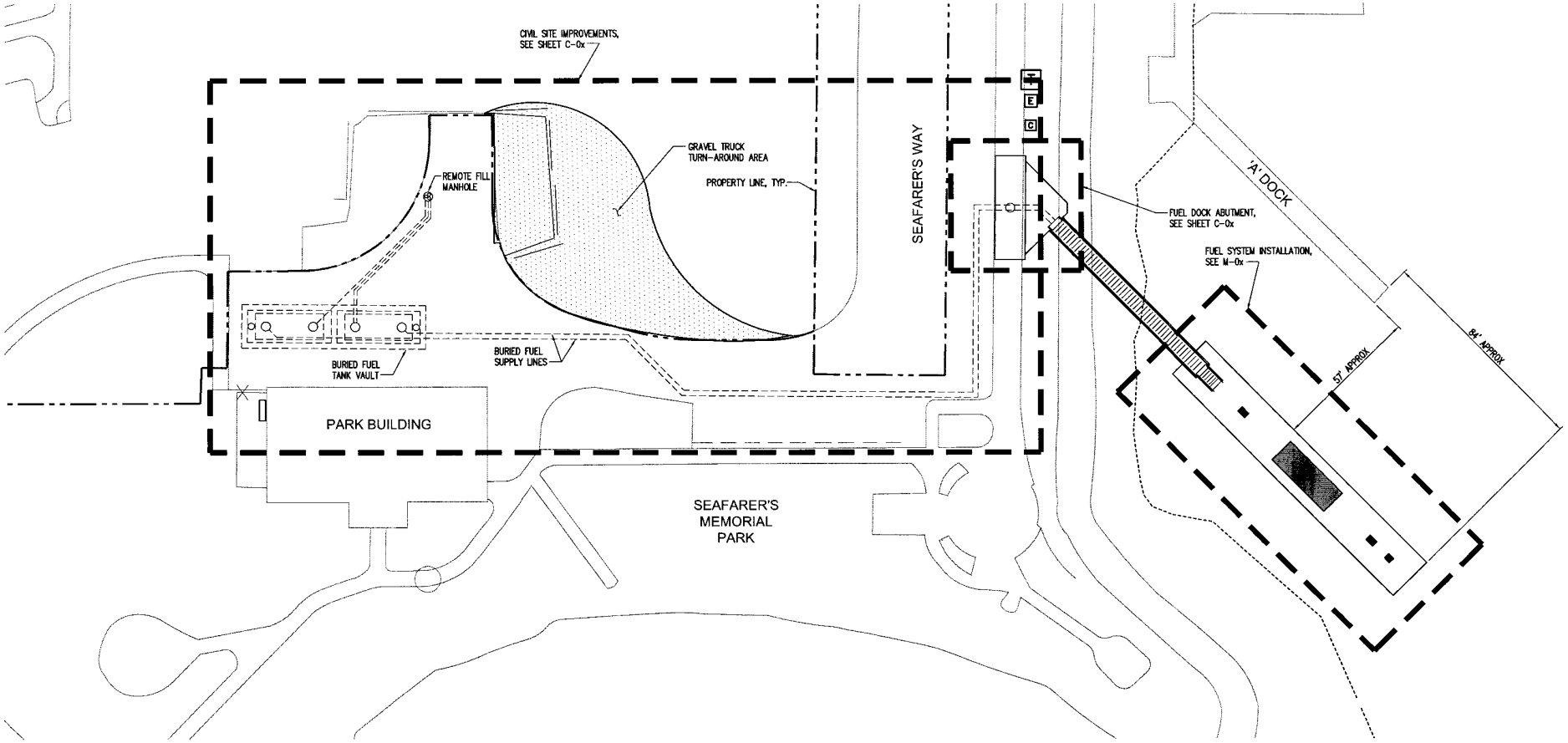
WEST BASIN REDEVELOPMENT PROJECT
PROJECT 044-00e

FUEL DOCK
PROJECT TITLE & SHEET LIST

DRAWN:	J.S.C.	PROJECT NO.:	104153
DESIGN:	M.D.K.	SCALE:	N/A
CHECKED:	S.D.S.	DATE:	04/14/05
SHEET NO.			G-01

70% PROGRESS DRAWINGS



PLAN
SCALE: 1"=20'

GRAPHIC SCALE
0 10 20 40 80
1 inch = 20 ft.

NOTES:

1. XX

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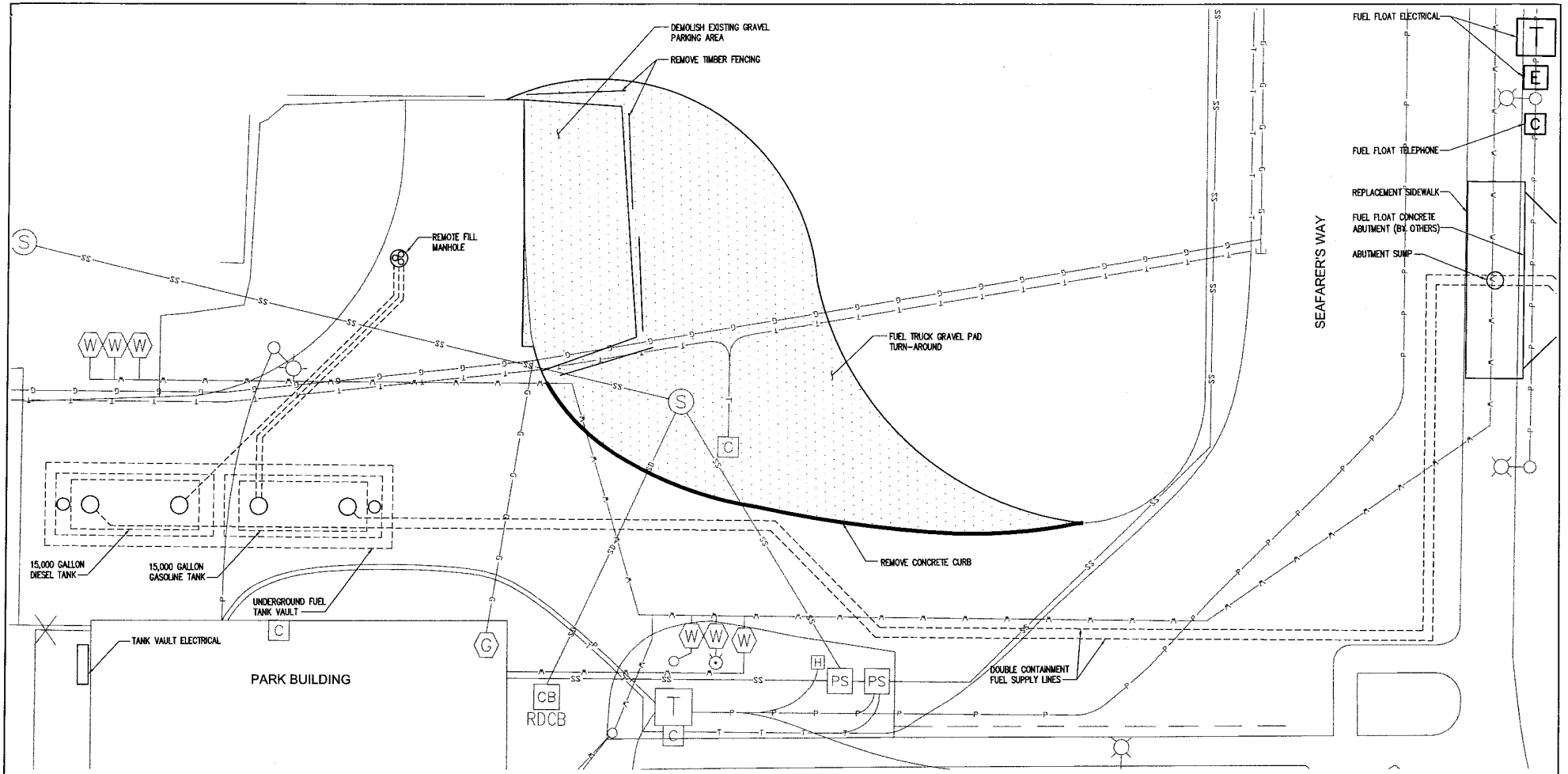
PROJECT 044-00e

FUEL DOCK
SITE PLAN

DRAWN: J.S.C.	PROJECT NO.:104153
DESIGN: M.D.K.	SCALE: AS SHOWN
CHECKED: S.D.S.	DATE: 04/14/05
SHEET NO.	G-02



PLAN
SCALE: 1"=10'

GRAPHIC SCALE
0 5 10 20 40
1 inch = 10 ft.

NOTES:

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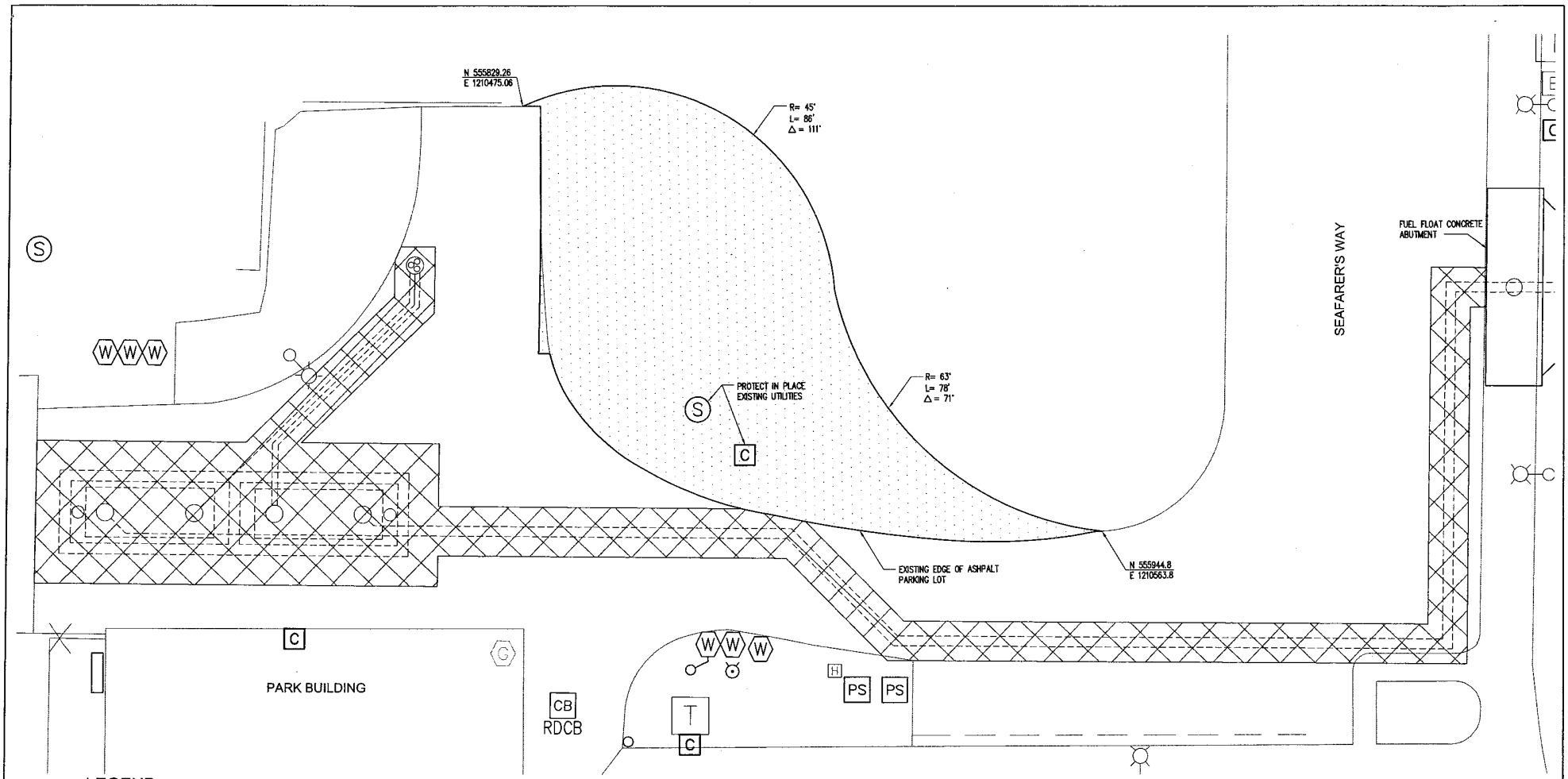
PROJECT 044-00e

FUEL DOCK
CIVIL UPLANDS SITE IMPROVEMENTS
GENERAL SITEWORK AND DEMOLITION PLAN

DRAWN:	J.S.C.	PROJECT NO.:	104153
DESIGN:	M.D.K.	SCALE:	AS SHOWN
CHECKED:	S.D.S.	DATE:	04/14/05
SHEET NO.			C-01



NOTES:

PRELIMINARY

1. FULL DEPTH PAVEMENT REPLACEMENT AT FUEL SUPPLY LINE TRENCH SHALL BE CONSTRUCTED PER DETAIL 1/C-05
2. CONSTRUCT FUEL TANK GRAVEL PAD PER DETAIL 3/C-05
3. CONSTRACTOR TO MATCH EXISTING ELEVATIONS AT THE EDGES OF THE FUEL VAULT EXCAVATION, UTILITY TRENCH AND GRAVEL PAD.

