SUBMITTED TO:
PACCAR Inc

BY:
Shannon & Wilson
400 N. 34th Street, Suite 100
Seattle, WA 98103

(206) 632-8020
www.shannonwilson.com

ENGINEERING DESIGN REPORT

Excavation Areas 3, 4, 5, and 8; Clay Cap and Asphalt/Concrete Covers; and Institutional Controls

8801 EAST MARGINAL WAY S., TUKWILA, WASHINGTON
AGREED ORDER N: 6069

SHANNON & WILSON

September 7, 2021

Shannon & Wilson No: 21-1-12567-027

Submitted To: PACCAR Inc

Subject: ENGINEERING DESIGN REPORT, EXCAVATION AREAS 3, 4, 5, AND 8; CLAY CAP AND ASPHALT/CONCRETE COVERS; AND INSTITUTIONAL CONTROLS, 8801 EAST MARGINAL WAY S., TUKWILA, WASHINGTON AGREED ORDER N: 6069

Shannon & Wilson prepared this report and participated in this project as a consultant to PACCAR Inc. This report presents the Engineering Design Report for targeted excavation at Areas 3, 4, 5, and 8; placement of a clay cap, drainage layer, and asphalt/concrete cover on areas to the west of the proposed new warehouse; and implementation of institutional controls at 8801 East Marginal Way S, Tukwila, Washington.

This report is one of multiple documents that fulfills the Final Engineering Design Report requirements discussed in Task 2C of Agreed Order No. 6069.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON

Ryan Peterson, PE
Environmental Engineer

Scott Gaulke, PE, LHG
Vice President

RBP:SWG:MJS/rbp

EXECUTIVE SUMMARY

The property located at 8801 East Marginal Way South in Tukwila, Washington (8801 property) occupies 24.30 acres on the east bank of the Lower Duwamish Waterway (LDW), as shown in Figure 1. Contaminated soil and groundwater are present at the 8801 property due to historical sources on and off the 8801 property.

This Engineering Design Report (EDR) provides the specifications necessary to implement a subset of the remedial actions described in the Final Feasibility Study, Final Interim Action Work Plan, and the Addendum to the Feasibility Study and Interim Action Work Plan (Addendum). The Final Interim Action Work Plan and the Addendum together constitute the Interim Action Work Plan (IAWP) for the 8801 property.

This EDR is intended to address contaminated soil on the western portion of the 8801 property that contains chemicals of concern (COCs) exceeding the remediation levels. The remedial actions discussed in this EDR will largely be implemented in the area within 100 feet of the western boundary of the 8801 property, also known as the 100-foot river buffer. CenterPoint 8801 Marginal LLC, the owner of the 8801 property, plans to redevelop the property and construct a new warehouse on it. As part of the redevelopment, which is separate from the remedial actions, the 100-foot river buffer will be landscaped to comply with the City of Tukwila shoreline requirements. Consequently, this EDR includes activities that facilitate integration of the remedial actions with the landscaping.

The subset of remedial actions for the western portion of the 8801 property includes targeted excavation at Areas 3, 4, 5, and 8; placement of a clay cap and drainage layer within the 100-foot river buffer; placement of asphalt/concrete covers outside the 100-foot river buffer; and implementation of institutional controls. These remedial actions include the following components:

- Soil will be excavated from Areas 3, 4, 5, and 8 and disposed of at an off-site facility permitted to receive such waste. Approximately 7,600 tons of non-hazardous soil could be excavated from up to 12 feet below ground surface. The excavations will be backfilled using clean imported fill meeting criteria described in the Compliance Monitoring Plan (CMP).
- The 100-foot river buffer will be graded, capped with clay, covered with a drainage layer, and landscaped.
- Asphalt/concrete covers will be placed east of the 100-foot river buffer and west of the proposed new warehouse which will pave areas where soil contains COCs at

concentrations exceeding the cleanup levels. The asphalt/concrete covers will be incorporated into the new parking lot proposed as part of the redevelopment. The asphalt/concrete covers will be sloped to direct runoff to storm sewers.

- The clay cap and asphalt/concrete covers will serve as engineered controls to limit human exposure to underlying contaminated soils and to limit infiltration of stormwater, which will prevent contamination from leaching from unsaturated soil to groundwater and then migrating to surface water.
- Institutional controls will be implemented across the western portion of the 8801 property, consisting of inspection and maintenance requirements for the clay cap and asphalt/concrete covers, limitations on activities that could disturb or expose contaminated soil beneath the clay cap, drainage layer, or asphalt/concrete covers, compliance with an Operations and Maintenance Plan if contaminated soil beneath the clay cap or asphalt/concrete covers will be exposed or handled, and limitations on the use of groundwater. The institutional controls will be incorporated into an environmental covenant, which will be executed by CenterPoint and recorded against title to the 8801 property.
- Compliance monitoring for the remedial actions described in this EDR is discussed in the CMP.

Other remedial actions to be completed on the western portion of the 8801 property are discussed in separate EDR and include extension and modification of the existing air sparging (AS)/soil vapor extraction (SVE) system and enhanced reductive dechlorination.

The preceding summary is provided for introductory use only. We recommend a thorough reading of the complete report.

CONTENTS

CONTENTS

Exhibits

Figures

Appendices

ACRONYMS

AO	Agreed Order
AS	air sparging
bgs	below ground surface
COC	chemical(s) of concern
CMP	Compliance Monitoring Plan
CULs	cleanup levels
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
GPS	global positioning system
HSP	Health and Safety Plan
IAWP	Interim Action Work Plan
LDW	Lower Duwamish Waterway
mg/m^3	milligrams per cubic meter
MTCA	Model Toxics Control Act
PCBs	polychlorinated biphenyls
POC	point(s) of compliance
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RL	remediation level
SAP	Sampling and Analysis Plan
SEPA	State Environmental Policy Act
SVE	soil vapor extraction
UECA	Uniform Environmental Covenant Act
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

1 INTRODUCTION

The upland portion of the property located at 8801 East Marginal Way S in Tukwila, Washington (8801 property) (Figure 1) and the adjoining sediments in the Lower Duwamish Waterway (LDW) together constitute the 8801 site. The 8801 site is subject to two separate Agreed Orders (AOs): AO No. 6069, which applies to the 8801 property, and AO No. 3599, which applies to the adjoining LDW sediments. This report is one of multiple documents that fulfills the Final Engineering Design Report requirements discussed in Task 2C of AO No. 6069.

This EDR provides the specifications necessary to implement a subset of the remedial actions that were selected for the 8801 property in the Final Feasibility Study, Final Interim Action Work Plan, and Addendum to the Feasibility Study and Interim Action Work Plan (Addendum) (Shannon & Wilson, 2020a, 2020b, and 2020c). The Final Interim Action Work Plan and the Addendum together constitute the Interim Action Work Plan (IAWP) for the 8801 property. This subset of remedial actions includes targeted excavation at Areas 3, 4, 5, and 8 (Figure 2); placement of a clay cap and drainage layer in the 100-foot river buffer; placement of asphalt/concrete covers over the remaining western one-third of the 8801 property; and implementation of institutional controls. Compliance monitoring for the remedial actions described in this EDR are discussed in the Compliance Monitoring Plan (CMP) (Shannon & Wilson, 2021). The Sampling and Analysis Plan (SAP) is an appendix of the CMP.

2 SITE DESCRIPTION

This section presents an overview of the 8801 property location, history, geology, and hydrogeology. Additional information is provided in the Final Feasibility Study and Final Interim Action Work Plan.

2.1 Physical Description and Use

The 8801 property occupies 24.30 acres on the east bank of the LDW and is relatively flat, with a ground surface elevation of approximately 20 feet above mean sea level (MSL).

The property owner, CenterPoint 8801 Marginal LLC, plans to redevelop the 8801 property by constructing an approximately 414,400-square foot warehouse for industrial use and trailer storage on the property. The redevelopment is slated to commence in 2021. The

redevelopment plans include demolition of the existing buildings, except a part of the smaller warehouse on the west end of the 8801 property that houses the aboveground infrastructure for the existing air sparging (AS)/soil vapor extraction (SVE) system. This building is referred to as the "Small Warehouse" and the portion of the Small Warehouse that will not be demolished is referred to as the "Equipment Room." After demolition of the Small Warehouse is complete, various remedial actions will be implemented, including excavation and removal of contaminated soil from several locations and installation of a clay cap and drainage layer within the 100-foot river buffer located along the western edge of the 8801 property. Much of the remainder of the western one-third of the 8801 property will be covered with an asphalt/concrete parking lot and the foundation of the new warehouse. The features of the proposed redevelopment are shown in Appendix B.

2.2 Geology

The 8801 property is currently paved. Fill material underlies paved surfaces and is up to 10 feet thick in some locations. Fill material includes gravelly structural fill beneath buildings and paved areas, poorly graded sand to silty sand fill deposits, and gravelly backfill materials in excavations. Fill material at the 8801 property is underlain by a layer of fine-grained material, including silt, sandy silt, and silty sand that extends to a depth of 5 to 15 feet below ground surface (bgs). A poorly graded sand layer, which typically contains less than 10% silt, is generally present beneath the fine-grained layer beginning at 10 to 15 feet bgs, although at some locations it is present immediately beneath the pavement surface or the fill material. A layer of fine-grained materials, consisting mainly of silt and silty sand, is typically present beneath the poorly graded sandy layer at depths of approximately 30 to 50 feet bgs. This fine-grained silty material acts as a confining layer to groundwater flow on the western portion of the 8801 property. The lower, fine-grained layer is typically underlain by poorly graded sand to the maximum depth explored at the 8801 property (60 feet bgs).

2.3 Hydrogeology

Results of groundwater monitoring at the 8801 property indicate that the shallow aquifer is typically 8 to 10 feet bgs. The hydraulic gradient in the shallow aquifer is generally toward the west. Groundwater velocity is estimated to be 40 feet per year.

Results of tidal influence analyses indicate that the maximum tidal fluctuation along the western boundary of the 8801 property ranges from -3.03 feet relative to MSL to +1.85 feet MSL in the southern portion of the 8801 property, where riprap demarcates the 8801 property boundary. Farther north, where the sheet piling bulkhead demarcates the 8801

property boundary, the maximum tidal fluctuation ranges between -1.80 feet MSL and +1.32 feet MSL.

The hydraulic gradient in the shallow aquifer is generally toward the west. Groundwater velocity is estimated to be 40 feet per year.

3 CLEANUP STANDARDS AND REMEDIATION LEVEL

Cleanup standards consist of cleanup levels (CULs) and points of compliance (POCs) where the CULs must be attained. A remediation level (RL) consists of a concentration of a COC above which a cleanup action component will be required as part of a cleanup action. The CULs and RLs described in this section apply to the remedial actions described in this EDR and other remedial actions described in the IAWP.

3.1 Soil Cleanup Levels (CULs)

The CULs for soil are provided in the IAWP. The starting point for establishing the CULs was the Washington State Department of Ecology (Ecology) preliminary CULs, which are based on various exposure pathways, including soil partitioning to groundwater, and entering surface water, and are protective of sediment, surface water, and consumption of fish. The CULs are based on applicable state and federal or relevant and appropriate requirements. The values were then adjusted for practical quantitation limits achievable by analytical laboratories and for natural background concentrations of COCs, as appropriate.

The soil CULs will be used to determine the limits of the remedial excavation at Areas 5, where cadmium, chromium, and lead are present at concentrations exceeding the CULs, and have been used to identify the predetermined limits of the remedial excavation at Area 8, where gasoline-range hydrocarbons are the only COC and they are present at concentrations exceeding the CULs. The CULs for the COCs in soil at Areas 5 and 8 are provided in Exhibit 3-1.

Exhibit 3-1: Areas 5 and 8 Soil Cleanup Levels (CULs)

Analyte	Cleanup Level (milligrams per kilogram)
Cadmium	5.1
Chromium	2,600
Gasoline-range hydrocarbons	250
Lead	250

3.2 Soil Remediation Levels (RLs)

The RLs for soil are provided in Exhibit 3-2. The RLs have been developed in accordance with Washington Administrative Code (WAC) 173-340-355 and take into consideration the expectations for cleanup alternatives in WAC 173-340-370. The IAWP discusses the selection procedure for RLs.

Exhibit 3-2: Soil Remediation Levels

Analyte	Remediation Level (milligrams per kilogram)
Arsenic	14.6
Copper	250
Oil-range hydrocarbons	4,000
Total cPAHs toxicity equivalency quotient	0.6
Total PCB aroclors	0.5

NOTES:
cPAHs = carcinogenic polycyclic aromatic hydrocarbons; PCB = polychlorinated biphenyls

The RLs will be used to delineate the limits of the remedial excavations at Areas 3 and 4 and will be used to guide the remedial excavation at Area 5, where arsenic and PCBs are present at concentrations exceeding the RLs. Due to the stringent values required to ensure that soil is protective of the leaching pathway, the selected RLs will result in the removal of a significant mass of COCs.

3.3 Points of Compliance for Soil CULs and RLs

The Model Toxics Control Act (MTCA) defines the POC as the point or points at which CULs must be attained. The POCs for the soil CULs and soil RLs are as follows:

- The POC demonstrating compliance for pathways protective of human health, namely potential direct contact, inhalation, or ingestion of impacted soil, shall be established in the soil throughout the 8801 property from the ground surface to 15 feet bgs (Washington Administrative Code [WAC] 173-340-740(6)(d)).
- The POC demonstrating protection of groundwater shall be established in soil throughout the 8801 property (WAC 173-340-740(6)(b)).
- The POC demonstrating compliance for pathways protective of human health and the environment by migration of chemicals from soil to air shall be established in the soil from the ground surface to the top of the uppermost saturated zone throughout the 8801 property (i.e., the vadose zone) (WAC 173-340- 740(6)(c)).

4 REMEDY OVERVIEW

The remedial actions described in this EDR consist of targeted excavation at Areas 3, 4, 5, and 8; placement of a clay cap and drainage layer within the 100-foot river buffer; placement of asphalt/concrete covers over the remaining western one-third of the 8801 property; and implementation of institutional controls. These remedial actions protect human health and the environment, employ reliable and proven technologies, and can be completed within a reasonable timeframe.

The remedial actions include the following components:

- Soil will be excavated from Areas 3, 4, 5, and 8 and will be disposed of at an off-site facility permitted to receive such waste. The excavations will be backfilled using clean imported fill meeting criteria described in the CMP. Soil COCs being targeted in each excavation area are as follows:
  - Area 3: removal of polychlorinated biphenyls (PCBs), copper, and gasoline-range hydrocarbons
  - Area 4: removal of PCBs and dioxin/furans
  - Area 5: removal of PCBs, arsenic, and lead, and cadmium, and chromium in near surface soil
  - Area 8: removal of gasoline-range hydrocarbons
- After completion of the remedial excavations, the 100-foot river buffer will be graded, capped with clay, and covered with a drainage layer. The remainder of the western one-third of the 8801 property will be covered with asphalt/concrete covers, which will be incorporated into the new parking lot proposed as part of the redevelopment. The asphalt/concrete covers will be sloped to direct runoff to storm sewers. Details of the clay cap, drainage layer and asphalt/concrete covers are shown in Appendices A and B.
- The clay cap and asphalt/concrete covers will serve as engineered controls to limit human exposure to underlying contaminated soils and to limit infiltration of stormwater, which will prevent contamination from leaching from unsaturated soil to groundwater and then migrating to surface water.
- Institutional controls will be implemented across the western portion of the 8801 property, consisting of inspection and maintenance requirements for the clay cap and asphalt/concrete covers, limitations on activities that could disturb or expose contaminated soil beneath the clay cap or asphalt/concrete covers, compliance with an Operations and Maintenance Plan if contaminated soil beneath the clay cap or asphalt/concrete covers will be exposed or handled, and limitations on the use of groundwater. The institutional controls will be incorporated into an environmental covenant, which will be executed by CenterPoint and recorded against title to the 8801 property.

- Compliance monitoring for the remedial actions described in this EDR is discussed in the CMP.

Other remedial actions to be completed on the western portion of the 8801 property are discussed in separate EDRs and include extension and modification of the existing air sparging (AS)/soil vapor extraction (SVE) system and enhanced reductive dechlorination injection into groundwater.

The remedial actions described in this EDR are anticipated to require several months and are scheduled to commence in 2021.

5 DESIGN AND IMPLEMENTATION

The purpose of this section is to provide a detailed description of the engineering design to implement the remedial actions.

5.1 Objective

The objective of the remedial actions described in this EDR is to remove pathways for contamination to impact potential receptors. The remedial actions fulfill this objective by eliminating high concentrations of COCs by removing them from the 8801 property, covering remaining contaminated soil with clay, asphalt, and concrete to prevent exposure to and migration of contamination, and implementing institutional controls to inspect and maintain the clay cap and asphalt/concrete covers and to limit uses at the 8801 property that could expose contaminated soil or extract contaminated groundwater.

5.2 Potentially Applicable or Relevant and Appropriate Requirements

The activities described in this EDR consist of remedial actions that will occur under the terms of an AO entered into with Ecology. As such, these remedial actions are exempt from the procedural requirements of Chapters 70A.15, 70A.205, 70A.305, 77.55, 90.48, and 90.58 Revised Code of Washington (RCW) and the procedural requirements of any laws requiring or authorizing local government permits or approvals. The remedial actions must nonetheless comply with the substantive provisions of state and local laws and regulations.

Potentially applicable or potentially relevant and appropriate requirements that might apply to these remedial actions include:

- The State Environmental Policy Act (SEPA) as authorized by RCW 43.21C and WAC 197-11. A SEPA checklist for the IAWP, which includes the remedial actions described

in this report, has been completed, a determination of non-significance issued, and the document provided for public review.

- Occupational Safety and Health Act and Washington Industrial Safety and Health Act regulations (29 Code of Federal Regulations 1910.120; WAC 296-843). Details to address this are provided in the Health and Safety Plan (HSP) attached to the CMP.
- Washington Industrial Safety and Health Act, Chapter 49.17 RCW, Safety Standards for Construction Work (WAC 296-155). Details to address this are provided in the HSP attached to the CMP.
- Underground Utilities, RCW 19.122.010, General Protection Requirements (WAC 296-155-655).
- City of Tukwila zoning, building, and construction regulations (e.g., grading, stormwater, and shoreline requirements).
- Requirements for decommissioning of groundwater monitoring wells (WAC 173-160). A licensed driller will submit a notice of intent to Ecology's Water Resources Program prior to decommissioning the monitoring wells as detailed in the CMP.
- Resource Conservation and Recovery Act (RCRA) regulations for waste generation, hauling, and disposal (WAC 173-303; WAC 173-350).
- Solid Waste Management Chapter 43.21 RCW, Minimum Functional Standards for Solid Waste Handling (WAC 173-304) for waste handling.

5.3 Pre-Mobilization Coordination

Pre-mobilization coordination activities will include, but are not limited to, the following:

- Addressing any overlapping health and safety issues with the project team.
- Communicating the project schedule with the project team.
- Notifying Ecology about the anticipated field schedule at least five working days prior to the scheduled start of the remedial actions.
- Performing a utility locate prior to each remedial excavation.
- Communicating with the laboratory about the laboratory requirements included in the SAP.
- Communicating with the off-site waste disposal facility regarding the acceptance of solid waste generated on the 8801 property.
- Coordinating with the appropriate wastewater facility regarding acceptance of any discharged stormwater or groundwater.

5.4 Site Preparation

The following tasks will be completed prior to commencing the remedial excavations:

- The Small Warehouse will be demolished except for the Equipment Room (Appendix B).
- Groundwater monitoring well MW-43A will be decommissioned, since it is within Area 5. The procedures for decommissioning of wells are described in the CMP.
- Existing asphalt and concrete pavements will be removed from the surface of the excavation areas and throughout the 100-foot river buffer except where existing infrastructure will remain (north and south stormwater vaults and the Equipment Room).

5.5 Targeted Excavation of Soil

The purpose of this section is to provide a detailed description of the targeted excavations that will be implemented as remedial actions and provide details on the work in the 100-foot river buffer.

5.5.1 Excavations

The initial boundary of each excavation will be determined using a global positioning system (GPS) receiver. To the extent practicable, each excavation will be cut vertically to minimize the removal of non-impacted media. The soil in each excavation area will be excavated in an iterative manner, as necessary, until CULs or RLs are achieved, as applicable, except in Area 8, where subsurface structures limit lateral and vertical extent of excavation.

The COC driving the excavation in Area 8 is gasoline-range hydrocarbons and the objective is to remove the soil from Area 8 containing gasoline-range hydrocarbons at concentrations exceeding the CUL. The vertical limit of the excavation in Area 8 is limited by a concrete structure present at a depth of approximately 14 feet bgs. The nature of the concrete structure is unknown; it may be an old utility or alternately a structural feature associated with the adjacent steel pile wall. To protect this structure, the excavation will not extend below 10 feet bgs. The lateral limits of excavation in Area 8 are limited by a steel pile retaining wall on its west side, an oil-water separator vault on its east side, and a stormwater treatment vault on its north side. To protect these structures, the excavation will terminate before reaching these structures. Additionally, the excavation is limited to the south to prevent unloading the sheet pile wall and causing structural impacts to the sheet pile wall. Due to the limitations imposed by the subsurface structures under and surrounding Area 8, gasoline-range hydrocarbons will remain in soil at the base and potentially the sidewalls of the excavation at concentrations exceeding the CUL.

The locations of the excavations are provided on Figures 2 and 3, which depict the initially targeted or predetermined lateral excavation limits. Cross sections of the excavations are provided in Figures 5 through 9, which depict the initially targeted or predetermined vertical excavation limits.

Due to the depth, the excavations may require preventive measures (e.g., sloping or shoring) per Occupational Safety and Health Act regulations. However, the methodology employed for the excavations will be selected by the contractor subject to the objectives of the excavation being met. If the contractor chooses to use shoring, then a design stamped by an engineer will be provided to Shannon & Wilson for review in advance of installation, unless a shore box is utilized. Dewatering methodologies will also be selected by the contractor. Any excavation water removed will be treated to meet discharge requirements under conditions of the discharge permit (likely the sanitary sewer).

5.5.2 Pre-Excavation Base Sampling

Three of the excavations (Areas 4, 5, and 8) on the western side of the 8801 property are proposed to extend below the groundwater table or will be in the tidal inundation zone. In February 2021, in accordance with an agreement with Ecology, borings were advanced, and samples were collected and analyzed to identify the maximum excavation depths in Areas 4, 5, and 8, to collect base samples in advance of the excavation. The borings were placed in locations where the maximum excavation depths were expected to be achieved. Soil samples were collected from the borings at the targeted excavation depth, and 1 foot above and 1 foot below the targeted depth. The sample collected from the targeted depth was analyzed first for the COCs applicable to the excavation area. If the COCs in the sample were below the applicable CUL or RL, then the shallower sample was analyzed, and if any of the COCs in the sample were above the applicable CUL or RL then the deeper sample was analyzed. The laboratory data was validated in accordance with the quality control measured detailed in the CMP. The sample results for each excavation area are summarized in the following sections.

5.5.2.1 Area 4

In Area 4, the initially targeted excavation depth was 8 feet bgs. In February 2021, four borings were placed where the excavation maximum depth would be achieved (Figure 4). Soil samples were collected at depths at 7, 8, and 9 feet bgs. All four samples collected from 8 feet bgs were analyzed for PCBs and copper, and two (A4-1:8 and A4-3:8) of the samples collected from 8 feet bgs were analyzed for dioxin/furans. The concentrations of PCBs and copper were below the RLs in all four samples at 8 feet bgs. The two samples analyzed for dioxin/furans had concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin below the human

health direct contact value by one order of magnitude. Because no PCBs or copper were detected in the 8-foot samples at concentrations above the RLs and 1,3,7,8-tetrachlorodibenzo-p-dioxin was detected in the 8-foot samples at concentrations below the human health direct contact value, the samples from the 7 foot depth were analyzed for PCBs and copper and there was no need to analyze the deeper samples (9 feet bgs). Copper exceeded the RL in two of the 7-foot depth samples (A4-2:7 and A4-4:7). Based on the sample results, the area 4 excavation will extend to a maximum depth of 8 feet bgs and the samples at 8 feet bgs will be used as the confirmation samples for the base of the excavation.