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PROJECT 044-00e

FUEL DOCK
CIVIL UPLANDS SITE IMPROVEMENTS
PAVING & GRADING PLAN

DRAWN:	J.S.C.	PROJECT NO.:	104153
DESIGN:	M.D.K.	SCALE:	AS SHOWN
CHECKED:	S.D.S.	DATE:	04/14/05

SHEET NO.
C-02

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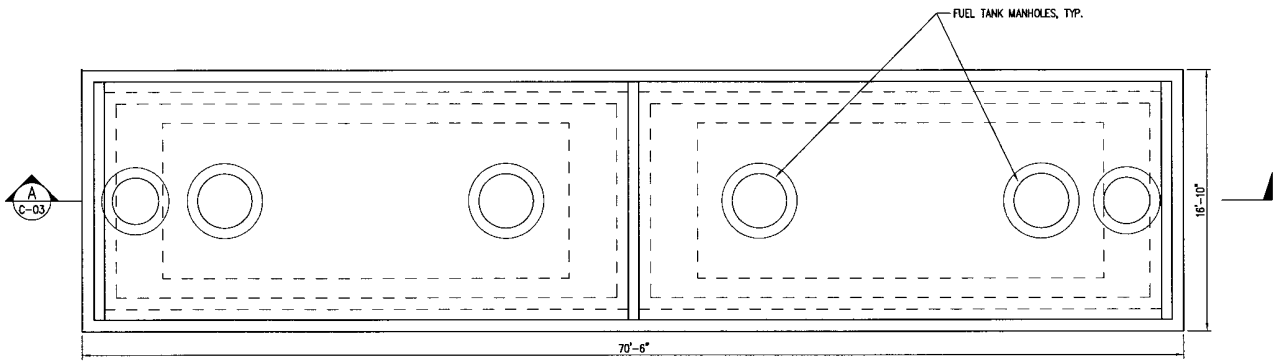
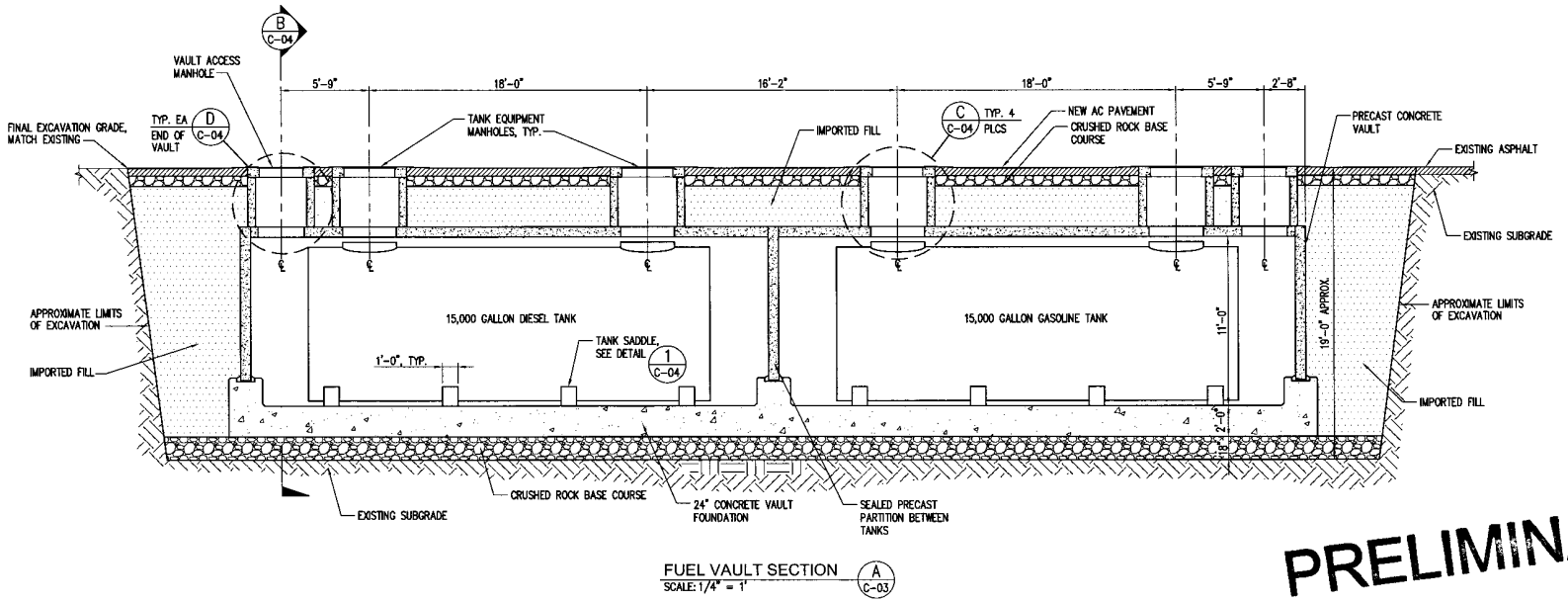


FUEL VAULT PLAN
SCALE: 1/4"=1'

GRAPHIC SCALE
0 1/8 1/4 1/2 1
1 inch = 1/4 ft.



FUEL VAULT SECTION
SCALE: 1/4" = 1'
A
C-03

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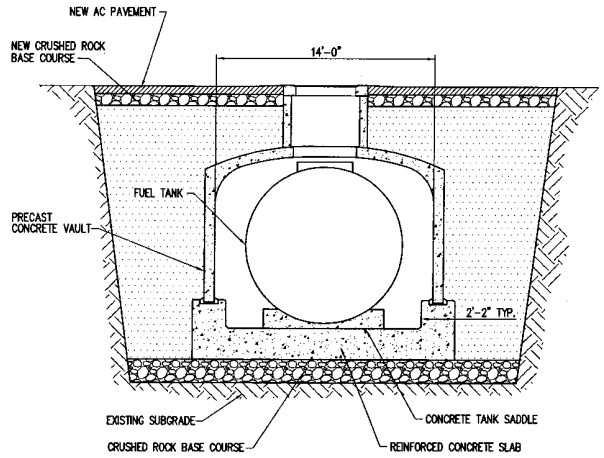
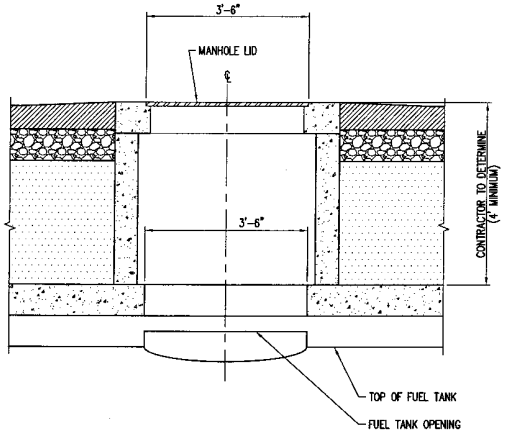
PROJECT 044-00e

FUEL DOCK
CIVIL UPLAND SITE IMPROVEMENTS
VAULT DETAILS

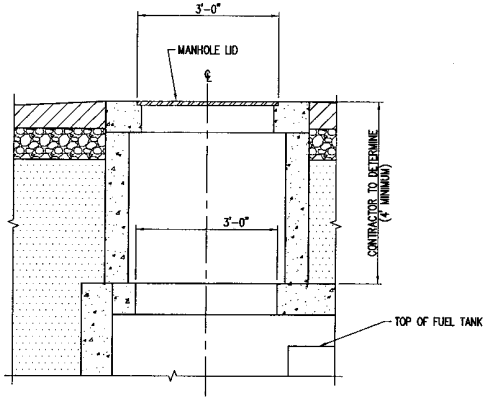
DRAWN: J.S.C.	PROJECT NO.:104153
DESIGN: M.D.K.	SCALE: AS SHOWN
CHECKED: S.D.S.	DATE: 04/14/05
SHEET NO.	C-03



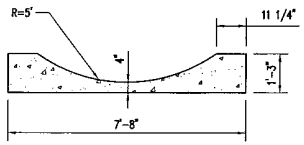
FUEL VAULT SECTION (B / C-04)
SCALE: N.T.S.



TANK EQUIPMENT 42"Ø MANHOLE SECTION (C / C-04)
SCALE: N.T.S.



VAULT ACCESS 36"Ø MANHOLE SECTION (D / C-04)
SCALE: N.T.S.



CONCRETE TANK SADDLES (1 / C-04)
SCALE: N.T.S.

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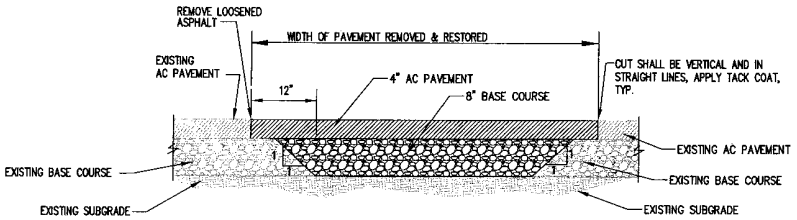
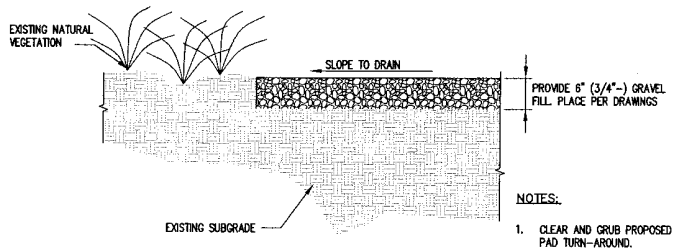
PROJECT 044-00e

FUEL DOCK
CIVIL UPLAND SITE IMPROVEMENTS
VAULT DETAILS

DRAWN:	J.S.C.	PROJECT NO.:	104153
DESIGN:	M.D.K.	SCALE:	AS SHOWN
CHECKED:	S.D.S.	DATE:	04/14/05
SHEET NO.			C-04



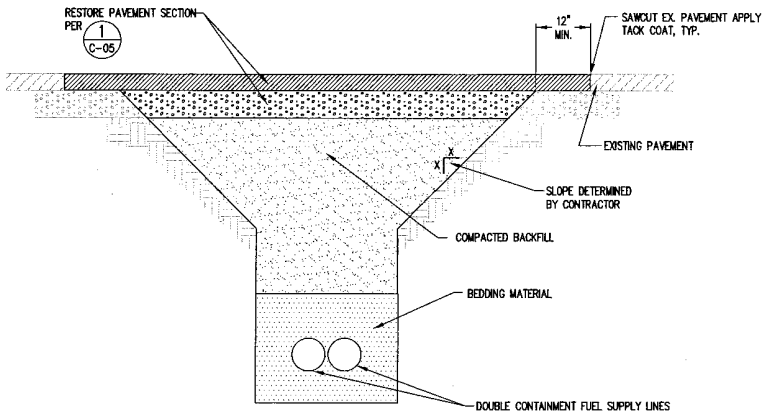
FULL DEPTH PAVEMENT REPLACEMENT (1 / C-05)
SCALE: SCALE: N.T.S.



NOTES:

1. CLEAR AND GRUB PROPOSED AREA OF FUEL TRUCK GRAVEL PAD TURN-AROUND.
2. COMACT EXISTING SUBGRADE.
3. FINISHED GRADES SHALL MATCH EXISTING AT EDGE OF ASPHALT PARKING LOT.

GRAVEL PAD DETAIL (2 / C-05)
SCALE: SCALE: N.T.S.



FUEL SUPPLY LINES TRENCH DETAIL (3 / C-05)
SCALE: SCALE: N.T.S.

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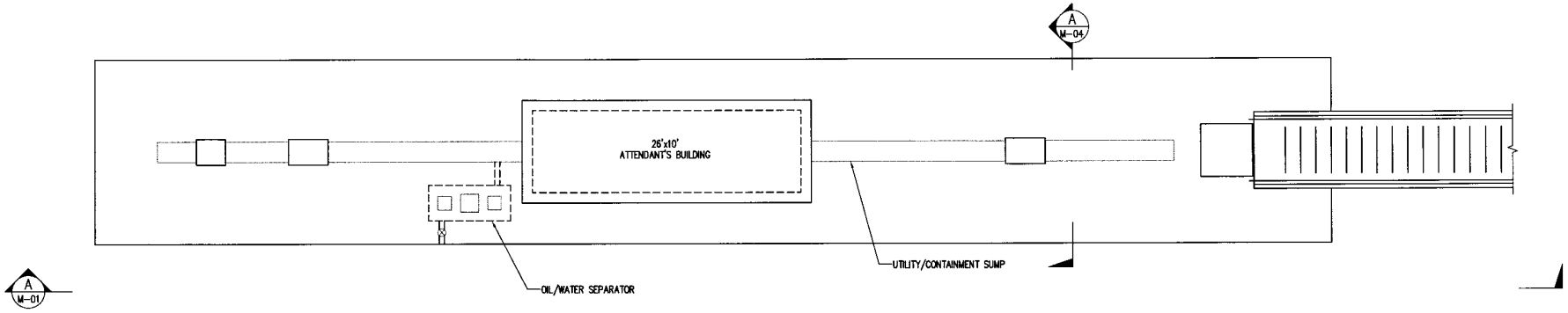
PROJECT 044-00e

FUEL DOCK

CIVIL UPLAND SITE IMPROVEMENTS
UPLAND CIVIL DETAILS

DRAWN:	J.S.C.	PROJECT NO.:	104153
DESIGN:	M.D.K.	SCALE:	AS SHOWN
CHECKED:	S.D.S.	DATE:	04/14/05

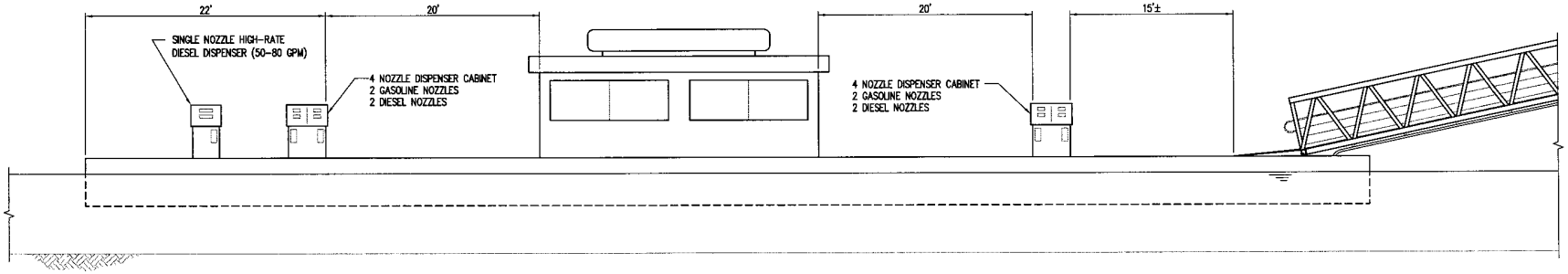
SHEET NO.
C-05



FUEL DOCK PLAN
SCALE: 3/16"=1'-0"

NOTES:

1. XX



ELEVATION
SCALE: 3/16"=1'-0"
A
M-01

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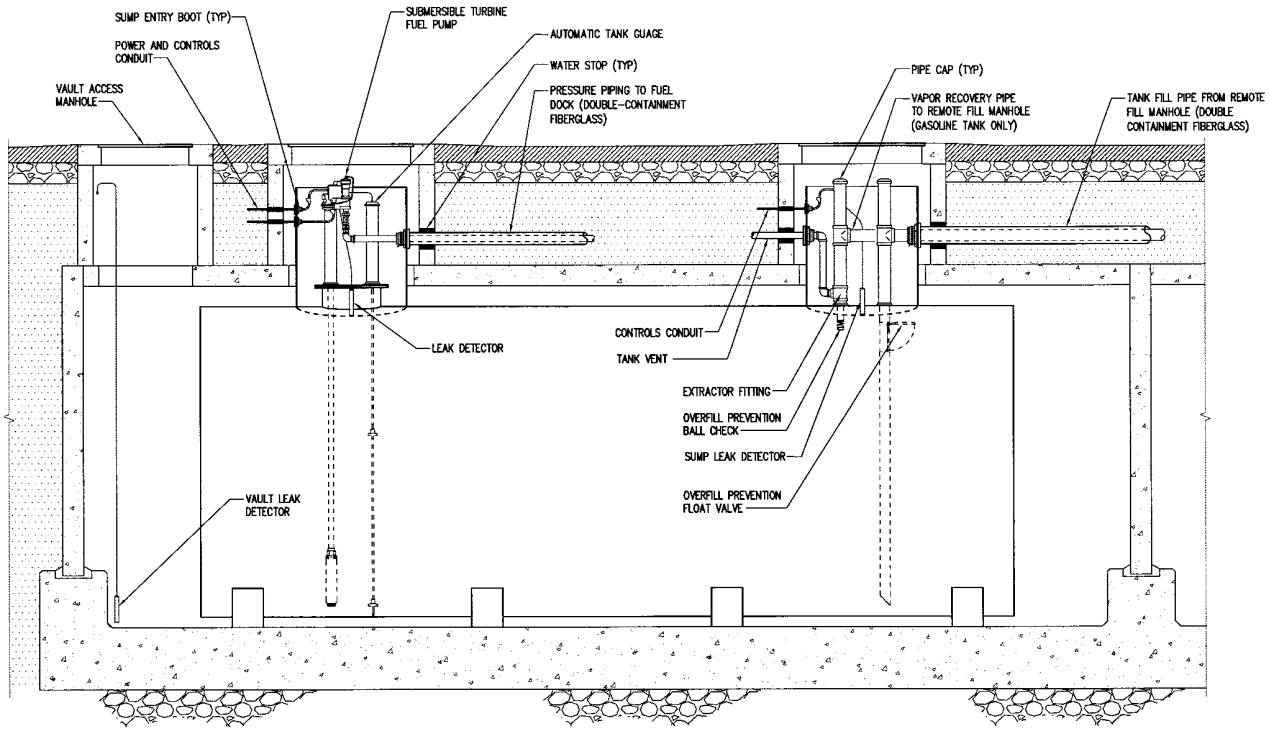
FUEL DOCK

FUEL DOCK PLAN AND ELEVATION

DRAWN: J.S.C.	PROJECT NO.:104153
DESIGN: M.D.K.	SCALE: AS SHOWN
CHECKED: S.D.S.	DATE: 04/14/05
SHEET NO.	

M-01



TYPICAL TANK
EQUIPMENT INSTALLATION (1)
SCALE: 1/2"=1'-0"

NOTE: HORIZONTAL PIPING AND CONDUIT SHOWN OUT OF POSITION FOR CLARITY.

PRELIMINARY

70% PROGRESS DRAWINGS

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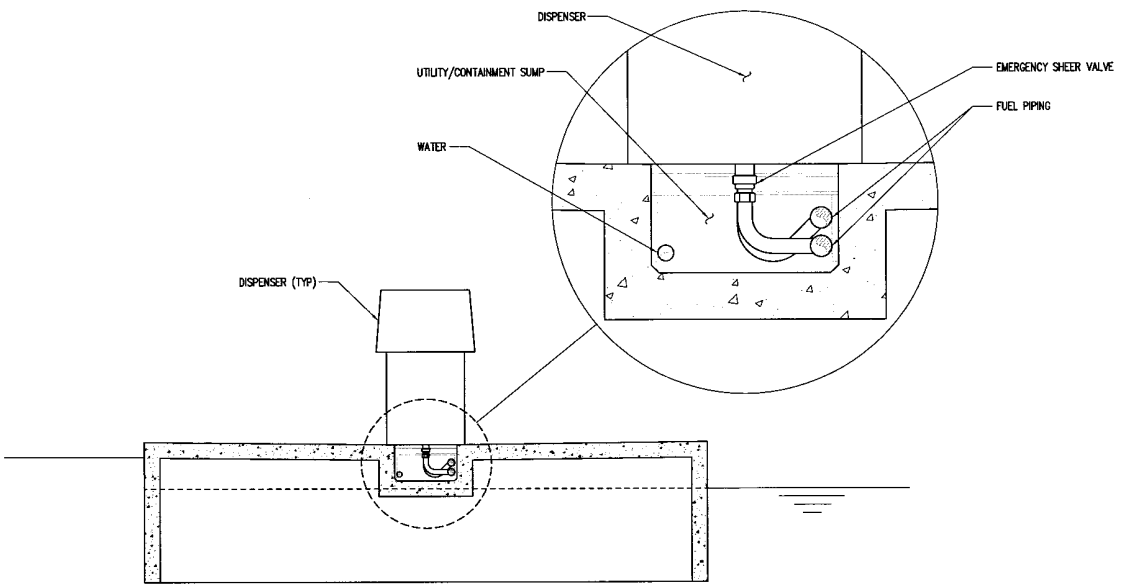
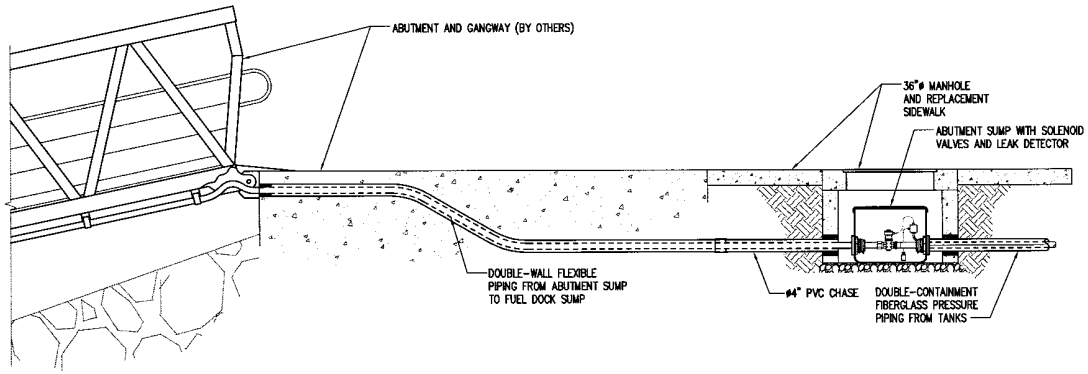
PROJECT 044-00e

FUEL DOCK
TANK AND EQUIPMENT DETAILS

DRAWN: J.S.C.	PROJECT NO.:104153
DESIGN: M.D.K.	SCALE: AS SHOWN
CHECKED: S.D.S.	DATE: 04/14/05
SHEET NO.	M-03



SECTION
SCALE: 1/2"=1'-0"
A
M-01



SECTION
SCALE: 1/2"=1'-0"
B
M-01

PRELIMINARY

70% PROGRESS DRAWINGS

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NO.	DATE	BY	REVISION

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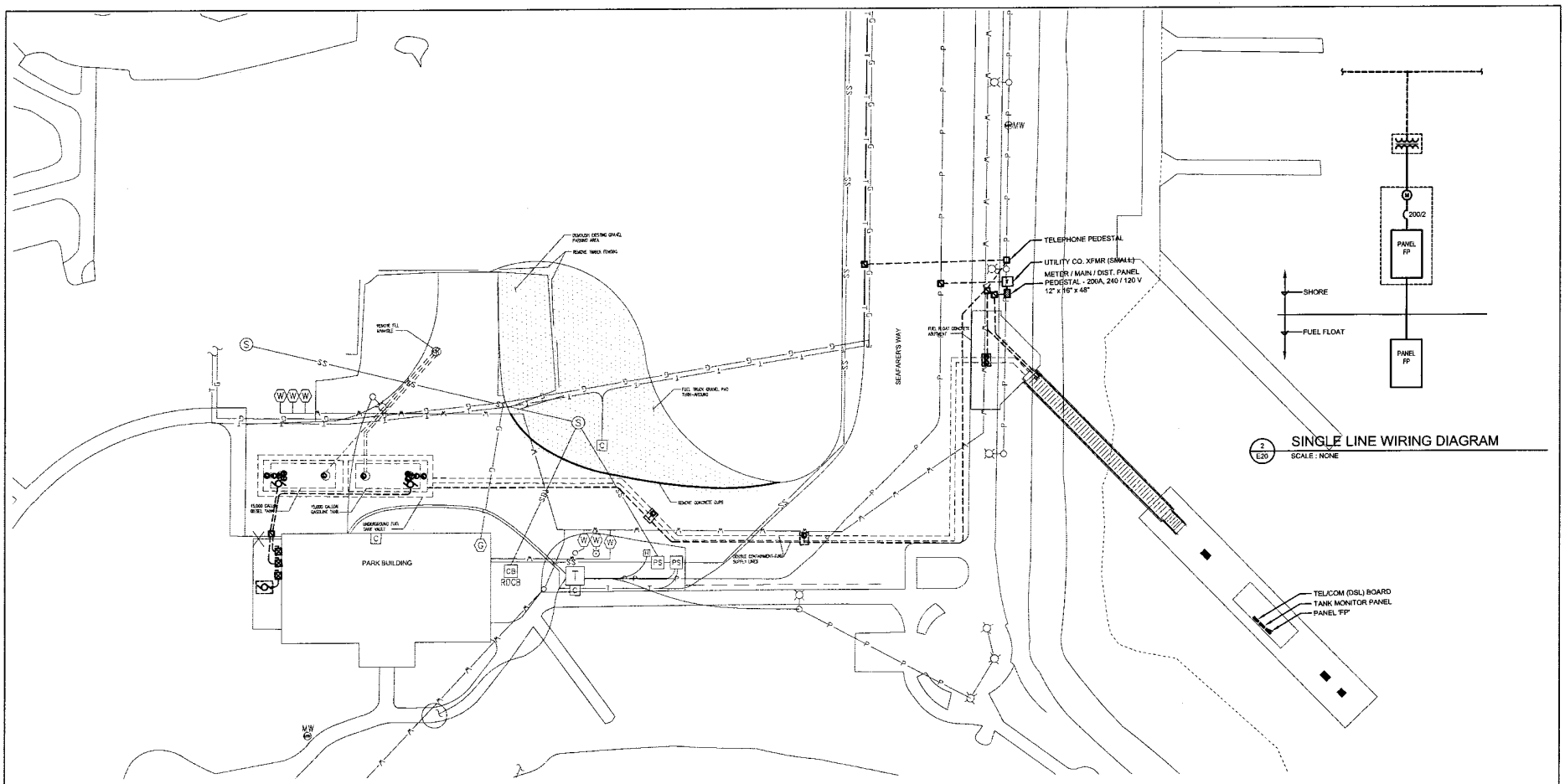
WEST BASIN REDEVELOPMENT PROJECT
PROJECT 044-00e

FUEL DOCK
SECTION

DRAWN: J.S.C.	PROJECT NO.:104153
DESIGN: M.D.K.	SCALE: AS SHOWN
CHECKED: S.D.S.	DATE: 04/14/05
SHEET NO.	M-04



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NO.	DATE	BY	REVISION

CAP SANTE BOAT HAVEN
WEST BASIN REDEVELOPMENT PROJECT
PROJECT 044-00e

FUEL DOCK
ELECTRICAL SITE PLAN

DRAWN: D.K.D	PROJECT NO.:104153
DESIGN: E.J.D	SCALE: AS SHOWN
CHECKED: E.J.D	DATE: 04/12/06
SHEET NO.	E-02

70% PROGRESS DRAWINGS

APPENDIX B

Selected Boring Logs and Monitoring Well Construction Details

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

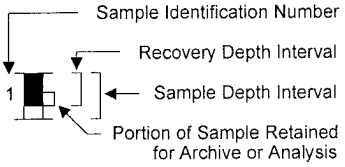
OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)* outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the *Standard Test Method for Classification of Soils for Engineering Purposes*, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50%	- "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤50%	- "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤30%	- "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤15%	- "with gravel," "with sand," "with silt," etc.
	≤ 5%	- "trace gravel," "trace sand," "trace silt," etc., or not noted.

Drilling and Sampling Key

SAMPLE NUMBER & INTERVAL



SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Other - See text if applicable

Groundwater

▽ ATD — Approximate water elevation at time of drilling (ATD) or on date noted. Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.

Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

5/10/05 \\EDMDATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL CLASS SHEET

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Anacortes, WA

Soil Classification System and Key

Figure B-1

MW-109

SAMPLE DATA						SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): 15.46445 (MSL)	Water Level
0	15						SP	Gray, fine SAND with roots (loose, moist)(no odor, no sheen)	
							SM	Dark gray, silty, fine SAND with gravel and organics (loose, moist)(no odor, no sheen)	
5	10		a2	31			SP	Gray, fine SAND with trace organics (loose, moist)(no odor, no sheen) (loose, wet)(no odor, no sheen)	▽ ATD
			a2	17			SM	Black, silty, fine SAND with gravel (medium dense, wet)(no odor, no sheen) -with a piece of rock-like slag material	
10	5		a2	9					
			a2	17			ML	Black, sandy, SILT with coarse sand (medium dense, wet)(no odor, no sheen)	
			a2	50/ 0"			WD	Large wood	
15	0		a2	50/ 0"					
20									
25									

Boring Completed 04/05/04
Total Depth of Boring = 18.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009. 5/10/05 \\EDMDATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV

LANDAU ASSOCIATES

Scott Paper Anacortes, WA	Log of MW-109	Figure B-2

MW-110

SAMPLE DATA						SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): 14.40752 (MSL)	Water Level
0								Crushed Rock	
							SP	Gray, fine SAND, trace gravel (medium dense, moist)(fill)	
	10		a1	16	0		SM	Dark gray, silty, fine SAND with organics (medium dense, moist)(no odor, no sheen)(fill)	
5			a1	14	0			(musty garbage-like odor, no sheen)	
			a1	7	0		WD	WOOD debris with silt (loose, moist to wet)(strong garbage-like odor, no sheen)(fill)	ATD
	5		a1	9	20				
10			a1	10					
			a1	45	8				
			a1	35				(dense, wet)(strong garbage-like odor, sheen on soil water)(fill)	
	0		a1	40					
15			a1	100	9				
			a1	16					
	-5		a1	20					
20			a1	27			ML	Gray with rust mottling, SILT (stiff, moist)(no odor, no sheen)(native)	
25									

Boring Completed 04/01/04
Total Depth of Boring = 22.0 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009. 5/10/05 \\EDMDATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV

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Log of MW-110

Figure
B-3

LSB-5

Drilling Method: Hollow-stem Auger

Ground Elevation (ft): 14.83549 (MSL)

Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Soil Profile	Water Level
0							SM	Dark gray, silty, fine SAND with gravel (medium dense, moist)(no odor, no sheen)	
5	10	LSB-5 4-5 @1015	a1	19	0				
			a1	8			SM	Black, silty, fine SAND with gravel (loose, moist)(no odor, no sheen)	
		LSB-5 7-8 @1045	a1	5	0				▽ ATD
		LSB-5 9-10 @1050	a1	6	0			(loose, wet)(no odor, heavy petroleum/creosote sheen)	
10	5	SLB-5 10-11 @1100	a1	8					
			a1	10	0		WD	WOOD debris (loose, wet)(strong hydrogen sulfide odor, heavy sheen)	
		LSB-5 14-15 @1105	a1	12					
15	0		a1	10	0				
			a1	8					
			a1	11					
20	-5		a1	11			ML	Gray, SILT, trace shell fragments (stiff, moist) -with rust mottling	
25									
30									

Boring Completed 03/31/04
Total Depth of Boring = 20.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009 5/10/05 \\EDMDATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV

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Log of LSB-5

Figure
B-4

LSB-6

SAMPLE DATA						SOIL PROFILE			GROUNDWATER
Depth (ft)	Elevation	Sample Number & Interval	Sampler Type	Blows/Foot	PID (ppm)	Graphic Symbol	USCS Symbol	Drilling Method: Hollow-stem Auger Ground Elevation (ft): 10.24164 (MSL)	Water Level
0	10						AC	Asphalt	
							SM	Dark gray, silty, fine SAND with gravel (medium dense, moist)(no odor, no sheen)(fill)	
5	5	LSB-6 4-5 @0905	a1	6	0			Dark gray to black, silty, fine SAND with trace gravel and wood debris (loose, moist)(no odor, slight sheen)(fill)	
		LSB-6 6-7 @0915	a1	14	0				
			a1	40			WD	WOOD debris with silt (medium dense, moist to wet)(no odor, no sheen)(fill)	▽ ATD
			a1	19					
10	0		a1	17					
			a1	12	0				
		LSB-6 14-15 @0920	a1	14					
15	-5		a1	14	0				
			a1	9					
			a1	17			ML	Gray SILT with trace gravel and rust mottling (very stiff, moist)(no odor, no sheen)	
20	-10		a1	46					
25									
30									

Boring Completed 03/31/04
Total Depth of Boring = 20.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.

529009. 5/10/05 \\EDMDATA\GINT\GINT6\PROJECTS\529009.GPJ SOIL BORING LOG W/ ELEV

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Anacortes, WA

Log of LSB-6

Figure
B-5

ENSR Consulting & Engineering

SUBSURFACE EXPLORATION LOG

BORING NUMBER: B-7

CLIENT: Log Sort Yard
JOB NUMBER: 5494-001-300
LOCATION: ANACORTES, WA
SURFACE ELEVATION:

GEOLOGIST: Siegfried Traeger
DATE DRILLED: 3/15/93
DRILLING COMPANY: HAYES DRILLING, INC.
REVIEWED BY: 0

TOTAL DEPTH: 21.5 Feet
DRILLING METHOD: Hollow Stem Auger
SAMPLE METHOD:
APPROVED BY: 0

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
							Brown wood debris and very loose soil, damp.	WD		
			0.0	SS		3-1-3	Dark yellow (uniform color); compacted sawdust, no spoil, damp.	WD		
5										5
		B-7-8	0.0	SS		4-2-5	Black; compacted sawdust, wood debris, damp.	WD		
10										10
			0.0	SS		4-6-7	Dark gray; wood debris, sawdust, no soil, wet. **	WD		
15										15
			0.0	SS		7-15-30	Light gray; clay, some wood debris, dry. **	ML		
20							Light gray; clay, medium stiff, some gravel pieces, dry.	ML		20
			0.0	SS		10-10-9				
25							NOTES: 1) Bottom of hole at 21.5 feet. *) Boring was moved 10 ft. south due to auger refusal at original site **) Smell of rotten eggs			25

SAMPLER TYPE
SS - SPLIT SPOON
ST - PRESSED SHELBY TUBE
HA - HAND SAMPLER
CC - CONTINUOUS CORE

BORING METHOD
HSA - HOLLOW STEM AUGER
CFA - CONTINUOUS FLIGHT AUGER
HA - HAND AUGER
MD - MUD DRILLING

ENSR Consulting & Engineering

SUBSURFACE EXPLORATION LOG

BORING NUMBER: B-13

CLIENT: Log Sort Yard
JOB NUMBER: 5494-001-300
LOCATION: ANACORTES, WA
SURFACE ELEVATION: 14.0

GEOLOGIST: Siegfried Traeger
DATE DRILLED: 3/17/93
DRILLING COMPANY: HAYES DRILLING, INC.
REVIEWED BY:

TOTAL DEPTH: 21.5 Feet
DRILLING METHOD: Hollow Stem Auger
SAMPLE METHOD:
APPROVED BY:

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
							Black SOIL, moist, soft.	WD ML		
		B-16-3		SS		2-1-1	Black, waxy substance, light brown SAND, no smell, medium grain.	WD ML		3.5
5		B-16-6		SS		1-3-3	Same as above.	WD ML		5 6 7 8
		B-16-8		SS		1-1-1	Same as above.	WD		9
10										10
				SS		4-3-2	No recovery, catcher blocked by wood piece; *	WD		
15										15 14 17 18
				SS		2-8-13	Cuttings still same as above only saturated, flows easily, still burnt smell.	CL		
20							Gray, CLAY, firm, low plasticity, burnt smell still present.			20
				SS		4-11-16	No recovery with 2" attempt to drive a 1.5" Split Spoon. No recovery, cohesion of clay , pull sample out of spoon.			
				SS		7-10-15	Same as above.			
25							NOTES: 1) Bottom of hole at 24.5 feet. *) Burnt smell same as boring B-12			25

SAMPLER TYPE
SS - SPLIT SPOON
ST - PRESSED SHELBY TUBE
HA - HAND SAMPLER
CC - CONTINUOUS CORE

BORING METHOD
HSA - HOLLOW STEM AUGER
CFA - CONTINUOUS FLIGHT AUGER
HA - HAND AUGER
MD - MUD DRILLING

ENSR Consulting & Engineering

SUBSURFACE EXPLORATION LOG

BORING NUMBER: B-14

CLIENT: Log Yard
JOB NUMBER: 5494-001-300
LOCATION: ANACORTES, WA
SURFACE ELEVATION:

GEOLOGIST: Siegfried Traeger
DATE DRILLED: 3/15/93
DRILLING COMPANY: HAYES DRILLING, INC.
REVIEWED BY: N=555,802.9

TOTAL DEPTH: 25.5 Feet
DRILLING METHOD: Hollow Stem Auger
SAMPLE METHOD: 16.73
APPROVED BY: E=1,210,539.5

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
			0.0	SS		2-3-5	CLAY Sample taken, firm gray CLAY, low plasticity. NOTES: 1) Bottom of hole at 25.5 feet.	OL		
30										30
35										35
40										40
45										45
50										50

SAMPLER TYPE
SS - SPLIT SPOON
ST - PRESSED SHELBY TUBE
HA - HAND SAMPLER
CC - CONTINUOUS CORE

BORING METHOD
HSA - HOLLOW STEM AUGER
CFA - CONTINUOUS FLIGHT AUGER
HA - HAND AUGER
MD - MUD DRILLING

ENSR Consulting & Engineering

SUBSURFACE EXPLORATION LOG

BORING NUMBER: B-14

CLIENT: Log Yard
JOB NUMBER: 5494-001-300
LOCATION: ANACORTES, WA
SURFACE ELEVATION:

GEOLOGIST: Siegfried Traeger
DATE DRILLED: 3/15/93
DRILLING COMPANY: HAYES DRILLING, INC.
REVIEWED BY: N=555,802.9

TOTAL DEPTH: 25.5 Feet
DRILLING METHOD: Hollow Stem Auger
SAMPLE METHOD: 16.73
APPROVED BY: E=1,210,539.5

DEPTH feet	SAMPLES	SAMPLE NUMBER	TIME	PID (ppm)	BLOW COUNT	RECOVERY	GEOLOGIC DESCRIPTION	SOIL CLASS.	GRAPHIC LOG	DEPTH feet
							WOOD debris and sand.	WD		
				SS		3-4-5	Light brown, loose SAND, medium grain, some gravel, black tar like substance mixed with sample, moist.	GP		
5				SS		7-20-13	No recovery, cuttings moist, SAND medium grain, light brown-green, gravels, black tar-like substance still present.			5
			0.0	SS		3-5-7	Poor recovery, green, hard fiberous material with SAND, medium grain, wet.	CL		
10		B-14-10	0.0	SS		2-1-2	Decomposed wood, wet sample taken.	CL WD		10
								WD		
			0.0	SS		8-4-3	Poor recovery, blocked by wood plug.			
15										15
				SS		3-5-7	No recovery, cuttings black SAND and SILT, wet, some pebbles.	GM		
20		B-14-25		SS		3-6-3	No recovery, cuttings same.	GM		20
								OL		
25										25

SAMPLER TYPE
SS - SPLIT SPOON
ST - PRESSED SHELBY TUBE
HA - HAND SAMPLER
CC - CONTINUOUS CORE

BORING METHOD
HSA - HOLLOW STEM AUGER
CFA - CONTINUOUS FLIGHT AUGER
HA - HAND AUGER
MD - MUD DRILLING

APPENDIX C

Health and Safety Plan

Ecology Review Draft
Health and Safety Plan
UST Installation at Seafarers' Memorial Park
Cap Sante Boat Haven Fuel Dock
Former Scott Paper Company Mill Site
Anacortes, Washington

May 10, 2005

Prepared for

Port of Anacortes
Anacortes, Washington

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ATTACHMENTS

Site Health and Safety Plan
Summary

Site Name: Port of Anacortes, Former Scott Paper Company Mill Site

Location: Anacortes, Washington

Client: Port of Anacortes

Proposed Dates of Activities: Summer to Fall of 2005

Type of Facility: Park

Land Use of Area Surrounding Facility: Commercial, industrial, and marine

Site Activities: Soil removal and excavation dewatering activities associated with installation of two 15,000-gallon underground storage tanks (USTs) for the new fuel dock at the Cap Sante Boat Haven in Anacortes, Washington. The new USTs will be located just west of the existing Park Building at Seafarers' Memorial Park, which is within the Uplands area of the northern portion of the former Scott Paper Company mill site.

Potential Site Contaminants: Soil: Lead (Pb), carcinogenic polycyclic aromatic hydrocarbons (cPAHs), diesel-range and/or motor oil-range petroleum hydrocarbons. Extracted groundwater: Arsenic (As), bis(2-ethylhexyl)phthalate, 4-methylphenol, ammonia, and hydrogen sulfide.

Routes of Entry: Skin contact with soil or groundwater, incidental ingestion of soil or water; and inhalation of airborne droplets, dusts, or vapors.

Protective Measures: Protective clothing (including hardhat, steel toed boots, safety glasses, gloves, coveralls); (stand-by) air purifying respirators; dust control; and vapor monitoring.

Monitoring Equipment: Photoionization detector (PID).
LEL 4 gas meter.

1.0 INTRODUCTION

This site-specific health and safety plan (HSP) addresses procedures to minimize the risk of chemical exposures, physical accidents to onsite workers, and environmental contamination associated with soil removal and excavation dewatering activities during installation of two 15,000-gallon underground storage tanks (USTs) for the new fuel dock at the Cap Sante Boat Haven.

1.1 PURPOSE AND REGULATORY COMPLIANCE

The HSP covers each of the required elements as specified in 29 CFR 1910.120 or equivalent Washington State Department of Labor and Industries regulations. When combined with the Landau Associates Health and Safety Program, this site-specific plan meets all applicable regulatory requirements.

This HSP will be made available to all Landau Associates' personnel and subcontractors involved in field work on this project. For prime contractor and subcontractors, this HSP represents minimum safety procedures. The prime contractor and subcontractors are responsible for their own safety while present onsite or conducting work for this project, and their work may involve construction safety and health procedures not addressed in the HSP. This HSP has been reviewed by the Landau Associates' Corporate Health and Safety Officer. By signing the documentation form provided with this plan (Attachment 2), project workers also certify their agreement to comply with the plan. Both Landau Associates and its subcontractors are independently responsible for the health and safety of their own employees on the project.

1.2 CHAIN OF COMMAND

The Landau Associates chain of command for health and safety on this project involves the following individuals:

- **Landau Associates Project Manager: Kris Hendrickson**

  The Project Manager has overall responsibility for the successful outcome of the project. The Project Manager, in consultation with the contracted Certified Industrial Hygienist or Corporate Health and Safety (H&S) Manager, makes final decisions regarding questions concerning the implementation of the site HSP.

- **Landau Associates Task Manager(s): David Pischer, Joe Kalmar and other staff**

  The Task Manager has day-to-day responsibility for the successful outcome of this project and if so designated by the Project Manager, may make decisions regarding implementation of this HSP.

- **Landau Associates Project Heath & Safety Coordinator: Staff personnel to be identified prior to field activities**

  As the Project Health & Safety Coordinator, this individual is responsible for implementing the HSP in the field as appropriate for the specific activity being conducted. This person will assure that: proper protective equipment is available for Landau Associates' employees and is used in the correct manner; decontamination activities are carried out properly; and that employees have knowledge of the local emergency medical system. The Project Health & Safety Coordinator also informs subcontractors of the minimum requirements of this plan.