5.5.2.2 Area 5

In Area 5, the initially targeted excavation depth was 12 feet bgs at the location of monitoring well MW-43A (the deepest location where COCs have been detected above the RLs based on previous sample results). In February 2021, 10 borings were placed where the excavation maximum depth would be achieved (Figure 4). Given the excavation will be sloped to achieve the depth of 12 feet at the location MW-43A, and to ensure targeted removal of the previously identified COCs above the applicable CULs or RLs, a plan section of the excavation design was drawn, and base samples depths determined using the plan to aid in targeting the correct base depths. Samples were collected as follows; six borings were used to target 12 feet bgs, one boring was used to target 10 feet bgs, one boring was used to target 9 feet bgs, and two borings were used to target 8 feet bgs. The samples were analyzed for arsenic, lead, and PCBs. Twenty-one samples were analyzed, and lead was the only COC that exceeded its applicable CUL or RL. Lead was detected at concentrations exceeding the CUL (250 mg/kg) in sample A5-3 at 10 feet bgs, and sample from A5-6 at 8 feet bgs. The deeper samples from A5-3 at 11 feet bgs and A5-6 at 9 feet bgs contained lead concentrations well below the CUL. Based on the sample results, the Area 5 excavation will extend to a maximum depth of 12 feet bgs and much of the excavation depth will range between 9 and 11 feet bgs. The samples collected at 11 feet bgs will be used as the confirmation samples for the base of the excavation.

5.5.2.3 Area 8

In Area 8, the initially targeted excavation depth was 10 feet bgs. In February 2021, a boring was placed in the center of Area 8 where the maximum excavation depth would be achieved (Figure 4). Soil samples were collected from the boring at depths of 9, 10, and 11 feet bgs and analyzed for gasoline-range hydrocarbons. Gasoline-range hydrocarbons were detected in all three samples at concentrations exceeding the CUL. As previously discussed in Section 5.5.1, although gasoline-range hydrocarbons are present below 10 feet bgs at concentrations exceeding the CUL, the excavation in Area 8 will not extend below 10 feet bgs in order to avoid damaging existing infrastructure.

5.5.3 Excavation Specifics

The approximate surface area and depth of each excavation are provided in Exhibit 5-1.

Exhibit 5-1: Excavation Areas Summary

Excavation Area Designation	Primary Chemicals of Concern (COCs)	Approximate Total Depth (feet bgs)	Approximate Surface Area of Soil to be Excavated (square feet)	Estimated Waste Disposal Classification	
				Non-Haz (tons)	Hazardous (tons)
3	PCBs, Copper, Gasoline-Range Hydrocarbons	6	5,400	1,800	0
4	PCBs, Dioxin/Furans	8	1,800	800	0
5	PCBs, Arsenic, Lead, Cadmium, Chromium	12	7,200	4,800	0
8	Gasoline-Range Hydrocarbons	10	200	110	0

NOTE:

This table assumes excavation sidewalls are cut vertically and excavations will not be expanded beyond initial estimates. Excavations may be required to be sloped, which would increase the surface area and waste tonnage. Excavations may be expanded if confirmation samples indicate that contamination exceeding CULs or RLs, as applicable, remains in excavation sidewalls or bottoms.

Further details of the excavations are presented below:

- **Area 3 – E7 and Vicinity:** This excavation is designed to address PCBs, copper, and gasoline-range hydrocarbons in shallow soil (2 to 6 feet bgs) in the unsaturated zone. The initially targeted depth of the excavation is approximately 6 feet bgs. The area surrounding DG11-11 and DG11-12 will first be excavated to 6 feet bgs. The excavation will be stepped out based on visually obvious indications of contamination, such as beige and green putty like material that was encountered in a remedial excavation of similar COCs on the south adjacent property (Figure 2). Samples will be collected from the sidewalls and base of the excavation and analyzed for PCBs, copper, and gasoline-range hydrocarbons. Based on the initially targeted size of the excavation, an estimated 1,800 tons of soil will be removed from the excavation and disposed of as non-hazardous waste at a RCRA Subtitle D landfill.
- **Area 4 – DG11-1 and Vicinity:** This excavation is designed to address PCBs and dioxin/furans in shallow soil (3 to 4 feet bgs) in the unsaturated zone and PCBs and copper in deeper soil (4 to 8 feet bgs) in the unsaturated zone. Based on pre-excavation base sampling conducted in February 2021, the excavation will extend to a maximum depth of 8 feet bgs. Samples will be collected from the east, north, and south sidewalls of the excavation and analyzed for PCBs and copper. The west sidewall of the excavation will not be sampled because the soil in this location consists of clean material imported to backfill a former stormwater vault excavation. And the base of the excavation will not be sampled because a confirmation base sample was collected in

February 2021. Based on the initially targeted size of the excavation, an estimated 800 tons of soil will be removed from the excavation and disposed of as non-hazardous waste at a Subtitle D landfill.

- **Area 5 – Southwest Storage Area:** This excavation is designed to address lead, arsenic, cadmium, and chromium in shallow soil (1 to 5 feet bgs) in the unsaturated zone and PCBs and lead in deeper soil (5 to 12 feet bgs) in the unsaturated zone. Based on the pre-excavation base sampling conducted in February 2021, the excavation will extend to a maximum depth of 12 feet bgs. The contractor may decide to use shoring and dewatering at this location given the excavation extends to a depth that is below the water table. Samples will be collected from the north, east and west sidewalls of the excavation in shallow soil (1 to 5 feet bgs) and analyzed for lead, arsenic, cadmium, and chromium. Samples will be collected from the north, east, and west sidewalls of the excavation in deeper soil (5 to 12 feet bgs) and analyzed for PCBs and lead. The south sidewall of the excavation will not be sampled because the soil in this location consists of clean material imported to backfill a former stormwater vault excavation. And the base of the excavation will not be sampled because confirmation base samples were collected in February 2021. Based on the initially targeted size of the excavation, an estimated 4,800 tons of soil will be removed from the excavation and disposed of as non-hazardous waste at a Subtitle D landfill.
- **Area 8 – Northwest Corner**: This excavation is designed to address gasoline-range hydrocarbons in soil (7 to 10 feet bgs) in the unsaturated zone. Based on the pre-excavation base sampling conducted in February 2021, the excavation will extend to a maximum depth of 10 feet bgs. Samples will be collected from the sidewalls of the excavation and analyzed for gasoline-range hydrocarbons. The base of the excavation will not be sampled because a sample was collected from this depth in February 2021. Based on the initially targeted size of the excavation, an estimated 110 tons of soil will be removed from the excavation and disposed of as non-hazardous waste at a Subtitle D landfill.

5.5.4 Confirmation Sampling

Once each excavation area is excavated to the initially targeted dimensions, confirmation samples will be collected in accordance with Section 3.1 of the SAP (appendix in the CMP). Confirmation samples will be collected to confirm that the soil remaining in place is below the applicable CULs or RLs. In Area 8, where infrastructure limits the extent of excavation, gasoline-range hydrocarbons will remain in the sidewalls and base of the excavation at concentrations exceeding the CUL. Except as indicated otherwise in Section 5.5.3, confirmation samples will be collected from the sidewalls and base of each excavation, with a minimum of one sample collected from each sidewall and base. Each excavation will have a unique analytical suite dependent upon the primary COCs previously documented in the area as referenced in Section 5.5.3 and Section 5.2.3 of the CMP (Shannon & Wilson, 2021).

In Areas 3, 4, and 5, if confirmation sample results indicate that the excavation is not in compliance with applicable CULS or RLs, then the excavation will be expanded until compliance is achieved as indicated by sample results. In Area 8, gasoline-range hydrocarbons will remain in the sidewalls and base of the excavation at concentrations exceeding the CULs. A GPS receiver will be used to determine the final excavation boundaries and confirmation sample locations.

The confirmation samples will be collected at the proposed extent of the excavation. Samples will be submitted for a maximum of a two-week turnaround time at the laboratory, with a request for a shorter turnaround time. The excavations will be extended if the analyzed soil sample exceeds the relevant RL or CUL except in Area 8.

5.5.5 Backfilling

The excavations will be backfilled using clean imported fill meeting criteria described in the CMP. The backfill will be compacted consistent with requirements in the Washington State Department of Transportation's (WSDOT's) Standard Specifications for Road, Bridge, and Municipal Construction (WSDOT, 2019).

5.5.6 Disposal

Excavated soil will be characterized and disposed of at an off-site facility permitted to receive such wastes.

5.6 Clay Cap, Drainage Layer and Asphalt/Concrete Covers

As shown on Figure 9, the 100-foot river buffer will be landscaped as part of the 8801 property redevelopment. Existing paving will be removed from the 100-foot river buffer (except where the existing north and south stormwater vaults lie and the Equipment Room), and soil will be excavated to a depth that allows an eastward gradient of approximately 2%. This will be under the control of the redevelopment contractor and will be visually assessed before placement of the clay cap. Specifications for materials to be used in the construction of the clay cap and drainage layer are provided in Appendix C.

The clay cap will be provided in rolls that will be placed on the ground within the 100-foot river buffer, unrolled, and then hydrated. The rolls will be spaced at a set distance from each other and after hydration will be inspected to ensure that no gaps exist between the rolls. After the clay is fully hydrated and inspected, a drainage layer will be installed over the clay, consisting of a geotextile fabric spread over the clay and drainage rock of 6- to 8-inch quarry spalls placed over the geotextile fabric and a with a filter fabric above.

Along the eastern boundary of the 100-foot river buffer, a trench will be excavated to greater than 60 inches below the existing surface to place a drainpipe surrounded by 6- to 8-inch quarry spalls. The drainpipe will run north/south and be keyed into the drainage layer in the 100-foot river buffer. The drainpipe will grade northwards to connect with the proposed new stormwater treatment system.

A minimum of 60 inches of soil will be placed over the drainage layer and landscaped per the plan in Appendix B.

The remainder of the western one-third of the 8801 property will be covered with asphalt/concrete covers, which will also serve as the parking lot for the proposed new development. The asphalt/concrete cover will be sloped to direct runoff to storm sewers.

The clay cap and asphalt/concrete covers will serve as engineered controls to limit human exposure to underlying contaminated soils and to limit infiltration of stormwater, which will prevent contamination from leaching from unsaturated soil to groundwater and then migrating to surface water.

5.7 Construction Procedures and Controls

This section describes the construction procedures and controls that will be implemented, as necessary, in conjunction with the remedial actions described in previous sections.

5.7.1 Site Control

A perimeter fence is already in place around the 8801 property to limit public access. The contractor will control fencing access points during construction.

5.7.2 Site Stockpile Management and Procedures

Soil with concentrations of COCs above the RLs will be direct-loaded into dump trucks, to the extent practicable, for off-site disposal. If appropriate, contaminated soil will be stockpiled on the 8801 property to limit delays to the project. The following steps shall be taken if soil is stockpiled:

- The stockpile will be placed on an impervious surface (e.g., concrete, asphalt, or a polyethylene liner with a thickness of at least 10 mils).
- When a stockpile is left overnight or not in use, it will be covered to prevent dust escape, odor emissions, and rainfall contact. The cover shall consist of a polyethylene liner (at least 6 mils), which will be secured with ropes and sandbags.

- A berm shall be installed around the stockpiled soil to prevent runoff from leaving the area and stormwater from entering the stockpile from other areas.
- Stockpiles shall not be placed near drains, watercourses, or other stormwater features.

5.7.3 Dust Control and Monitoring

Best management practices for dust control (e.g., misting/watering of dry soil) will be implemented to suppress dust during construction activities and eliminate visible dust. Misting/watering will not be conducted for stockpiles of potentially contaminated material to minimize contaminant transport to stormwater. Designated construction entrances and wheel washes will be used to prevent contaminated soil from leaving the 8801 property.