- **Landau Associates Corporate H&S Manager: Tim Syverson**

  The Landau Associates Corporate H&S Manager has overall responsibility for preparation and modification of this HSP. In the event that health and safety issues arise during site operations, the H&S Manager will attempt to resolve them in discussion with the appropriate members of the project team.

- **Project Team Members**

  Project team members are responsible for understanding the H&S requirements for this project, and implementing these procedures in the field. Team members will receive technical guidance from the Project H&S Coordinator.

In instances where this HSP is adopted by others, the chain of command and the associated responsibilities identified throughout this HSP refers to the applicable health and safety representatives within the subject organization, not Landau Associates personnel.

1.3 SITE WORK ACTIVITIES

This HSP covers soil removal, excavation dewatering, and backfilling activities associated with installation of two 15,000-gallon USTs for the new fuel dock at the Cap Sante Boat Haven. The new USTs will be located just west of the existing Park Building at Seafarers' Memorial Park, which is within the Uplands area of the northern portion of the former Scott Paper Company mill site. The field activities associated with the interim action UST installation project include:

- Excavation, temporary stockpiling, loading, and offsite disposal of contaminated soil and wood debris removed from the excavation for the UST and associated fuel supply pipelines (the excavations may be shored with temporary sheet piling or may be conducted as open excavations)

- Excavation dewatering and pretreatment of extracted water prior to discharge to the sanitary sewer system, including treated water sampling

- Installation of a concrete vault for UST containment and associated excavation backfilling

- Installation of fuel supply pipelines in shallow trenches excavated between the USTs and the new fuel dock

- Site restoration.

1.4 SITE DESCRIPTION

The site currently includes Seafarers' Memorial Park, an office campus, and traffic related to each of these. The Cap Sante Boat Haven and associated marina facilities are located just north of the Park. Refer to the text of the Interim Action Work Plan for additional information regarding the site and the planned interim action activities.

2.0 HAZARD EVALUATION AND CONTROL MEASURES

2.1 TOXICITY OF CHEMICALS OF CONCERN

Based on the results of the Uplands Area remedial investigation (RI), contaminants that may be present in Parcel 3 soil at concentrations above preliminary cleanup levels include metals (lead), carcinogenic polycyclic aromatic hydrocarbons, diesel-range and/or motor oil-range petroleum hydrocarbons. Based on the Uplands Area groundwater investigations, 4-methylphenol may be present in groundwater in the project vicinity at concentrations above the preliminary cleanup level based on protection of marine surface water. Arsenic, bis(2-ethylhexyl)phthalate, and ammonia have been detected in groundwater at concentrations exceeding preliminary screening levels protective of marine surface water, but not at locations near the project. Hydrogen sulfide may also be present at the site.

Human health hazards of these chemicals are summarized in Table C-1. The information provided in this table covers potential toxic effects that might occur if relatively significant acute and/or chronic exposure occurred. However, this information does not indicate that such effects are likely to occur from the planned site activities. The chemicals that may be encountered at this site are not expected to be present at concentrations that could cause significant health hazards from short-term exposures. The types of planned work activities and use of monitoring procedures and protective measures will further limit potential exposures at this site.

Health standards are presented using the following abbreviations:

- PEL – Permissible exposure limit
- TWA – Time-weighted average exposure limit for any 8-hour work shift
- STEL – Short-term exposure limit expressed as a 15-minute time-weighted average and not to be exceeded at any time during a work day.

2.2 POTENTIAL EXPOSURE ROUTES

2.2.1 INHALATION

Inhalation of dusts generated during soil excavation and material handling activities could be an issue if the weather is dry, windy, or warm. Exposure via this route could potentially occur if chemicals are present in the soil being excavated and dust particles become airborne during site activities or if hydrogen sulfide is liberated when the material is exposed to air during excavation. Air monitoring will be performed during excavation and soil handling activities, as described in Section 3.2.

2.2.2 SKIN CONTACT

Exposure via dermal contact could occur if contaminated soil or groundwater contacts the skin or clothing. Protective clothing and decontamination activities specified in this plan will minimize the potential for skin contact with the contaminants.

2.2.3 INGESTION

Exposure via this route could occur if individuals eat, drink, or perform other hand-to-mouth contact in the contaminated (exclusion) zones. Decontamination procedures established in this plan will minimize the inadvertent ingestion of contaminants.

2.3 HEAT STRESS AND HYPOTHERMIA

2.3.1 HEAT STRESS

Use of impermeable clothing reduces the cooling ability of the body due to evaporation reduction. This may lead to heat stress. If such conditions occur during site activities, appropriate work-rest cycles will be utilized and water or electrolyte-rich fluids (Gatorade or equivalent) will be made available to minimize heat stress effects.

Also, when ambient temperatures exceed 70°F, monitoring of employee pulse rates will be conducted. Each employee will check his or her pulse rate at the beginning of each break period. Take the pulse at the wrist for 6 seconds, and multiply by 10. If the pulse rate exceeds 110 beats per minute, then reduce the length of the next work period by one-third.

Example: After a 1-hour work period at 80°F, a worker has a pulse rate of 120 beats per minute. The worker must shorten the next work period by one-third, resulting in a work period of 40 minutes until the next break.

2.3.2 HYPOTHERMIA

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment and wind-chill. Wetness or water immersion can also play a significant role.

Typical warning signs of hypothermia include fatigue, weakness, lack of coordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90°F require immediate treatment to restore temperature to normal.

Current medical practice recommends slow re-warming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping with blankets in a warm room. In emergency situations, where body temperature falls below 90°F and heated shelter is not available, use a sleeping bag, blankets, and body heat from another individual to help restore normal body temperature.

2.4 OTHER PHYSICAL HAZARDS

2.4.1 SLIPS/FALLS

As with all field work sites, caution will be exercised to prevent slips on wet surfaces, stepping on sharp objects, etc. Work will not be performed on elevated platforms without fall protection. Recognize and avoid areas with low traction (e.g., muddy areas or slick metal surfaces), ground surface obstructions, or unguarded areas elevated above ground surface.

2.4.2 HEAVY EQUIPMENT AND MACHINERY

The earthwork equipment may be equipped with various winches, motors, booms, and other machines. These present a general physical hazard from moving parts. Personnel will stand clear of machinery at all times unless specific instructions are given by the equipment operator or other person in authority. Steel-toed shoes or boots will be worn at all times when on the site. When possible, appropriate guards will be in place during equipment use.

Lifting equipment may also present a physical hazard. Field personnel should be careful to keep loose clothing, hands, and feet away from winches and capstones.

2.4.3 CONFINED SPACES

Confined space entry is not anticipated for this project. Appropriate equipment will be provided by the contractor for personnel who must enter the UST excavation. Personnel will not enter any confined space without specific approval of the Project Manager and Corporate H&S Manager.

2.4.4 NOISE

Appropriate hearing protection (ear muffs or ear plugs with a noise reduction rating of at least 20 dBA) will be used if individuals work near high-noise generating equipment (> 85 dBA). Determination of the need for hearing protection will be made by the Project H&S Coordinator.

3.0 PROTECTIVE EQUIPMENT AND AIR MONITORING

3.1 PROTECTIVE EQUIPMENT

Work for this project will be conducted in Level D protection. Level C protection is presented as a contingency only and represents a modified protection level, incorporating respiratory protection only where required by site conditions. Situations requiring Levels A or B protection are not anticipated for this project; should they occur, work will stop and the HSP will be amended, as appropriate, prior to resuming work.

Workers performing general site activities where skin contact with highly contaminated materials is unlikely and inhalation risks are not expected will wear coveralls, eye protection, gloves (whenever handling samples), and safety boots. Level D protection will consist of the following:

- Hard hats
- Rain gear or poly-coated Tyvek (wet operations) or uncoated Tyvek (dry operations)
- Safety glasses
- Steel-toed, chemical-resistant boots
- Nitrile, neoprene, or equivalent inner and outer gloves.

Workers performing site activities where heavily contaminated materials are detected will wear chemical-resistant gloves (nitrile, neoprene, or other appropriate outer and inner gloves) and coated Tyvek or other chemical-resistant suits. Workers will use face shields or goggles, as necessary, to avoid splashes.

When performing activities in which inhalation of chemical vapors and dusts is a concern, workers will wear half-mask or full-face air-purifying respirators with combination cartridges. Cartridges should be changed on a daily basis, at a minimum. They should be changed more frequently if chemical vapors are detected inside the respirator or other symptoms of breakthrough are noted (e.g., irritation, dizziness, breathing difficulty).

3.2 AIR MONITORING

Direct reading instruments give immediate, real time readings of contaminant levels. Reliable direct reading instruments, such as the combustible gas indicator and photoionization detector (PID) are available for situations commonly encountered at hazardous and contaminated substance sites. The appropriate type of monitoring equipment depends on the suspected type and concentration of chemical

contaminants. The primary limitation of direct reading instruments is that most do not quantify specific chemical compounds.

Air monitoring for hydrogen sulfide will be conducted during soil excavation activities. Instruments used to monitor for these contaminants are listed in Table C-1 and include a PID and MSA 361 or equivalent monitor. The instruments will be calibrated prior to each day's activity according to manufacturer's instructions. Calibration will be recorded in the health and safety logbook or field notes. Readings shall be entered into the logbook at a minimum of 30-minute intervals.

4.0 SAFETY EQUIPMENT LIST

The following safety equipment must be available onsite:

- First aid kit
- Mobile telephone
- Steel-toed safety boots
- Chemical-resistant coveralls and gloves
- Safety glasses
- Hard hat
- Air monitoring instruments
- Half-face respirator with cartridges.

5.0 EXCLUSION AREAS

If migration of chemicals from the work area is a possibility, or as otherwise required by regulations or client specifications, site control will be maintained by establishing clearly identified work zones. These will include the exclusion zone, contaminant reduction zone, and support zone, as discussed below.

5.1 EXCLUSION ZONE

Exclusion zones will be established around each excavation location. Only persons with appropriate training and authorization from the Project H&S Coordinator will enter this perimeter while work is being conducted.

5.2 CONTAMINATION REDUCTION ZONE

A contamination reduction zone will consist of a decontamination station that must be used to exit the exclusion zone. The station will have the brushes and wash fluids necessary to decontaminate personnel and equipment leaving the exclusion zone. Care will be taken to prevent the spread of contamination from this area.

5.3 SUPPORT ZONE

A support zone will be established outside the contamination reduction area to stage clean equipment, don protective clothing, take rest breaks, etc.

6.0 MINIMIZATION OF CONTAMINATION

To make the work zone procedure function effectively, the amount of equipment and number of personnel allowed in contaminated areas must be minimized. Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials. Eating, drinking, chewing gum, smoking, or using smokeless tobacco are forbidden in the exclusion zone.

7.0 DECONTAMINATION

Decontamination is necessary to limit the migration of contaminants from the work zone(s) onto the site or from the site into the surrounding environment. Equipment and personnel decontamination are discussed in the following sections, and the following types of equipment will be available to perform these activities:

- Boot and glove wash bucket and rinse bucket
- Scrub brushes – long handled
- Spray rinse applicator
- Plastic garbage bags
- 5-gallon container with soap solution.

Proper decontamination (decon) procedures will be employed to ensure that contaminated materials do not contact individuals and are not spread from the site. These procedures will also ensure that contaminated materials generated during site operations and during decontamination are managed appropriately. All nondisposable equipment will be decontaminated in the contamination reduction zone.

Personnel working in exclusion zones will perform a limited decontamination in the contamination reduction zone prior to changing respirator cartridges (if worn), taking rest breaks, drinking liquids, etc. They will decontaminate fully before eating lunch or leaving the site. The following describes the procedures for decon activities:

1. In the contamination reduction zone, wash and rinse outer gloves and boots in portable buckets.
2. Inspect protective outer suit, if worn, for severe contamination, rips, or tears.
3. If suit is highly contaminated or damaged, full decontamination will be performed.
4. Remove outer gloves. Inspect and discard if ripped or damaged.

Construction equipment decontamination will be performed at the equipment decontamination pad to be constructed by the contractor. Portions of construction equipment that has been in contact with contaminated materials will be cleaned at the equipment decontamination pad prior to leaving the site.

8.0 DISPOSAL OF CONTAMINATED MATERIALS

All disposable equipment and personal protective equipment will be rinsed to remove gross contamination and placed inside of a 10 mil polyethylene bag or other appropriate containers. These disposable supplies and containers will be removed from the site by the contractor and disposed of in a normal refuse container (dumpster) and/or along with excavated soil to be disposed at an appropriate solid waste landfill facility.

9.0 SITE SECURITY AND CONTROL

Site security and control will be the responsibility of the Project H&S Coordinator and the selected Contractor. The "buddy-system" will be used when working in designated hazardous areas. Any security or control problems will be reported to the Contractor or the Port as appropriate.

10.0 SPILL CONTAINMENT

It is not anticipated that bulk chemicals subject to spillage will be used by Landau Associates personnel on this project. Accordingly, a spill containment plan is not included with this HSP. The selected Contractor will be required to prepare and implement a spill containment plan as part of its work activities.

11.0 EMERGENCY RESPONSE PLAN

The Emergency Response Plan outlines the steps necessary for appropriate response to emergency situations. The following paragraphs summarize the key Emergency Response Plan procedures for this project.

11.1 PLAN CONTENT AND REVIEW

The principal hazards addressed by the Emergency Response Plan include the following: fire or explosion, medical emergencies, uncontrolled contaminant release, and situations such as the presence of chemicals above exposure guidelines or inadequate protective equipment for the hazards present. However, in order to help anticipate potential emergency situations, field personnel should always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- Visible or odorous chemical contaminants
- Drums or other containers
- General physical hazards (e.g., traffic, cranes, moving equipment, sharp or hot surfaces, slippery or uneven surfaces)
- Live electrical wires or equipment; and underground pipelines or cables.

These and other potential problems should be anticipated and steps taken to avert problems before they occur. All personnel will certify (Attachment 2) that they are familiar with the contents of this plan and acknowledge their agreement to comply with the provisions of the plan.

The Emergency Response Plan will be reviewed during the onsite health and safety briefing so that all personnel will know what their duties are should an emergency occur.

11.2 PLAN IMPLEMENTATION

The Project H&S Coordinator will act as the lead individual in the event of an emergency situation and evaluate the situation. This individual will determine the need to implement the emergency procedures, in concert with other resource personnel including client representatives, and the Corporate H&S Manager. Other onsite field personnel will assist the H&S Coordinator as required during the emergency.