Airborne dust monitoring will be conducted during soil excavation activities. Real-time monitoring will be conducted each workday for the duration of the workday at one reasonable maximum exposure sample location (e.g., next to heavy-equipment operators). Each workday may have a different monitoring location depending on the nature of work being conducted that day. A calibrated dust monitor will be used to measure the amount of respirable dust (i.e., particulates less than 10 microns in diameter) in the air. The respirable dust measurements will be logged throughout the day. The field meter will be configured to collect measurements approximately every minute and to emit an alarm if a concentration exceeds the 8801 property's Airborne Dust Action Level of 5 milligrams per cubic meter (mg/m^3). The Airborne Dust Action Level is the permissible exposure limit for the respirable fraction of nuisance dust of 5 mg/m^3 per WAC 296-841-20025.

5.7.4 Groundwater Dewatering and Stormwater Control

Because one of the planned excavations (Area 5) will extend below the typical depth to groundwater at the 8801 property, it is expected that some groundwater will need to be removed from this excavation using a pump in order to complete excavation activities. Any groundwater that is removed from this excavation will be temporarily stored in a large portable tank, pre-treated for suspended solids, and disposed per the contractor's permit requirements.

Generation of stormwater during the remedial actions is not expected; however, the excavations will be protected to prevent drainage of stormwater into them. Any stormwater that ponds in an open excavation will be handled in the same manner as any groundwater removed from Area 5.

5.7.5 Spill Control

The contractors will use best management practices to prevent spills of oil, fuel, and other products containing hazardous substances, and will have spill kits available at the 8801 property to respond to any spills. Any release to the environment will be remedied to Ecology's satisfaction by the contractor responsible for the spill.

5.8 Institutional Controls

Institutional controls will be implemented on the western portion of the 8801 property using an environmental covenant developed in accordance with WAC 173-340-440 and Ecology's Toxics Cleanup Program Procedure 440A. Specifically, the environmental covenant will:

- Restrict activities that could disturb or expose contaminated soil beneath the clay cap and asphalt/concrete covers, including, excavation, grading, digging, or drilling.
- Require regular inspections and, if necessary, repairs of the clay cap and asphalt/concrete covers, in accordance with an Operations and Maintenance Plan. The Operations and Maintenance Plan will also describe the procedures that must be followed if contaminated soil beneath the clay cap or asphalt/concrete covers will be exposed, handled, excavated, or removed.
- Prohibit installation of a water-supply well within the 8801 property.
- Prohibit extraction of groundwater within the 8801 property for any purpose other than temporary construction dewatering, investigation, monitoring, or remediation.
- Require that groundwater extracted for any purpose within the 8801 property be considered potentially contaminated and any discharge of this water be conducted in accordance with state and federal law.
- Require that the potential for vapor intrusion be evaluated prior to the design or construction of any new enclosed structures on the 8801 property.

The covenant will be based on Ecology's template for environmental covenants. Once signed, the environmental covenant will be recorded in the property records of King County in accordance with the Uniform Environmental Covenants Act (UECA) requirements of RCW Chapter 64.70.080(1). A copy of the recorded environmental covenant will also be distributed to each person signing the covenant, each person holding a title interest in the real property subject to the covenant, each person in possession of the real property subject to the covenant at the time the covenant is executed, the City of Tukwila, and Ecology per UECA requirements in RCW Chapter 64.70.070(1).

The environmental covenant and the Operations and Maintenance Plan will be prepared once the remedial actions described in the EDRs for the 8801 property are complete.

5.9 Remedial Action Completion Report

After the remedial actions described in this EDR are completed, a Remedial Action Completion Report documenting the remedial actions will be produced in accordance with WAC 173-340. The Remedial Action Completion Report may also document remedial actions described in other EDRs.

6 COMPLIANCE MONITORING

This section discusses the compliance monitoring that will be undertaken to demonstrate compliance with MTCA. The CMP with additional detail for performance and compliance monitoring has been submitted separately (Shannon & Wilson, 2021).

Three types of compliance monitoring are identified for remedial actions performed under MTCA (WAC 173-340-410): Protection, Performance, and Compliance Monitoring. The definition of each is presented below (WAC 173-340-410 [1]) with project-specific action to be undertaken:

- Protection Monitoring – To confirm that human health and the environment are adequately protected during construction, operation, and maintenance of remedial actions. Protection monitoring for the remedial actions described in this EDR will include:
  - Personal and perimeter air sampling.
  - Implementation of best management practices as discussed in the existing site-specific Stormwater Pollution Prevention Plan for the 8801 property.
  - Implementation of a temporary erosion and sedimentation control plan.
- Performance Monitoring – To evaluate whether remedial actions have attained cleanup standards and other performance standards. Performance monitoring for the remedial actions described in this EDR will include:
  - Waste characterization for off-site treatment or disposal.
  - Archaeological observation during subsurface work.
  - Soil sampling of excavation sidewalls and bottoms.
  - Groundwater sampling from groundwater monitoring wells located downgradient of the remediated areas.
  - Characterization of imported fill material.
- Confirmation Monitoring – To confirm the long-term effectiveness of remedial actions once cleanup standards and other performance standards have been attained. Confirmation monitoring for the remedial actions described in this EDR will include:

- Groundwater sampling from groundwater monitoring wells along the western boundary of the 8801 property to determine if CULs have been achieved. The locations of the proposed confirmation wells and selected analyses are provided in the CMP.

7 LIMITATIONS

Shannon & Wilson has reviewed historical records and conducted subsurface explorations of the 8801 site. We have examined and relied on documents referenced in the report and made assumptions for the design and operation of equipment. We have not conducted an independent examination of all facts contained in referenced materials and statements. We have assumed that these documents are genuine and that the information provided in these documents and statements is true and accurate. We have no knowledge or indication to the contrary unless otherwise stated in the body of this report.

The data presented in this report are based on limited research and sampling at the 8801 site; other areas of contamination that were not identified during investigations could be present at the 8801 site. Conditions referenced in this report may change over time.

8 REFERENCES

Shannon & Wilson, 2020a, Final feasibility study, 8801 East Marginal Way S, Tukwila, Wash.: Report prepared by Shannon & Wilson, Inc., Seattle, Wash., 21-1-12567-021, for PACCAR Inc, Bellevue, Wash., July 27, available https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=93568.

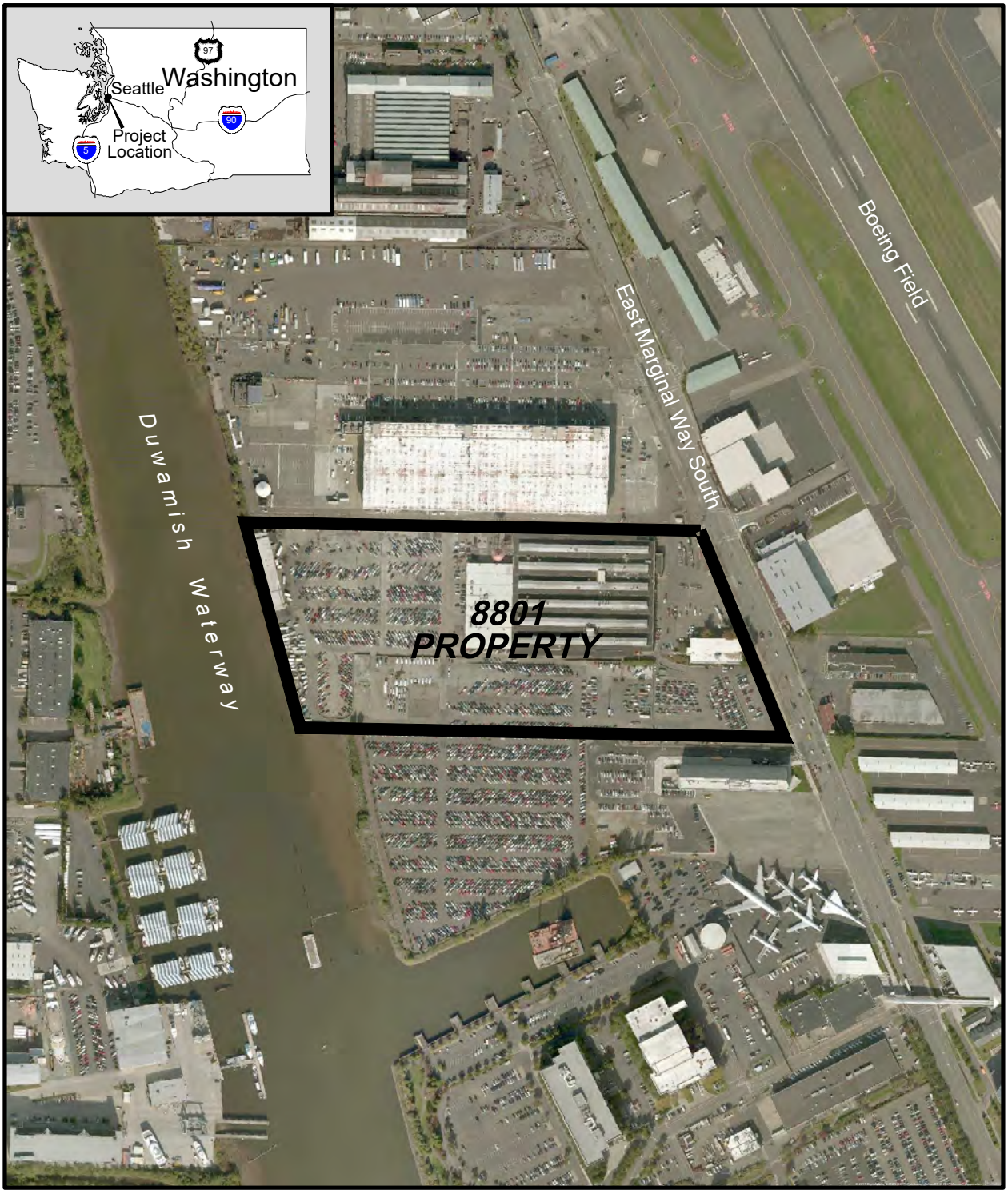
Shannon & Wilson, 2020b, Final interim action work plan, 8801 East Marginal Way S, Tukwila, Wash.: Report prepared by Shannon & Wilson, Inc., Seattle, Wash., 21-1-12567-021, for PACCAR Inc, Bellevue, Wash., July 27, available https://apps.ecology.wa.gov/gsp/DocViewer.ashx?did=93570.

Shannon & Wilson, 2020c, Final feasibility study and interim action work plan addendum, 8801 East Marginal Way S, Tukwila, Wash.: Report prepared by Shannon & Wilson, Inc., Seattle, Wash., 21-1-12567-023, for PACCAR Inc, Bellevue, Wash., December 11.

Shannon & Wilson, 2021, Compliance monitoring plan, 8801 East Marginal Way S., Tukwila, Wash.: Report prepared by Shannon & Wilson, Seattle, Wash., 21-1-12567-024, for PACCAR Inc, Bellevue, Wash., March 15.

Washington State Department of Ecology (Ecology), 2016, Attachment B: Recommended vertical separation distances between contamination and building basement floor, foundation, or crawlspace surface, to updated process for initially assessing the potential for petroleum vapor intrusion, implementation memo no. 14: Olympia, Wash., Washington State Department of Ecology, Publication no. 16-09-046, March 31, available: https://fortress.wa.gov/ecy/publications/SummaryPages/1609046.html

Washington State Department of Transportation (WSDOT), 2019, Standard specifications for road, bridge, and municipal construction, 2020: Olympia, Wash., Washington State Department of Transportation, Publication no. M 41-10, September 1, available: https://www.wsdot.wa.gov/publications/manuals/fulltext/M41-10/SS.pdf



0 500 1,000

Approximate Scale in Feet

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

VICINITY MAP

September 2021 21-1-12567-027

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12567\027\21-1-12567-027 Vicinity Map-a.dwg Date: 07-02-2021 Login: JRS

Sample ID	MW-44B
Depth	7'-8'
Gasoline	8,300

Sample ID	A1
Depth	7.5'-8.5'
Gasoline	5,180

Excavate to 10'

For Sample Results within Area 5, please refer to Figure 3, "Remedial Action Excavation Area 5 Detail"

Excavate to up to 12'

Sample ID	SS-SW-04
Depth	3'-4.5'
Copper	911

Sample ID	SS-SW-05
Depth	7.5'-8'
Copper	336

Sample ID	DG11-1
Depth	3'-4'
PCBs	1.69
Total TEQ D/F	0.000795

Excavate to 8'

Sample ID	C6
Depth	3'-4.5'
Total TEQ D/F	0.000747

Sample ID	DG11-11
Depth	2'-3'
PCBs	1.97
Copper	3,450

Excavate to 6'

Sample ID	DG11-12
Depth	2'-3'
Gasoline	14,000

Excavation work was undertaken previously to the south at the "Rhone-Poulenc NW Corner Excavation." Additional data is in the Feasibility Study, Appendix A.

Wheel Wash Area

Construction Entrance

Conceptual Truck Route
The Route May Vary Dependent on Site Conditions and the Contractor's Means and Methods

EAST MARGINAL WAY

DUWAMISH WATERWAY

STORM – NORTH OUTFALL

STORM – SOUTH OUTFALL

MIDDLE OUTFALL

DEMOLISHED BUILDING

EXISTING BUILDING

SLAB FOUNDATION

N

0 120 240

Scale in Feet

LEGEND

- 3 — Proposed Estimated Excavation Extents with Area Number Designation
- Soil Sample
- MW-36B — Groundwater Monitoring Well
- Fenceline
- ' — Feet

ABBREVIATIONS

PCBs	=	Polychlorinated Biphenyls
cPAHs	=	Carcinogenic Polycyclic Aromatic Hydrocarbons
TEQ	=	Toxicity Equivalency Quotient
D/F	=	Dioxin/Furan
mg/kg	=	Milligrams per Kilograms
HC	=	Hydrocarbons

NOTES

1. Exploration locations are approximate.
2. Base map and historic exploration points are from Kennedy-Jenks Figures 2 and 3, 046001.00/Report/Po4SK003.
3. Concentrations are expressed in milligrams per kilograms (mg/kg).
4. Established project specific remediation level (mg/kg):

Arsenic	14.6
Copper	250
Oil-Range HC	4,000
Total cPAH TEQ	0.6
Total PCB Aroclors	0.5

5. Established project specific cleanup levels for select analytes (mg/kg):

D/F TEQ	0.0000052
Gasoline-Range HC	250

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

REMEDIAL ACTION EXCAVATIONS

September 2021 21-1-12567-027

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\21\12567\027\21-1-12567-027 Chemistry.dwg Layout: Figure 2 Date: 07-07-2021 Login: JRS

Sample ID	BY-1	
Depth	0'-1'	1'-3'
Lead	631	9,220
cPAHs	0.7	--
Oil	5,000	--

Excavate up to 12'

Sample ID	SWS-2		
Depth	3'-5.5'	6'-7.5'	9.5'-11'
Lead	476	1,600	3,430

Sample ID	C5
Depth	3'-4.5'
Lead	287

Sample ID	S5
Depth	4'
Lead	619

Sample ID	BY-3		
Depth	3'-5'	6'-8'	8'-9'
Arsenic	14.7	--	--
Lead	5,200	6,080	520
Copper	380	--	--

Sample ID	S8
Depth	4'
Lead	261

Sample ID	MW-43A		
Depth	2'-3'	6.5'-7.5'	11'-12'
Lead	382J	4,430	463
Copper	8,475	2,560	103

Sample ID	S1
Depth	3'
Lead	1,180

Sample ID	SWS-1	
Depth	3.5'-5'	6'-7'
PCBs	--	1.75
Lead	626	1,030

Sample ID	BY-5
Depth	7'-9'
Lead	1,310

Sample ID	BY-4	
Depth	4'-6'	6'-7.5'
Lead	3,330	3,780

Sample ID	DS-2
Depth	6'-8'
Total TEQ cPAHs	320

Sample ID	SWS-3
Depth	6'-7.5'
Arsenic	10.0

LEGEND

- 5 — Proposed Estimated Excavation Extents with Area Number Designation
- Approximate Stormwater Soil Excavation Area (2007)
- Soil Sample
- MW-36B — Groundwater Monitoring Well
- Fenceline
- ' — Feet

ABBREVIATION

PCBs = Polychlorinated Biphenyls

cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons

mg/kg = Milligrams per Kilograms

HC = Hydrocarbons

NOTES

1. Exploration locations are approximate.
2. Base map and historic exploration points are from Kennedy-Jenks Figures 2 and 3, 046001.00/Report/Po4SK003.
3. Concentrations are expressed in milligrams per kilograms (mg/kg).
4. Established project specific remediation levels (mg/kg):

Arsenic	14.6
Copper	250
Oil-Range HC	4,000
Total cPAH TEQ	0.6
Total PCB Aroclors	0.5

5. Established project specific cleanup levels for select analytes (mg/kg):

Lead	250
Gasoline-Range HC	250

0 20 40

Scale in Feet

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

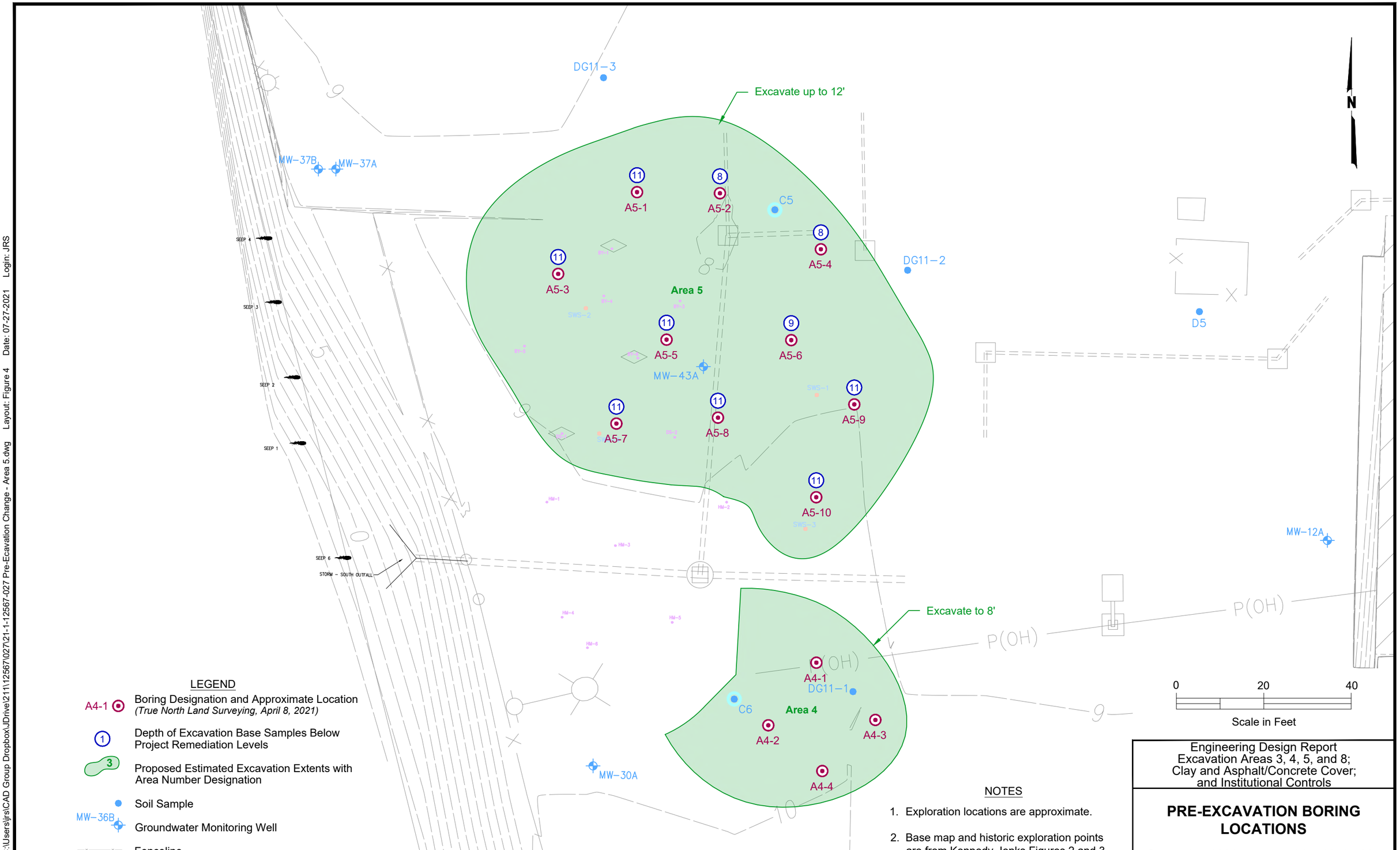
REMEDIAL ACTION EXCAVATION AREA 5 DETAIL

September 2021 21-1-12567-027

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12567\027\21-1-12567-027 Area 5.dwg Layout: Figure 3 Date: 07-02-2021 Login: JRS



LEGEND

- A4-1 — Boring Designation and Approximate Location *(True North Land Surveying, April 8, 2021)*
- (1) — Depth of Excavation Base Samples Below Project Remediation Levels
- 3 — Proposed Estimated Excavation Extents with Area Number Designation
- Soil Sample
- MW–36B — Groundwater Monitoring Well
- Fenceline

NOTES

1. Exploration locations are approximate.
2. Base map and historic exploration points are from Kennedy-Jenks Figures 2 and 3, 046001.00/Report/Po4SK003.

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

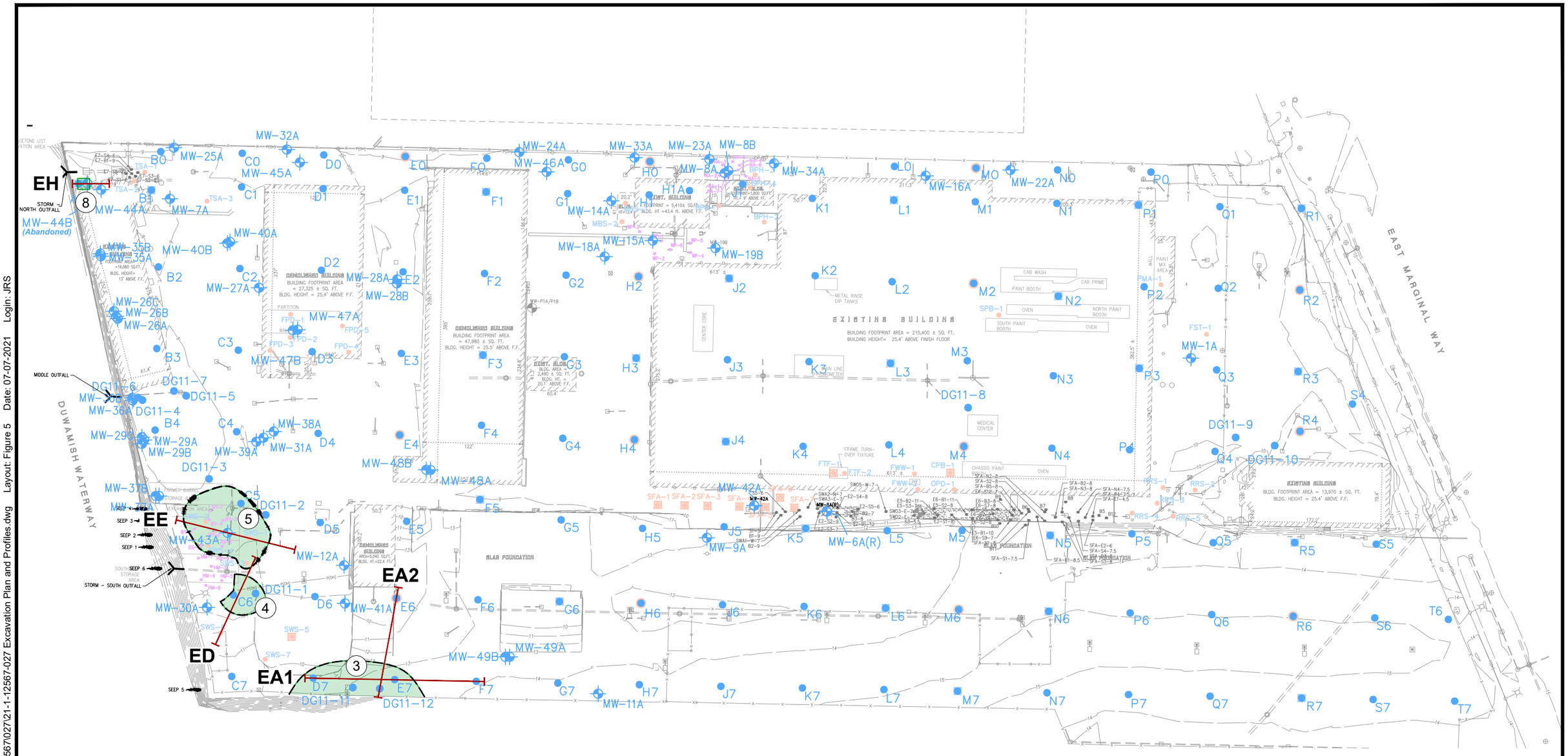
PRE-EXCAVATION BORING LOCATIONS

September 2021 21-1-12567-027

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 4

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\21\12567\027\21-1-12567-027 Pre-Ecavation Change - Area 5.dwg Layout: Figure 4 Date: 07-27-2021 Login: JRS