If the Emergency Response Plan is implemented, the Project H&S Coordinator or designees are responsible for alerting all personnel at the affected area by use of a signal device (such as a hand-held air horn), visual, or shouted instructions, as appropriate.

Emergency evacuation routes and safe assembly areas will be identified and discussed in the onsite health and safety briefing, as appropriate. The buddy-system will be employed during evacuation to ensure safe escape, and the Project H&S Coordinator will be responsible for roll-call to account for all personnel.

11.3 EMERGENCY RESPONSE CONTACTS

Site personnel must know whom to notify in the event of Emergency Response Plan implementation. The following information will be readily available at the site in a location known to all workers:

- Emergency Telephone Numbers: see list in Attachment 1
- Route to Nearest Hospital: see directions and map in Attachment 1
- Site Descriptions: see the description at the beginning of this plan
- If a significant environmental release of contaminants occurs, the federal, state, and local agencies noted in this plan must be notified within 24 hours. Contact the Project Manager as soon as possible and he/she will be responsible for notifying agencies listed in Attachment 1. If the release to the environment includes navigable waters, also notify the National Response Center.

In the event of an emergency situation requiring implementation of the Emergency Response Plan (e.g., fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personnel protection equipment for the hazards present), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protective equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave the work area, pending approval by the Project H&S Coordinator for re-start of work. The following general emergency response safety procedures should be followed.

11.4 FIRES

Landau Associates personnel will attempt to control only very small fires. If an explosion appears likely, evacuate the area immediately. If a fire occurs that cannot be readily controlled, then immediate intervention by the local fire department or other appropriate agency is imperative. Use these steps:

- Contact fire agency identified in the site-specific plan
- Inform Project Manager/Project H&S Coordinator of the situation.

Contact 911 if a medical emergency occurs. If a worker leaves the site to seek medical attention, another worker should accompany the patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach. Notify the Project Manager of the outcome of the medical evaluation as soon as possible. For minor cuts and bruises, an onsite first aid kit will be available.

If a worker is seriously injured or becomes ill or unconscious, immediately request assistance from the emergency contact sources noted in the site-specific plan. Do not attempt to assist an unconscious worker in an untested confined space without applying confined space entry procedures or without using proper respiratory protection, such as a self-contained breathing apparatus.

In the event that a seriously injured person is also heavily contaminated, use clean plastic sheeting to prevent contamination of the inside of the emergency vehicle. Less severely injured individuals may also have their protective clothing carefully removed or cut off before transport to the hospital. If it is deemed appropriate to transport the victim to the hospital, follow the route map on Attachment 1.

11.5 PLAN DOCUMENTATION AND REVIEW

The Project Manager/Project H&S Coordinator will notify the Corporate H&S Manager as soon as possible after an emergency situation has been stabilized. The Project Manager will also notify the appropriate client contacts, and regulatory agencies, if applicable. If an individual is injured, the Project Manager will file a detailed Accident Report with the Corporate H&S Manager within 24 hours.

The Project Manager and Corporate H&S Manager will critique the emergency response action following the event. The results of the critique will be used in to improve future Emergency Response Plans and actions.

12.0 MEDICAL SURVEILLANCE

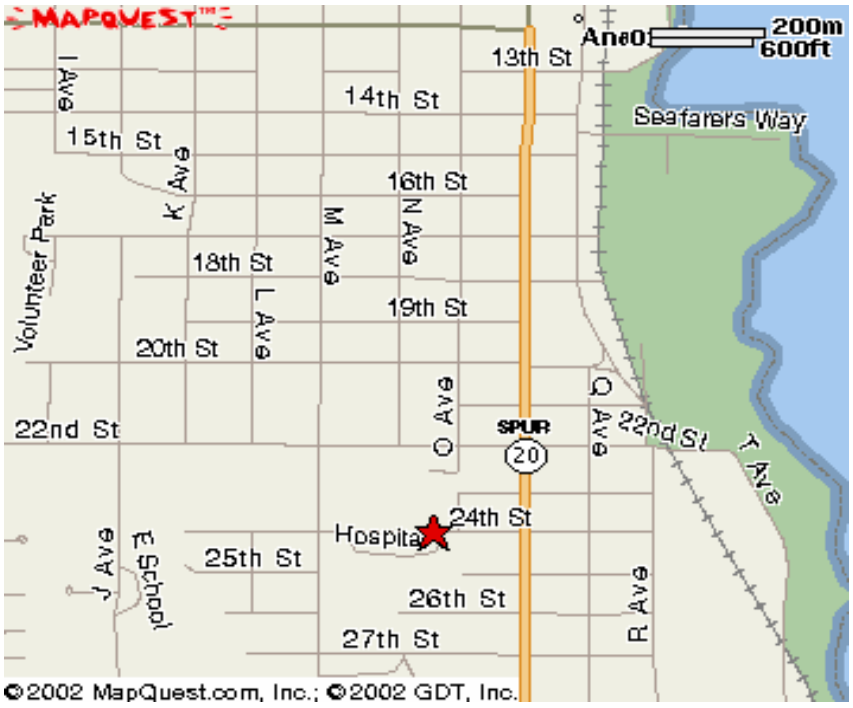
A medical surveillance program has been instituted for Landau Associates and will also be in effect for Landau Associates' subcontractor employees having exposures to hazardous substances. For certain Landau Associates field personnel, exams are given before employment; annually, thereafter; and upon termination. Content of exams is determined by the Occupational Medicine physician, in compliance with applicable regulations, and is detailed in the Landau Associates General Health and Safety Program.

ATTACHMENT 1
EMERGENCY INFORMATION

HOSPITAL Island Hospital
1211 24th Street
Anacortes, Washington 98221
Information: (360) 299-1300

DIRECTIONS:

1. Determine your location and call 911 if the situation warrants.
2. If the situation is not an emergency, but medical attention is required, get to your vehicle parked at the site and:
   - At the site head west on Seafarers' Way
   - Turn left (south) onto Q Avenue
   - Turn right (west) onto 15th Street
   - Turn left (south) onto Commercial Avenue
   - After approximately 0.6 mile, turn right (west) onto 24th Street
   - Follow 24th Street about 0.1 mile to the hospital



TELEPHONE – Cellular telephones to be carried by each team on/off shore.

EMERGENCY TRANSPORTATION SYSTEMS (Fire, Police, Ambulance) – **911**

EMERGENCY ROUTES – See map above

EMERGENCY CONTACTS –

Poison Control Center:	(800) 222-1222
Project Manager – Kris Hendrickson	(425) 778-0907
Corporate H&S Manager – Tim Syverson	(425) 778-0907
Port of Anacortes Contact – Margaret Schwertner	(360) 299-1827
National Response Center:	(800) 424-8802
Washington Division of Emergency Management	(800) 258-5990
U.S. Coast Guard	(800) 982-8813

In the event of an uncontrolled emergency, call for help as soon as possible. Dial **911**; give the following information:

- WHERE the emergency is – use cross streets or landmarks
- PHONE NUMBER you are calling from
- WHAT HAPPENED – type of injury
- HOW MANY persons need help
- WHAT is being done for the victim(s)
- YOU HANG UP LAST – let the person you called hang up first.

ATTACHMENT 2
CERTIFICATION

All field members are required to read and familiarize themselves with the contents of this Health & Safety Plan and acknowledge their agreement to comply with the provisions of the plan through the entry of a signature and date on the section below.

By my signature, I certify that:

- I have read,
- I understand, and
- I will comply with this site health and safety plan for the interim action UST installation project.

Printed Name	Signature	Date	Affiliation

Personnel health and safety briefing conducted by:

_____	_____	_____
Name	Signature	Date

Plan prepared by/reviewed by:

_____/_____	_____/_____	_____/_____
Name	Signature	Date

ATTACHMENT 3

HEALTH AND SAFETY PLAN MODIFICATION

No. ___ DATE ___/___/___

Modification: _____

_____

_____

_____

Reasons for Modification: _____

_____

_____

_____

Project Personnel Briefed:

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Approvals:

Project H&S Coordinator: _____

Corporate Health & Safety Officer: _____

Project Manager: _____

Others: _____

ATTACHMENT 4

easily accessible. Under no circumstances shall an air receiver be buried underground or located in an inaccessible place.

(2) *Drains and traps.* A drain pipe and valve shall be installed at the lowest point of every air receiver to provide for the removal of accumulated oil and water. Adequate automatic traps may be installed in addition to drain valves. The drain valve on the air receiver shall be opened and the receiver completely drained frequently and at such intervals as to prevent the accumulation of excessive amounts of liquid in the receiver.

(3) *Gages and valves.* (i) Every air receiver shall be equipped with an indicating pressure gage (so located as to be readily visible) and with one or more spring-loaded safety valves. The total relieving capacity of such safety valves shall be such as to prevent pressure in the receiver from exceeding the maximum allowable working pressure of the receiver by more than 10 percent.

(ii) No valve of any type shall be placed between the air receiver and its safety valve or valves.

(iii) Safety appliances, such as safety valves, indicating devices and controlling devices, shall be constructed, located, and installed so that they cannot be readily rendered inoperative by any means, including the elements.

(iv) All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition.

[39 FR 23502, June 27, 1974, as amended at 49 FR 5322, Feb. 10, 1984; 61 FR 9239, Mar. 7, 1996]

Subpart N—Materials Handling and Storage

AUTHORITY: Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), 9–83 (48 FR 35736), 1–90 (55 FR 9033) or 6–96 (62 FR 111), as applicable.

Sections 1910.176, 1910.177, 1910.178, 1910.179, 1910.180, 1910.181, and 1910.184 also issued under 29 CFR part 1911.

§ 1910.176 Handling materials—general.

(a) *Use of mechanical equipment.* Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard. Permanent aisles and passageways shall be appropriately marked.

(b) *Secure storage.* Storage of material shall not create a hazard. Bags, containers, bundles, etc., stored in tiers shall be stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse.

(c) *Housekeeping.* Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.

(d) [Reserved]

(e) *Clearance limits.* Clearance signs to warn of clearance limits shall be provided.

(f) *Rolling railroad cars.* Derail and/or bumper blocks shall be provided on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work or traffic area.

(g) *Guarding.* Covers and/or guardrails shall be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc.

[39 FR 23052, June 27, 1974, as amended at 43 FR 49749, Oct. 24, 1978]

§ 1910.177 Servicing multi-piece and single piece rim wheels.

(a) *Scope.* (1) This section applies to the servicing of multi-piece and single piece rim wheels used on large vehicles such as trucks, tractors, trailers, buses and off-road machines. It does not apply to the servicing of rim wheels used on automobiles, or on pickup trucks and vans utilizing automobile tires or truck tires designated "LT".

(2) This section does not apply to employers and places of employment regulated under the Construction Safety

and keep in a crouched position. Employees shall avoid the area from the cockpit or cabin rearward unless authorized by the helicopter operator to work there.

(q) *Personnel.* Sufficient ground personnel shall be provided when required for safe helicopter loading and unloading operations.

(r) *Communications.* There shall be constant reliable communication between the pilot, and a designated employee of the ground crew who acts as a signalman during the period of loading and unloading. This signalman shall be distinctly recognizable from other ground personnel.

(s) *Fires.* Open fires shall not be permitted in an area that could result in such fires being spread by the rotor downwash.

§ 1926.552 Material hoists, personnel hoists, and elevators.

(a) *General requirements.* (1) The employer shall comply with the manufacturer's specifications and limitations applicable to the operation of all hoists and elevators. Where manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a professional engineer competent in the field.

(2) Rated load capacities, recommended operating speeds, and special hazard warnings or instructions shall be posted on cars and platforms.

(3) Wire rope shall be removed from service when any of the following conditions exists:

(i) In hoisting ropes, six randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay;

(ii) Abrasion, scrubbing, flattening, or peening, causing loss of more than one-third of the original diameter of the outside wires;

(iii) Evidence of any heat damage resulting from a torch or any damage caused by contact with electrical wires;

(iv) Reduction from nominal diameter of more than three sixty-fourths inch for diameters up to and including three-fourths inch; one-sixteenth inch for diameters seven-eights to 1⅛ inches; and three thirty-seconds inch for diameters 1¼ to 1½ inches.

(4) Hoisting ropes shall be installed in accordance with the wire rope manufacturers' recommendations.

(5) The installation of live booms on hoists is prohibited.

(6) The use of endless belt-type manlifts on construction shall be prohibited.

(b) *Material hoists.* (1)(i) Operating rules shall be established and posted at the operator's station of the hoist. Such rules shall include signal system and allowable line speed for various loads. Rules and notices shall be posted on the car frame or crosshead in a conspicuous location, including the statement "No Riders Allowed."

(ii) No person shall be allowed to ride on material hoists except for the purposes of inspection and maintenance.

(2) All entrances of the hoistways shall be protected by substantial gates or bars which shall guard the full width of the landing entrance. All hoistway entrance bars and gates shall be painted with diagonal contrasting colors, such as black and yellow stripes.

(i) Bars shall be not less than 2- by 4-inch wooden bars or the equivalent, located 2 feet from the hoistway line. Bars shall be located not less than 36 inches nor more than 42 inches above the floor.

(ii) Gates or bars protecting the entrances to hoistways shall be equipped with a latching device.

(3) Overhead protective covering of 2-inch planking, ¾-inch plywood, or other solid material of equivalent strength, shall be provided on the top of every material hoist cage or platform.

(4) The operator's station of a hoisting machine shall be provided with overhead protection equivalent to tight planking not less than 2 inches thick. The support for the overhead protection shall be of equal strength.

(5) Hoist towers may be used with or without an enclosure on all sides. However, whichever alternative is chosen, the following applicable conditions shall be met:

(i) When a hoist tower is enclosed, it shall be enclosed on all sides for its entire height with a screen enclosure of

½-inch mesh, No. 18 U.S. gauge wire or equivalent, except for landing access.

(ii) When a hoist tower is not enclosed, the hoist platform or car shall be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering with ½-inch mesh of No. 14 U.S. gauge wire or equivalent. The hoist platform enclosure shall include the required gates for loading and unloading. A 6-foot high enclosure shall be provided on the unused sides of the hoist tower at ground level.

(6) Car arresting devices shall be installed to function in case of rope failure.

(7) All material hoist towers shall be designed by a licensed professional engineer.

(8) All material hoists shall conform to the requirements of ANSI A10.5–1969, Safety Requirements for Material Hoists.