LEGEND

- 1 — Estimated Excavation Extents and Designation
- MW-47A — Groundwater Monitoring Well
- DG11-8 — Soil Sample
- SFA-1, TSA-3, SWO3-E-7
- EA1 — Proposed Excavation Profile (See Figures D2 through D5)

0 120 240

Scale in Feet
Contour Interval = 1 Foot
Datum = NGVD29

NOTES

1. Exploration locations are approximate.
2. Base map and historic exploration points are from Kennedy-Jenks Figures 2 and 3, 046001.00/Report/Po4SK003..

N

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

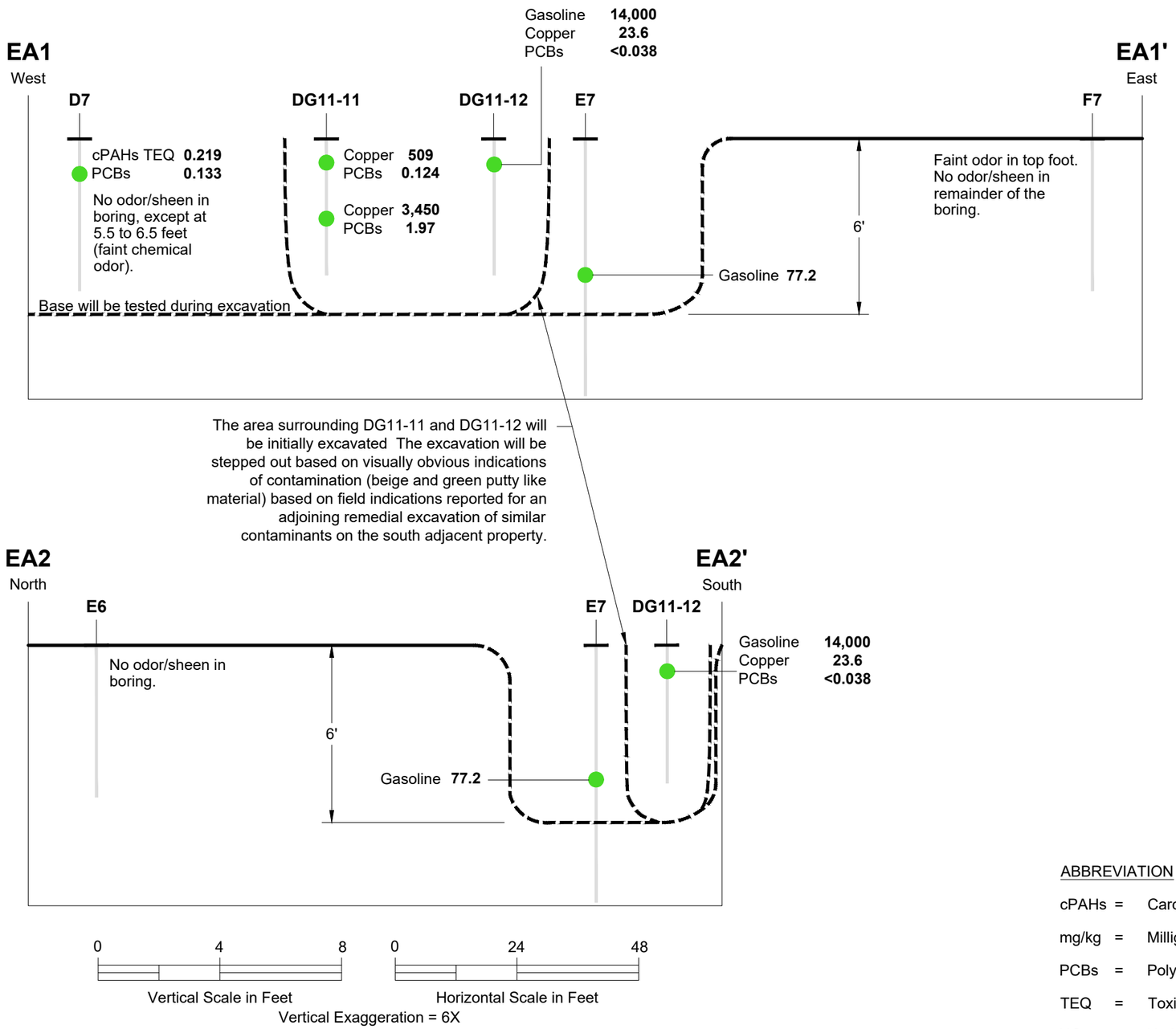
KEY MAP FOR CROSS-SECTIONS

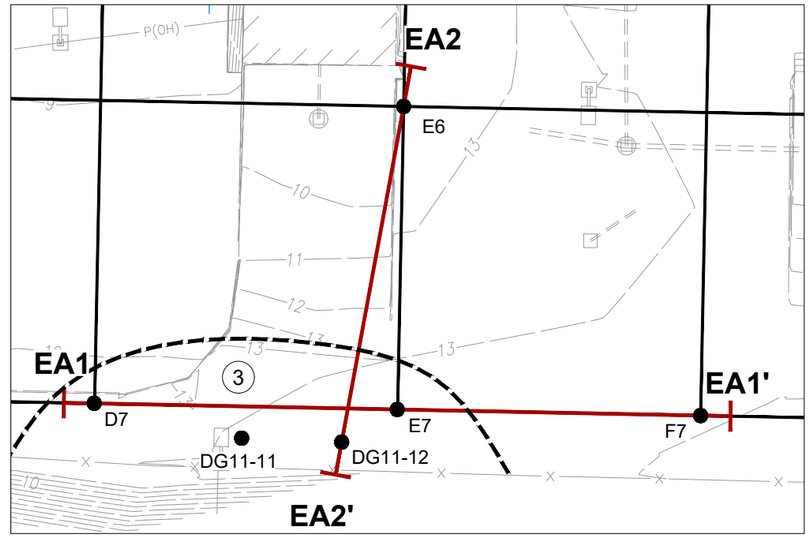
September 2021 21-1-12567-027

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 5

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\21\12567\027\21-1-12567-027 Excavation Plan and Profiles.dwg Layout: Figure 5 Date: 07-07-2021 Login: JRS





PLAN - PROFILE LOCATIONS

0 50 00

Scale in Feet

PLAN LEGEND

E7 ● Soil Sample

Proposed Excavation

EA1 Excavation Profile Location

PROFILE LEGEND

E6 Designation of Boring

Proposed Excavation Limits

Data Result in mg/kg

< Not Detected Above Laboratory Reporting Limit

DATA TABLE	REMEDIATION LEVELS (mg/kg)
Copper	250
Total cPAH TEQ	0.6
Total PCB Aroclors	0.5

DATA TABLE	CLEANUP LEVELS (mg/kg)
Gasoline-Range HC	250

ABBREVIATION

cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons

mg/kg = Milligrams per Kilograms

PCBs = Polychlorinated Biphenyls

TEQ = Toxicity Equivalency Quotient

HC = Hydrocarbons

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

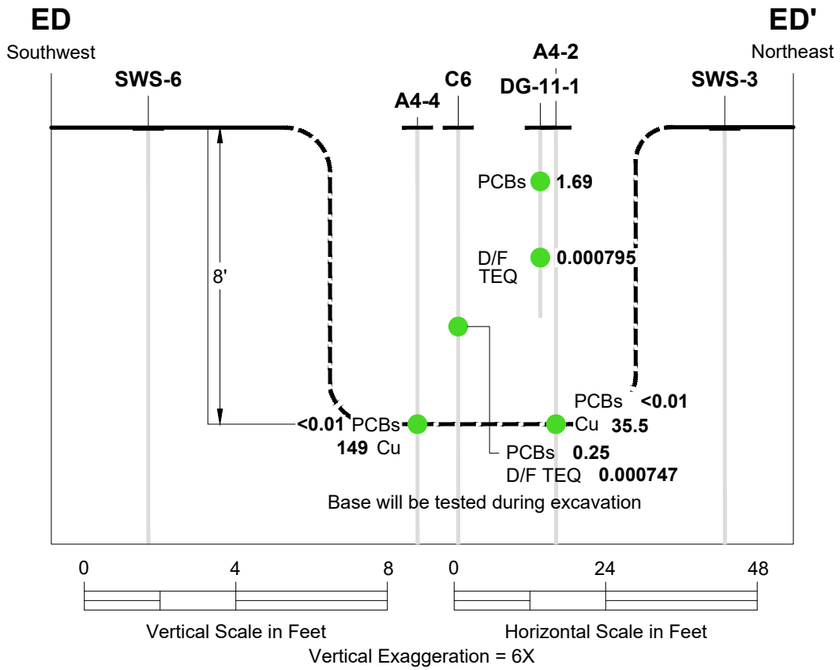
PROPOSED EXCAVATION PROFILES EA1 AND EA2

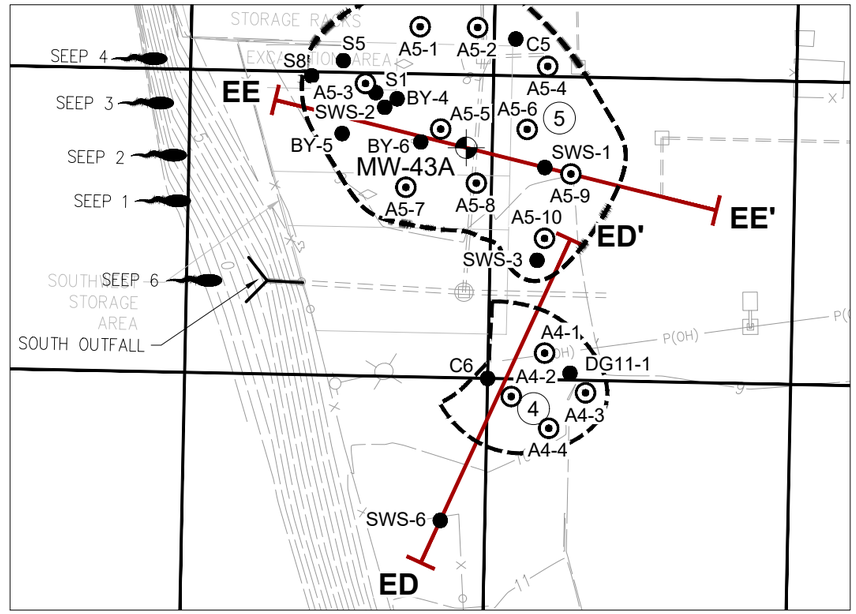
September 2021 21-1-12567-027

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 6

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12567\027\21-1-12567-027 Excavation Plan and Profiles.dwg Layout: Figure 6 Date: 07-07-2021 Login: JRS