(c) *Personnel hoists.* (1) Hoist towers outside the structure shall be enclosed for the full height on the side or sides used for entrance and exit to the structure. At the lowest landing, the enclosure on the sides not used for exit or entrance to the structure shall be enclosed to a height of at least 10 feet. Other sides of the tower adjacent to floors or scaffold platforms shall be enclosed to a height of 10 feet above the level of such floors or scaffolds.

(2) Towers inside of structures shall be enclosed on all four sides throughout the full height.

(3) Towers shall be anchored to the structure at intervals not exceeding 25 feet. In addition to tie-ins, a series of guys shall be installed. Where tie-ins are not practical the tower shall be anchored by means of guys made of wire rope at least one-half inch in diameter, securely fastened to anchorage to ensure stability.

(4) Hoistway doors or gates shall be not less than 6 feet 6 inches high and shall be provided with mechanical locks which cannot be operated from the landing side, and shall be accessible only to persons on the car.

(5) Cars shall be permanently enclosed on all sides and the top, except sides used for entrance and exit which have car gates or doors.

(6) A door or gate shall be provided at each entrance to the car which shall protect the full width and height of the car entrance opening.

(7) Overhead protective covering of 2-inch planking, ¾-inch plywood or other solid material or equivalent strength shall be provided on the top of every personnel hoist.

(8) Doors or gates shall be provided with electric contacts which do not allow movement of the hoist when door or gate is open.

(9) Safeties shall be capable of stopping and holding the car and rated load when traveling at governor tripping speed.

(10) Cars shall be provided with a capacity and data plate secured in a conspicuous place on the car or crosshead.

(11) Internal combustion engines shall not be permitted for direct drive.

(12) Normal and final terminal stopping devices shall be provided.

(13) An emergency stop switch shall be provided in the car and marked "Stop."

(14) Ropes: (i) The minimum number of hoisting ropes used shall be three for traction hoists and two for drum-type hoists.

(ii) The minimum diameter of hoisting and counterweight wire ropes shall be ½-inch.

(iii) Safety factors:

MINIMUM FACTORS OF SAFETY FOR SUSPENSION WIRE ROPES

Rope speed in feet per minute	Minimum factor of safety
50	7.60
75	7.75
100	7.95
125	8.10
150	8.25
175	8.40
200	8.60
225	8.75
250	8.90
300	9.20
350	9.50
400	9.75
450	10.00
500	10.25
550	10.45
600	10.70

(15) Following assembly and erection of hoists, and before being put in service, an inspection and test of all functions and safety devices shall be made under the supervision of a competent

person. A similar inspection and test is required following major alteration of an existing installation. All hoists shall be inspected and tested at not more than 3-month intervals. The employer shall prepare a certification record which includes the date the inspection and test of all functions and safety devices was performed; the signature of the person who performed the inspection and test; and a serial number, or other identifier, for the hoist that was inspected and tested. The most recent certification record shall be maintained on file.

(16) All personnel hoists used by employees shall be constructed of materials and components which meet the specifications for materials, construction, safety devices, assembly, and structural integrity as stated in the American National Standard A10.4–1963, Safety Requirements for Workmen's Hoists. The requirements of this paragraph (c)(16) do not apply to cantilever type personnel hoists.

(17) (i) Personnel hoists used in bridge tower construction shall be approved by a registered professional engineer and erected under the supervision of a qualified engineer competent in this field.

(ii) When a hoist tower is not enclosed, the hoist platform or car shall be totally enclosed (caged) on all sides for the full height between the floor and the overhead protective covering with ¾-inch mesh of No. 14 U.S. gauge wire or equivalent. The hoist platform enclosure shall include the required gates for loading and unloading.

(iii) These hoists shall be inspected and maintained on a weekly basis. Whenever the hoisting equipment is exposed to winds exceeding 35 miles per hour it shall be inspected and put in operable condition before reuse.

(iv) Wire rope shall be taken out of service when any of the following conditions exist:

(*a*) In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay;

(*b*) Wear of one-third the original diameter of outside individual wires. Kinking, crushing, bird caging, or any other damage resulting in distortion of the rope structure;

(*c*) Evidence of any heat damage from any cause;

(*d*) Reductions from nominal diameter of more than three-sixty-fourths inch for diameters to and including three-fourths inch, one-sixteenth inch for diameters seven-eights inch to 1⅛ inches inclusive, three-thirty-seconds inch for diameters 1¼ to 1½ inches inclusive;

(*e*) In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

(d) Permanent elevators under the care and custody of the employer and used by employees for work covered by this Act shall comply with the requirements of American National Standards Institute A17.1–1965 with addenda A17.1a–1967, A17.1b–1968, A17.1c–1969, A17.1d–1970, and inspected in accordance with A17.2–1960 with addenda A17.2a–1965, A17.2b–1967.

[44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 52 FR 36382, Sept. 28, 1987]

§ 1926.553 Base-mounted drum hoists.

(a) *General requirements.* (1) Exposed moving parts such as gears, projecting screws, setscrews, chain, cables, chain sprockets, and reciprocating or rotating parts, which constitute a hazard, shall be guarded.

(2) All controls used during the normal operation cycle shall be located within easy reach of the operator's station.

(3) Electric motor operated hoists shall be provided with:

(i) A device to disconnect all motors from the line upon power failure and not permit any motor to be restarted until the controller handle is brought to the "off" position;

(ii) Where applicable, an overspeed preventive device;

(iii) A means whereby remotely operated hoists stop when any control is ineffective.

(4) All base-mounted drum hoists in use shall meet the applicable requirements for design, construction, installation, testing, inspection, maintenance, and operations, as prescribed by the manufacturer.

(b) *Specific requirements.* [Reserved]

§ 1926.554 Overhead hoists.

(a) *General requirements.* (1) The safe working load of the overhead hoist, as determined by the manufacturer, shall be indicated on the hoist, and this safe working load shall not be exceeded.

(2) The supporting structure to which the hoist is attached shall have a safe working load equal to that of the hoist.

(3) The support shall be arranged so as to provide for free movement of the hoist and shall not restrict the hoist from lining itself up with the load.

(4) The hoist shall be installed only in locations that will permit the operator to stand clear of the load at all times.

(5) Air hoists shall be connected to an air supply of sufficient capacity and pressure to safely operate the hoist. All air hoses supplying air shall be positively connected to prevent their becoming disconnected during use.

(6) All overhead hoists in use shall meet the applicable requirements for construction, design, installation, testing, inspection, maintenance, and operation, as prescribed by the manufacturer.

(b) *Specific requirements.* [Reserved]

§ 1926.555 Conveyors.

(a) *General requirements.* (1) Means for stopping the motor or engine shall be provided at the operator's station. Conveyor systems shall be equipped with an audible warning signal to be sounded immediately before starting up the conveyor.

(2) If the operator's station is at a remote point, similar provisions for stopping the motor or engine shall be provided at the motor or engine location.

(3) Emergency stop switches shall be arranged so that the conveyor cannot be started again until the actuating stop switch has been reset to running or "on" position.

(4) Screw conveyors shall be guarded to prevent employee contact with turning flights.

(5) Where a conveyor passes over work areas, aisles, or thoroughfares, suitable guards shall be provided to protect employees required to work below the conveyors.

(6) All crossovers, aisles, and passageways shall be conspicuously marked by suitable signs, as required by subpart G of this part.

(7) Conveyors shall be locked out or otherwise rendered inoperable, and tagged out with a "Do Not Operate" tag during repairs and when operation is hazardous to employees performing maintenance work.

(8) All conveyors in use shall meet the applicable requirements for design, construction, inspection, testing, maintenance, and operation, as prescribed in the ANSI B20.1–1957, Safety Code for Conveyors, Cableways, and Related Equipment.

Subpart O—Motor Vehicles, Mechanized Equipment, and Marine Operations

AUTHORITY: Section 107, Construction Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), 9–83 (48 FR 35736), 1–90 (55 FR 9033), or 6–96 (62 FR 111), as applicable. Section 1926.602 also issued under 29 CFR part 1911.

§ 1926.600 Equipment.

(a) *General requirements.* (1) All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.

(2) A safety tire rack, cage, or equivalent protection shall be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

(3) (i) Heavy machinery, equipment, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them. Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment, shall be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with the motors stopped and

brakes set, unless work being performed requires otherwise.

(ii) Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.

(4) The use, care and charging of all batteries shall conform to the requirements of subpart K of this part.

(5) All cab glass shall be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of any machine covered by this subpart.

(6) All equipment covered by this subpart shall comply with the requirements of §1926.550(a)(15) when working or being moved in the vicinity of power lines or energized transmitters.

(7) *Rolling railroad cars.* Derail and/or bumper blocks shall be provided on spur railroad tracks where a rolling car could contact other cars being worked, enter a building, work or traffic area.

(b) *Specific requirements.* [Reserved]

[44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 58 FR 35183, June 30, 1993]

§1926.601 Motor vehicles.

(a) *Coverage.* Motor vehicles as covered by this part are those vehicles that operate within an off-highway jobsite, not open to public traffic. The requirements of this section do not apply to equipment for which rules are prescribed in §1926.602.

(b) *General requirements.* (1) All vehicles shall have a service brake system, an emergency brake system, and a parking brake system. These systems may use common components, and shall be maintained in operable condition.

(2)(i) Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.

(ii) All vehicles, or combination of vehicles, shall have brake lights in operable condition regardless of light conditions.

(3) All vehicles shall be equipped with an adequate audible warning device at the operator's station and in an operable condition.

(4) No employer shall use any motor vehicle equipment having an obstructed view to the rear unless:

(i) The vehicle has a reverse signal alarm audible above the surrounding noise level or:

(ii) The vehicle is backed up only when an observer signals that it is safe to do so.

(5) All vehicles with cabs shall be equipped with windshields and powered wipers. Cracked and broken glass shall be replaced. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields shall be equipped with operable defogging or defrosting devices.

(6) All haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

(7) Tools and material shall be secured to prevent movement when transported in the same compartment with employees.

(8) Vehicles used to transport employees shall have seats firmly secured and adequate for the number of employees to be carried.

(9) Seat belts and anchorages meeting the requirements of 49 CFR part 571 (Department of Transportation, Federal Motor Vehicle Safety Standards) shall be installed in all motor vehicles.

(10) Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.

(11) Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device which will prevent accidental starting or tripping of the mechanism.

(12) Trip handles for tailgates of dump trucks shall be so arranged that, in dumping, the operator will be in the clear.

(13) (i) All rubber-tired motor vehicle equipment manufactured on or after May 1, 1972, shall be equipped with fenders. All rubber-tired motor vehicle equipment manufactured before May 1,

1972, shall be equipped with fenders not later than May 1, 1973.

(ii) Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

(14) All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.

§ 1926.602 Material handling equipment.

(a) *Earthmoving equipment; General.* (1) These rules apply to the following types of earthmoving equipment: scrapers, loaders, crawler or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment. The promulgation of specific rules for compactors and rubber-tired "skid-steer" equipment is reserved pending consideration of standards currently being developed.

(2) *Seat belts.* (i) Seat belts shall be provided on all equipment covered by this section and shall meet the requirements of the Society of Automotive Engineers, J386–1969, Seat Belts for Construction Equipment. Seat belts for agricultural and light industrial tractors shall meet the seat belt requirements of Society of Automotive Engineers J333a–1970, Operator Protection for Agricultural and Light Industrial Tractors.

(ii) Seat belts need not be provided for equipment which is designed only for standup operation.

(iii) Seat belts need not be provided for equipment which does not have roll-over protective structure (ROPS) or adequate canopy protection.

(3) *Access roadways and grades.* (i) No employer shall move or cause to be moved construction equipment or vehicles upon any access roadway or grade unless the access roadway or grade is constructed and maintained to accommodate safely the movement of the equipment and vehicles involved.

(ii) Every emergency access ramp and berm used by an employer shall be constructed to restrain and control runaway vehicles.

(4) *Brakes.* All earthmoving equipment mentioned in this §1926.602(a) shall have a service braking system capable of stopping and holding the equipment fully loaded, as specified in Society of Automotive Engineers SAE–J237, Loader Dozer–1971, J236, Graders–1971, and J319b, Scrapers–1971. Brake systems for self-propelled rubber-tired off-highway equipment manufactured after January 1, 1972 shall meet the applicable minimum performance criteria set forth in the following Society of Automotive Engineers Recommended Practices:

Self-Propelled Scrapers	SAE J319b–1971.
Self-Propelled Graders	SAE J236–1971.
Trucks and Wagons	SAE J166–1971.
Front End Loaders and Dozers	SAE J237–1971.

(5) *Fenders.* Pneumatic-tired earthmoving haulage equipment (trucks, scrapers, tractors, and trailing units) whose maximum speed exceeds 15 miles per hour, shall be equipped with fenders on all wheels to meet the requirements of Society of Automotive Engineers SAE J321a–1970, Fenders for Pneumatic-Tired Earthmoving Haulage Equipment. An employer may, of course, at any time seek to show under §1926.2, that the uncovered wheels present no hazard to personnel from flying materials.

(6) *Rollover protective structures (ROPS).* See subpart W of this part for requirements for rollover protective structures and overhead protection.

(7) *Rollover protective structures for off-highway trucks.* The promulgation of standards for rollover protective structures for off-highway trucks is reserved pending further study and development.

(8) *Specific effective dates—brakes and fenders.* (i) Equipment mentioned in paragraph (a)(4) and (5) of this section, and manufactured after January 1, 1972, which is used by any employer

after that date, shall comply with the applicable rules prescribed therein concerning brakes and fenders. Equipment mentioned in paragraphs (a) (4) and (5) of this section, and manufactured before January 1, 1972, which is used by any employer after that date, shall meet the applicable rules prescribed herein not later than June 30, 1973. It should be noted that, as permitted under §1926.2, employers may request variations from the applicable brakes and fender standards required by this subpart. Employers wishing to seek variations from the applicable brakes and fenders rules may submit any requests for variations after the publication of this document in the FEDERAL REGISTER. Any statements intending to meet the requirements of §1926.2(b)(4), should specify how the variation would protect the safety of the employees by providing for any compensating restrictions on the operation of equipment.

(ii) Notwithstanding the provisions of paragraphs (a)(5) and (a)(8)(i) of this section, the requirement that fenders be installed on pneumatic-tired earthmoving haulage equipment, is suspended pending reconsideration of the requirement.

(9) *Audible alarms.* (i) All bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction. The horn shall be maintained in an operative condition.

(ii) No employer shall permit earthmoving or compacting equipment which has an obstructed view to the rear to be used in reverse gear unless the equipment has in operation a reverse signal alarm distinguishable from the surrounding noise level or an employee signals that it is safe to do so.

(10) *Scissor points.* Scissor points on all front-end loaders, which constitute a hazard to the operator during normal operation, shall be guarded.

(b) *Excavating and other equipment.* (1) Tractors covered in paragraph (a) of this section shall have seat belts as required for the operators when seated in the normal seating arrangement for tractor operation, even though backhoes, breakers, or other similar attachments are used on these machines for excavating or other work.

(2) For the purposes of this subpart and of subpart N of this part, the nomenclatures and descriptions for measurement of dimensions of machinery and attachments shall be as described in Society of Automotive Engineers 1970 Handbook, pages 1088 through 1103.

(3) The safety requirements, ratios, or limitations applicable to machines or attachment usage covered in Power Crane and Shovel Associations Standards No. 1 and No. 2 of 1968, and No. 3 of 1969, shall be complied with, and shall apply to cranes, machines, and attachments under this part.

(c) *Lifting and hauling equipment (other than equipment covered under subpart N of this part).* (1) Industrial trucks shall meet the requirements of §1926.600 and the following:

(i) Lift trucks, stackers, etc., shall have the rated capacity clearly posted on the vehicle so as to be clearly visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also shall be clearly shown on the vehicle. These ratings shall not be exceeded.

(ii) No modifications or additions which affect the capacity or safe operation of the equipment shall be made without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.

(iii) If a load is lifted by two or more trucks working in unison, the proportion of the total load carried by any one truck shall not exceed its capacity.

(iv) Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering handwheel to spin. The steering knob shall be mounted within the periphery of the wheel.

(v) All high lift rider industrial trucks shall be equipped with overhead guards which meet the configuration

and structural requirements as defined in paragraph 421 of American National Standards Institute B56.1–1969, Safety Standards for Powered Industrial Trucks.

(vi) All industrial trucks in use shall meet the applicable requirements of design, construction, stability, inspection, testing, maintenance, and operation, as defined in American National Standards Institute B56.1–1969, Safety Standards for Powered Industrial Trucks.

(vii) Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized.

(viii) Whenever a truck is equipped with vertical only, or vertical and horizontal controls elevatable with the lifting carriage or forks for lifting personnel, the following additional precautions shall be taken for the protection of personnel being elevated.

(A) Use of a safety platform firmly secured to the lifting carriage and/or forks.

(B) Means shall be provided whereby personnel on the platform can shut off power to the truck.

(C) Such protection from falling objects as indicated necessary by the operating conditions shall be provided.

(d) *Powered industrial truck operator training.*

NOTE: The requirements applicable to construction work under this paragraph are identical to those set forth at §1910.178(l) of this chapter.

[44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 58 FR 35183, June 30, 1993; 63 FR 66274, Dec. 1, 1998]

§ 1926.603 Pile driving equipment.

(a) *General requirements.* (1) Boilers and piping systems which are a part of, or used with, pile driving equipment shall meet the applicable requirements of the American Society of Mechanical Engineers, Power Boilers (section I).

(2) All pressure vessels which are a part of, or used with, pile driving equipment shall meet the applicable requirements of the American Society of Mechanical Engineers, Pressure Vessels (section VIII).

(3) Overhead protection, which will not obscure the vision of the operator and which meets the requirements of subpart N of this part, shall be provided. Protection shall be the equivalent of 2-inch planking or other solid material of equivalent strength.

(4) Stop blocks shall be provided for the leads to prevent the hammer from being raised against the head block.

(5) A blocking device, capable of safely supporting the weight of the hammer, shall be provided for placement in the leads under the hammer at all times while employees are working under the hammer.

(6) Guards shall be provided across the top of the head block to prevent the cable from jumping out of the sheaves.

(7) When the leads must be inclined in the driving of batter piles, provisions shall be made to stabilize the leads.

(8) Fixed leads shall be provided with ladder, and adequate rings, or similar attachment points, so that the loft worker may engage his safety belt lanyard to the leads. If the leads are provided with loft platforms(s), such platform(s) shall be protected by standard guardrails.

(9) Steam hose leading to a steam hammer or jet pipe shall be securely attached to the hammer with an adequate length of at least ¼-inch diameter chain or cable to prevent whipping in the event the joint at the hammer is broken. Air hammer hoses shall be provided with the same protection as required for steam lines.

(10) Safety chains, or equivalent means, shall be provided for each hose connection to prevent the line from thrashing around in case the coupling becomes disconnected.

(11) Steam line controls shall consist of two shutoff valves, one of which shall be a quick-acting lever type within easy reach of the hammer operator.

(12) Guys, outriggers, thrustouts, or counterbalances shall be provided as necessary to maintain stability of pile driver rigs.

(b) *Pile driving from barges and floats.* Barges or floats supporting pile driving operations shall meet the applicable requirements of §1926.605.

(c) *Pile driving equipment.* (1) Engineers and winchmen shall accept signals only from the designated signalmen.

(2) All employees shall be kept clear when piling is being hoisted into the leads.

(3) When piles are being driven in an excavated pit, the walls of the pit shall be sloped to the angle of repose or sheet-piled and braced.

(4) When steel tube piles are being "blown out", employees shall be kept well beyond the range of falling materials.

(5) When it is necessary to cut off the tops of driven piles, pile driving operations shall be suspended except where the cutting operations are located at least twice the length of the longest pile from the driver.

(6) When driving jacked piles, all access pits shall be provided with ladders and bulkheaded curbs to prevent material from falling into the pit.

§ 1926.604 Site clearing.

(a) *General requirements.* (1) Employees engaged in site clearing shall be protected from hazards of irritant and toxic plants and suitably instructed in the first aid treatment available.

(2) All equipment used in site clearing operations shall be equipped with rollover guards meeting the requirements of this subpart. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the following requirements:

(i) The overhead covering on this canopy structure shall be of not less than ⅛-inch steel plate or ¼-inch woven wire mesh with openings no greater than 1 inch, or equivalent.

(ii) The opening in the rear of the canopy structure shall be covered with not less than ¼-inch woven wire mesh with openings no greater than 1 inch.

(b) *Specific requirements.* [Reserved]

§ 1926.605 Marine operations and equipment.

(a) *Material handling operations.* (1) Operations fitting the definition of "material handling" shall be performed in conformance with applicable requirements of part 1918, "Safety and Health Regulations for Longshoring" of this chapter. The term "longshoring operations" means the loading, unloading, moving, or handling of construction materials, equipment and supplies, etc. into, in, on, or out of any vessel from a fixed structure or shore-to-vessel, vessel-to-shore or fixed structure or vessel-to-vessel.

(b) *Access to barges.* (1) Ramps for access of vehicles to or between barges shall be of adequate strength, provided with side boards, well maintained, and properly secured.

(2) Unless employees can step safely to or from the wharf, float, barge, or river towboat, either a ramp, meeting the requirements of paragraph (b)(1) of this section, or a safe walkway, shall be provided.

(3) Jacob's ladders shall be of the double rung or flat tread type. They shall be well maintained and properly secured.

(4) A Jacob's ladder shall either hang without slack from its lashings or be pulled up entirely.

(5) When the upper end of the means of access rests on or is flush with the top of the bulwark, substantial steps properly secured and equipped with at least one substantial hand rail approximately 33 inches in height, shall be provided between the top of the bulwark and the deck.

(6) Obstructions shall not be laid on or across the gangway.

(7) The means of access shall be adequately illuminated for its full length.

(8) Unless the structure makes it impossible, the means of access shall be so located that the load will not pass over employees.

(c) *Working surfaces of barges.* (1) Employees shall not be permitted to walk along the sides of covered lighters or barges with coamings more than 5 feet high, unless there is a 3-foot clear walkway, or a grab rail, or a taut handline is provided.

(2) Decks and other working surfaces shall be maintained in a safe condition.

(3) Employees shall not be permitted to pass fore and aft, over, or around deckloads, unless there is a safe passage.

(4) Employees shall not be permitted to walk over deckloads from rail to coaming unless there is a safe passage.

If it is necessary to stand at the outboard or inboard edge of the deckload where less than 24 inches of bulwark, rail, coaming, or other protection exists, all employees shall be provided with a suitable means of protection against falling from the deckload.

(d) *First-aid and lifesaving equipment.* (1) Provisions for rendering first aid and medical assistance shall be in accordance with subpart D of this part.

(2) The employer shall ensure that there is in the vicinity of each barge in use at least one U.S. Coast Guard-approved 30-inch lifering with not less than 90 feet of line attached, and at least one portable or permanent ladder which will reach the top of the apron to the surface of the water. If the above equipment is not available at the pier, the employer shall furnish it during the time that he is working the barge.

(3) Employees walking or working on the unguarded decks of barges shall be protected with U.S. Coast Guard-approved work vests or buoyant vests.

(e) *Commercial diving operations.* Commercial diving operations shall be subject to subpart T of part 1910, §§1910.401–1910.441, of this chapter.

[39 FR 22801, June 24, 1974, as amended at 42 FR 37674, July 22, 1977]

§ 1926.606 Definitions applicable to this subpart.

(a) *Apron*—The area along the waterfront edge of the pier or wharf.

(b) *Bulwark*—The side of a ship above the upper deck.

(c) *Coaming*—The raised frame, as around a hatchway in the deck, to keep out water.

(d) *Jacob's ladder*—A marine ladder of rope or chain with wooden or metal rungs.

(e) *Rail*, for the purpose of §1926.605, means a light structure serving as a guard at the outer edge of a ship's deck.

Subpart P—Excavations

AUTHORITY: Sec. 107, Contract Worker Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); Secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), or 9–83 (48 FR 35736), as applicable, and 29 CFR part 1911.

SOURCE: 54 FR 45959, Oct. 31, 1989, unless otherwise noted.

§ 1926.650 Scope, application, and definitions applicable to this subpart.

(a) *Scope and application.* This subpart applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.

(b) *Definitions applicable to this subpart.*

Accepted engineering practices means those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such system is designed, specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system) means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross braces mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or *sides* means the vertical or inclined earth surfaces formed as a result of excavation work.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous atmosphere means an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kickout means the accidental release or failure of a cross brace.

Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with §1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sides. See "Faces."

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural ramp means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated data means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less

(measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box. See "Shield."

Trench shield. See "Shield."

Uprights means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

Wales means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

§ 1926.651 Specific excavation requirements.

(a) *Surface encumbrances.* All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

(b) *Underground installations.* (1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

(2) Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

(3) When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(4) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

(c) *Access and egress*—(1) *Structural ramps.* (i) Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

(ii) Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

(iii) Structural members used for ramps and runways shall be of uniform thickness.

(iv) Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

(v) Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

(2) *Means of egress from trench excavations.* A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

(d) *Exposure to vehicular traffic.* Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

(e) *Exposure to falling loads.* No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with § 1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.

(f) *Warning system for mobile equipment.* When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

(g) *Hazardous atmospheres*—(1) *Testing and controls.* In addition to the requirements set forth in subparts D and E of this part (29 CFR 1926.50–1926.107) to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

(i) Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

(ii) Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.

(iii) Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.

(iv) When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

(2) *Emergency rescue equipment.* (i) Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

(ii) Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

(h) *Protection from hazards associated with water accumulation.* (1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

(2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(3) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (h)(1) and (h)(2) of this section.

(i) *Stability of adjacent structures.* (1) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

(2) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably

expected to pose a hazard to employees shall not be permitted except when:

(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

(ii) The excavation is in stable rock; or

(iii) A registered professional engineer has approved the determination that the structure is sufficently removed from the excavation so as to be unaffected by the excavation activity; or

(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

(3) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

(j) *Protection of employees from loose rock or soil.* (1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

(2) Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

(k) *Inspections.* (1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

(2) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

(l) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with §1926.502(b) shall be provided where walkways are 6 feet (1.8 m) or more above lower levels.

[54 FR 45959, Oct. 31, 1989, as amended by 59 FR 40730, Aug. 9, 1994]

§ 1926.652 Requirements for protective systems.

(a) *Protection of employees in excavations.* (1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c) of this section except when:

(i) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 5 feet (1.52m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

(2) Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

(b) *Design of sloping and benching systems.* The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3), or, in the alternative, paragraph (b)(4), as follows:

(1) *Option (1)—Allowable configurations and slopes.* (i) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical

(34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in paragraph (b)(1)(i) of this section, shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to this subpart.

(2) *Option (2)—Determination of slopes and configurations using Appendices A and B.* Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in appendices A and B to this subpart.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and shall include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project; and

(C) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

(c) *Design of support systems, shield systems, and other protective systems.* Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or, in the alternative, paragraph (c)(3); or, in the alternative, paragraph (c)(4) as follows:

(1) *Option (1)—Designs using appendices A, C and D.* Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in appendices A and C to this subpart. Designs for aluminum hydraulic shoring shall be in accordance with paragraph (c)(2) of this section, but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with appendix D.

(2) *Option (2)—Designs Using Manufacturer's Tabulated Data.* (i) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(ii) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

(iii) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall

be made available to the Secretary upon request.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and include all of the following:

(A) Identification of the parameters that affect the selection of a protective system drawn from such data;

(B) Identification of the limits of use of the data;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include the following:

(A) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

(B) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Secretary upon request.

(d) *Materials and equipment.* (1) Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

(2) Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(3) When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

(e) *Installation and removal of support*—(1) *General.* (i) Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(ii) Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(iii) Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

(iv) Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(v) Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

(vi) Backfilling shall progress together with the removal of support systems from excavations.

(2) *Additional requirements for support systems for trench excavations.* (i) Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and

there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

(ii) Installation of a support system shall be closely coordinated with the excavation of trenches.

(f) *Sloping and benching systems.* Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

(g) *Shield systems*—(1) *General.* (i) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

(ii) Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

(iii) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

(iv) Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

(2) *Additional requirement for shield systems used in trench excavations.* Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

APPENDIX A TO SUBPART P OF PART 1926—SOIL CLASSIFICATION

(a) *Scope and application*—(1) *Scope.* This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) *Application.* This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in §1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in §1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) *Definitions.* The definitions and examples given below are based on, in whole or in part, the following: American Society for Testing Materials (ASTM) Standards D653–85 and D2488; The Unified Soils Classification System, The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS–121.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.

Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt, (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.