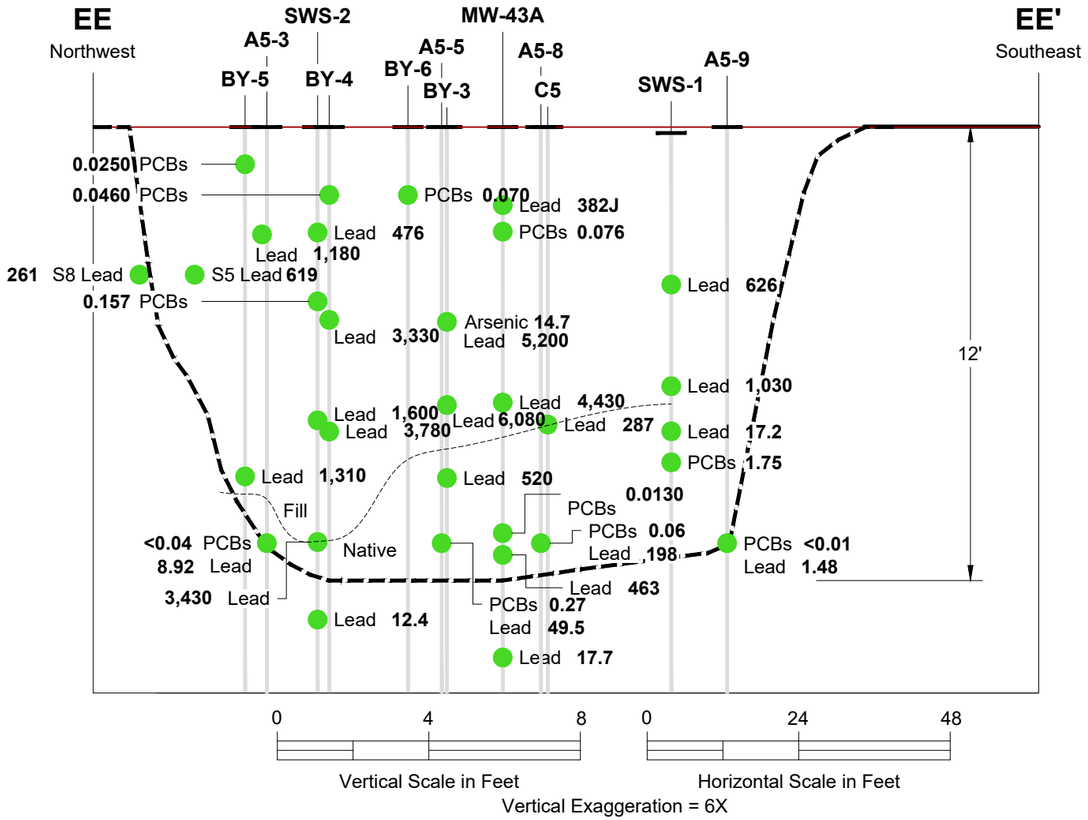




PLAN - PROFILE LOCATIONS

0 50 00

Scale in Feet



PLAN LEGEND

MW-43A	Groundwater Monitoring Well
C6	Soil Sample
A5-1	Borings
	Proposed Excavation
ED	Excavation Profile Location

PROFILE LEGEND

E6	Designation of Boring
	Proposed Excavation Limits
	Data Result in mg/kg
<	Not Detected Above Laboratory Reporting Limit

DATA TABLE	REMEDIATION LEVELS (mg/kg)
Arsenic	14.6
Total PCB Aroclors	0.5
Copper	250

DATA TABLE	CLEANUP LEVELS (mg/kg)
D/F TEQ	0.0000052
Lead	250

ABBREVIATION

Cu	=	Copper
D/F	=	Dioxin/Furans
mg/kg	=	Milligrams per Kilograms
PCBs	=	Polychlorinated Biphenyls
TEQ	=	Toxicity Equivalency Quotient

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

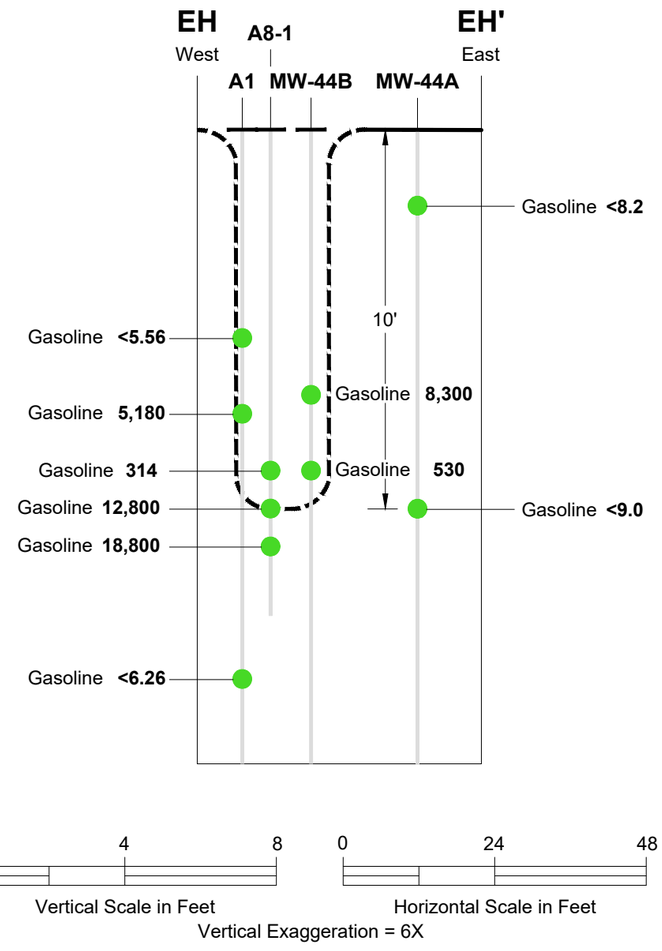
PROPOSED EXCAVATION PROFILES ED AND EE

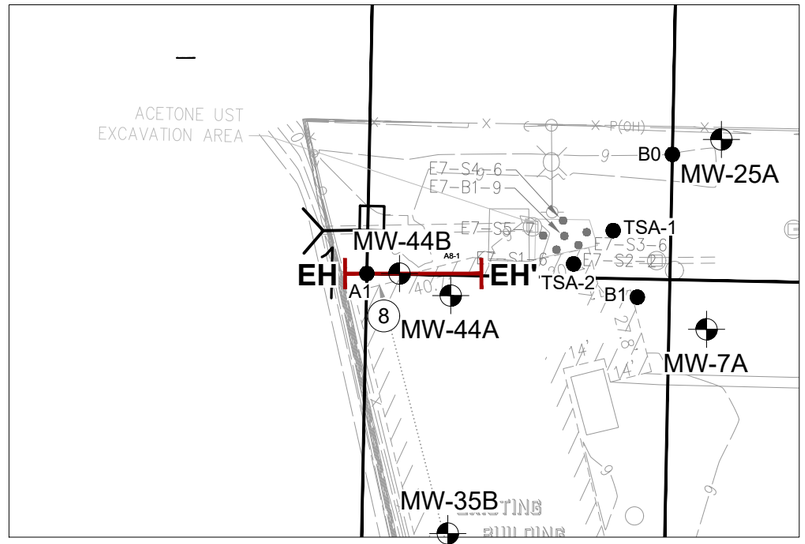
September 2021 21-1-12567-027

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 7

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12567\027\21-1-12567-027 Excavation Plan and Profiles.dwg Layout: Figure 7 Date: 07-07-2021 Login: JRS





PLAN - PROFILE LOCATIONS

0 50 00

Scale in Feet

PLAN LEGEND

H4 ● Soil Sample

Proposed Excavation

EB Excavation Profile Location

PROFILE LEGEND

E6 Designation of Boring

Proposed Excavation Limits

Data Result in mg/kg

No Data

Indicates Not Detected at or Above Value Shown

DATA TABLE	CLEANUP LEVEL (mg/kg)
Gasoline-Range HC	250

ABBREVIATION

mg/kg = Milligrams per Kilograms

HC = Hydrocarbons

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

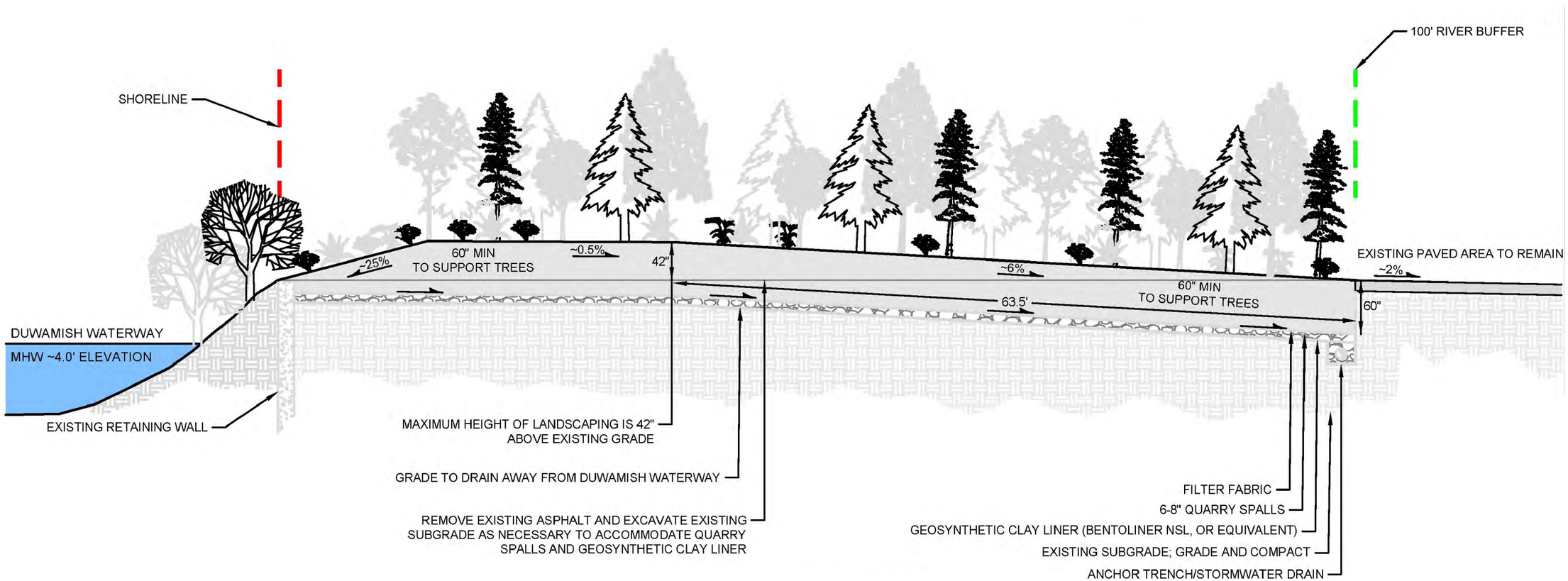
PROPOSED EXCAVATION PROFILE EH

September 2021 21-1-12567-027

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 8

Filename: C:\Users\jrs\CAD Group Dropbox\JDrive\211\12567\027\21-1-12567-027 Excavation Plan and Profiles.dwg Layout: Figure 8 Date: 07-07-2021 Login: JRS



0 10 20

Approximate Scale in Feet

NOTES

1. Landscaping is Consistent with the Planting Plan prepared by Soundview Consultants, Dated 02/12/2020.
2. Figure adapted from "Centerpoint Tukwila - Proposed Shoreline Cross-Section" of *Centerpoint Tukwila* dated 10/29/2020 by Soundview Consultants, Inc.

FARALLON CONSULTING
Quality Service for Environmental Solutions | farallonconsulting.com
Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Baker City
California
Oakland | Folsom | Irvine

Engineering Design Report
Excavation Areas 3, 4, 5, and 8;
Clay and Asphalt/Concrete Cover;
and Institutional Controls

CROSS SECTION OF CAP, DRAINAGE AND LANDSCAPING

September 2021 21-1-12567-027

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 9

APPENDIX A: CENTERPOINT PROPOSED DRAINAGE AND GRADING PLANS

Appendix A

CenterPoint Proposed Drainage and Grading Plans

DRAINAGE PLAN - WEST

FOR

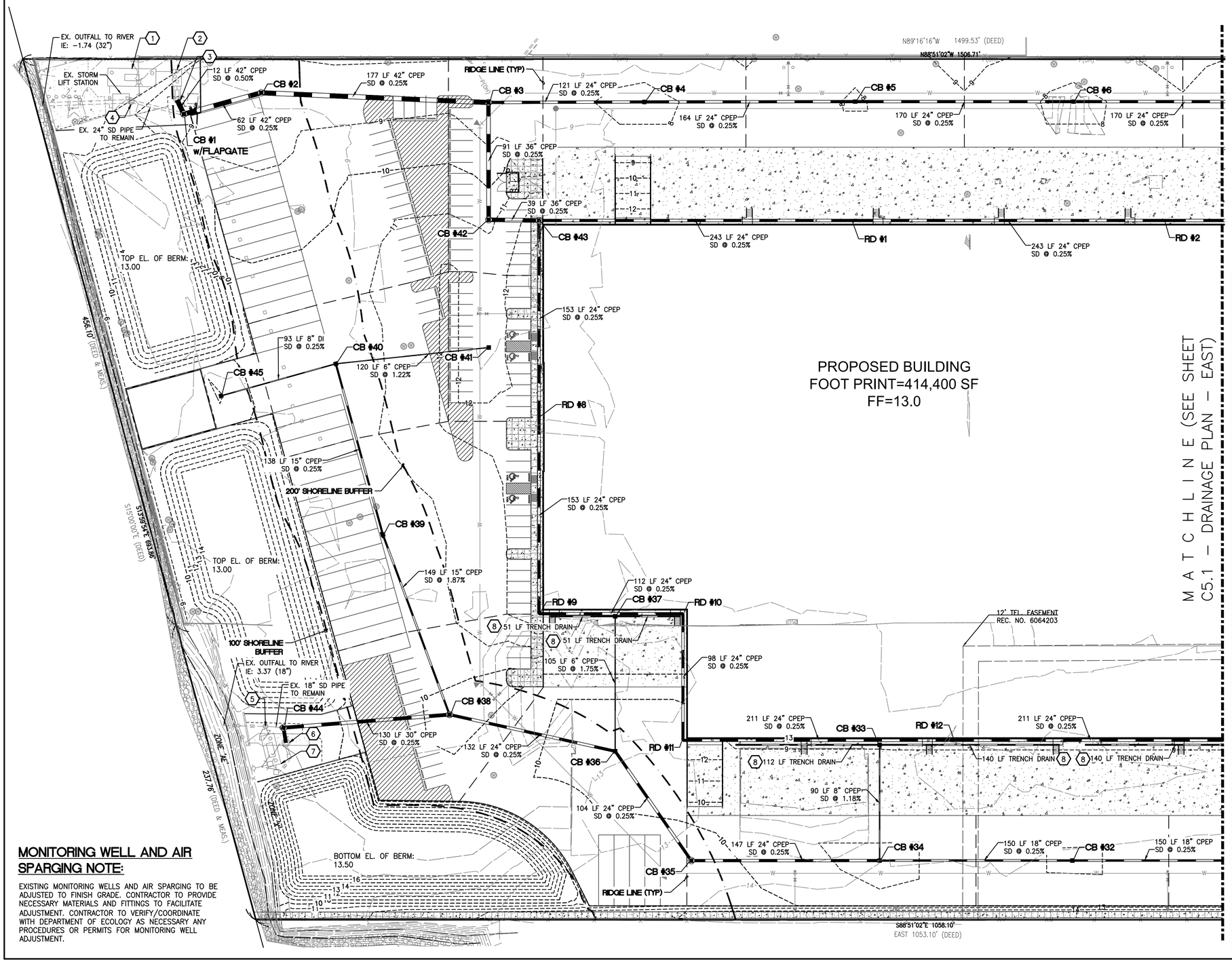
CENTERPOINT TUKWILA

PTN OF THE SE 1/4 AND THE SW 1/4 OF SEC. 23, TWNP 24 N, RNG 4 E, W.M.
CITY OF TUKWILA, KING COUNTY, STATE OF WASHINGTON

1"=40'

0 20 40 80

Know what's **below.** **Call** before you dig.



MONITORING WELL AND AIR SPARGING NOTE:

EXISTING MONITORING WELLS AND AIR SPARGING TO BE ADJUSTED TO FINISH GRADE. CONTRACTOR TO PROVIDE NECESSARY MATERIALS AND FITTINGS TO FACILITATE ADJUSTMENT. CONTRACTOR TO VERIFY/COORDINATE WITH DEPARTMENT OF ECOLOGY AS NECESSARY ANY PROCEDURES OR PERMITS FOR MONITORING WELL ADJUSTMENT.

(#) STORM STRUCTURE NOTES:

1. EXISTING 11.5' X 36.5' PANEL VAULT STORMFILTER. EXISTING FILTERS TO BE REPLACED WITH NEW MEDIA. CONTRACTOR TO COORDINATE WITH CONTECH NECESSARY MATERIALS AND PROCEDURES TO MAINTAIN WATER QUALITY VAULT'S DESIGN.
2. EXISTING VORTECHS MODEL V4000 TO REMAIN.
3. EXISTING SDMH W/ PUMP STATION.
   RIM: ±12.72
   IE: 1.86 (IN 12" SE)
   IE: 11.27 (OUT 6" N)
   PROPOSED CONNECTION TO EXISTING WATER QUALITY SYSTEM. CONTRACTOR TO VERIFY EXISTING STRUCTURE RIM AND INVERT ELEVATIONS AND SHALL NOTIFY BARGHAUSEN CONSULTING ENGINEERS, INC. OF ANY DISCREPANCIES.
4. EXISTING SDMH TO REMAIN. CONTRACTOR TO VERIFY RIM AND INVERT ELEVATIONS TO ENSURE POSITIVE DRAINAGE.
5. EXISTING TYPE 2–54" SDMH TO REMAIN.
   RIM: ±11.36
   IE: 6.88 (IN 18" E)
   IE: 6.66 (OUT 18" W)
   IE: 7.46 (IN 8" S)
6. EXISTING SD MANHOLE W/ PUMP STATION. CONTRACTOR TO LOWER INLET INVERT ELEVATION.
   RIM: ±11.95
   IE: 3.57 (IN 12" N)
   IE: 9.95 (OUT 6" S)
   CONTRACTOR TO COORDINATE LOWERING OF EXISTING PUMP FLOATS. SEE DETAIL 2/C5.2 FOR PROPOSED FLOAT ELEVATIONS.
   PROPOSED CONNECTION TO EXISTING WATER QUALITY SYSTEM. CONTRACTOR TO VERIFY EXISTING STRUCTURE RIM AND INVERT ELEVATIONS AND SHALL NOTIFY BARGHAUSEN CONSULTING ENGINEERS, INC. OF ANY DISCREPANCIES.
7. EXISTING 8' X 22' PRECAST VAULT STORMFILTER. EXISTING FILTERS TO BE REPLACED WITH NEW MEDIA. CONTRACTOR TO COORDINATE WITH CONTECH NECESSARY MATERIALS AND PROCEDURES TO MAINTAIN WATER QUALITY VAULT'S DESIGN.
8. PROPOSED TRENCH DRAIN. SEE DETAIL 1/C5.2.

STORM STRUCTURE TABLE
CB #1, TYPE 2 RIM = 8.65 IE=1.92 (42" E) IE=1.92 (42" NW) IE=2.13 (24" W) MATCH EXISTING
CB #2, TYPE 2 RIM = 8.15 IE=2.08 (42" E) IE=2.08 (42" W)
CB #3, TYPE 2–48", W/ STANDARD GRATE RIM = 7.95 IE=2.52 (24" E) IE=2.52 (36" S) IE=2.52 (42" W)
CB #4, TYPE 1, W/ STANDARD GRATE RIM = 7.61 IE=2.82 (24" E) IE=2.82 (24" W)
CB #5, TYPE 1, W/ STANDARD GRATE RIM = 7.89 IE=3.23 (24" E) IE=3.23 (24" W)
CB #6, TYPE 1, W/ STANDARD GRATE RIM = 7.61 IE=3.66 (24" E) IE=3.66 (24" W)
CB #32, TYPE 1, W/ STANDARD GRATE RIM = 8.74 IE=5.26 (18" E) IE=5.26 (18" W)
CB #33, TYPE 1, W/ STANDARD GRATE RIM = 8.95 IE=5.95 (12" W) IE=5.95 (12" E) IE=5.95 (8" S)
CB #34, TYPE 1, W/ STANDARD GRATE RIM = 8.51 IE=4.88 (8" N) IE=4.88 (18" E) IE=4.88 (24" W)
CB #35, TYPE 2–48", W/ SOLID LID RIM = 10.41 IE=4.52 (24" E) IE=4.52 (24" NW)
CB #36, TYPE 1, W/ STANDARD GRATE RIM = 9.17 IE=4.26 (24" SE) IE=4.26 (6" N) IE=4.26 (24" W)
CB #37, TYPE 1, W/ SOLID LID RIM = 9.10 IE=6.10 (12" W) IE=6.10 (12" E) IE=6.10 (6" S)
CB #38, TYPE 2–48", W/ STANDARD GRATE RIM = 9.35 IE=3.93 (24" E) IE=3.93 (15" N) IE=3.93 (30" W)
CB #39, TYPE 1, W/ STANDARD GRATE RIM = 9.98 IE=6.73 (15" N) IE=6.73 (15" S)

STORM STRUCTURE TABLE
CB #40, TYPE 1, W/ STANDARD GRATE RIM = 10.07 IE=7.07 (6" E) IE=7.07 (8" W) IE=7.07 (15" S)
CB #41, TYPE 1, W/ STANDARD GRATE RIM = 11.53 IE=8.53 (6" W)
CB #42, TYPE 2–48", W/ SOLID LID RIM = 10.75 IE=2.75 (36" E) IE=2.75 (36" N)
CB #43, TYPE 2–48", W/ SOLID LID RIM = 12.87 IE=2.85 (24" E) IE=2.85 (24" S) IE=2.85 (36" W)
CB #44, TYPE 2–48", W/ SOLID LID RIM = 9.32 IE=3.60 (30" E) IE=3.60 (30" S) IE=7.28 (18" W) MATCH EXISTING
CB #45, TYPE 1, W/ STANDARD GRATE RIM = 8.95 IE=7.30 (8" E)
RD #1, 6" CO W/ CONCRETE COLLAR RIM = 8.97 IE=3.46 (24" E) IE=3.46 (24" W)
RD #2, 6" CO W/ CONCRETE COLLAR RIM = 8.97 IE=4.07 (24" E) IE=4.07 (24" W)
RD #8, 6" CO W/ CONCRETE COLLAR RIM = 12.95 IE=3.23 (24" S) IE=3.23 (24" N)
RD #9, 6" CO W/ CONCRETE COLLAR RIM = 12.81 IE=3.61 (24" E) IE=3.61 (24" N)
RD #10, 6" CO W/ CONCRETE COLLAR RIM = 9.06 IE=3.89 (24" S) IE=3.89 (24" W)
RD #11, 6" CO W/ CONCRETE COLLAR RIM = 9.58 IE=4.14 (24" E) IE=4.14 (24" N)
RD #12, 6" CO W/ CONCRETE COLLAR RIM = 8.99 IE=4.67 (24" E) IE=4.67 (24" W)

No.	Date	By	Chkd.	Appr.	Revision

Title: DRAINAGE PLAN - WEST
FOR
CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
TUKWILA, WA 98108

For:
CENTERPOINT PROPERTIES
725 S FIGUEROA ST STE 3005
LOS ANGELES, CA 90017
CONTACT: JOHN LASS

BENJAMIN H. ELDRIDGE — STATE OF WASHINGTON — 42766 — REGISTERED PROFESSIONAL ENGINEER
4/27/2020

Scale: Horizontal 1"=40' Vertical -

Designed WED Drawn WED Checked LD Approved DKB Date 2/11/20

Barghausen Consulting Engineers, Inc.
18215 72nd Avenue South
Kent, WA 98032
425.251.6222 **barghausen.com**

Job Number 20538

Sheet C5.0 of 19

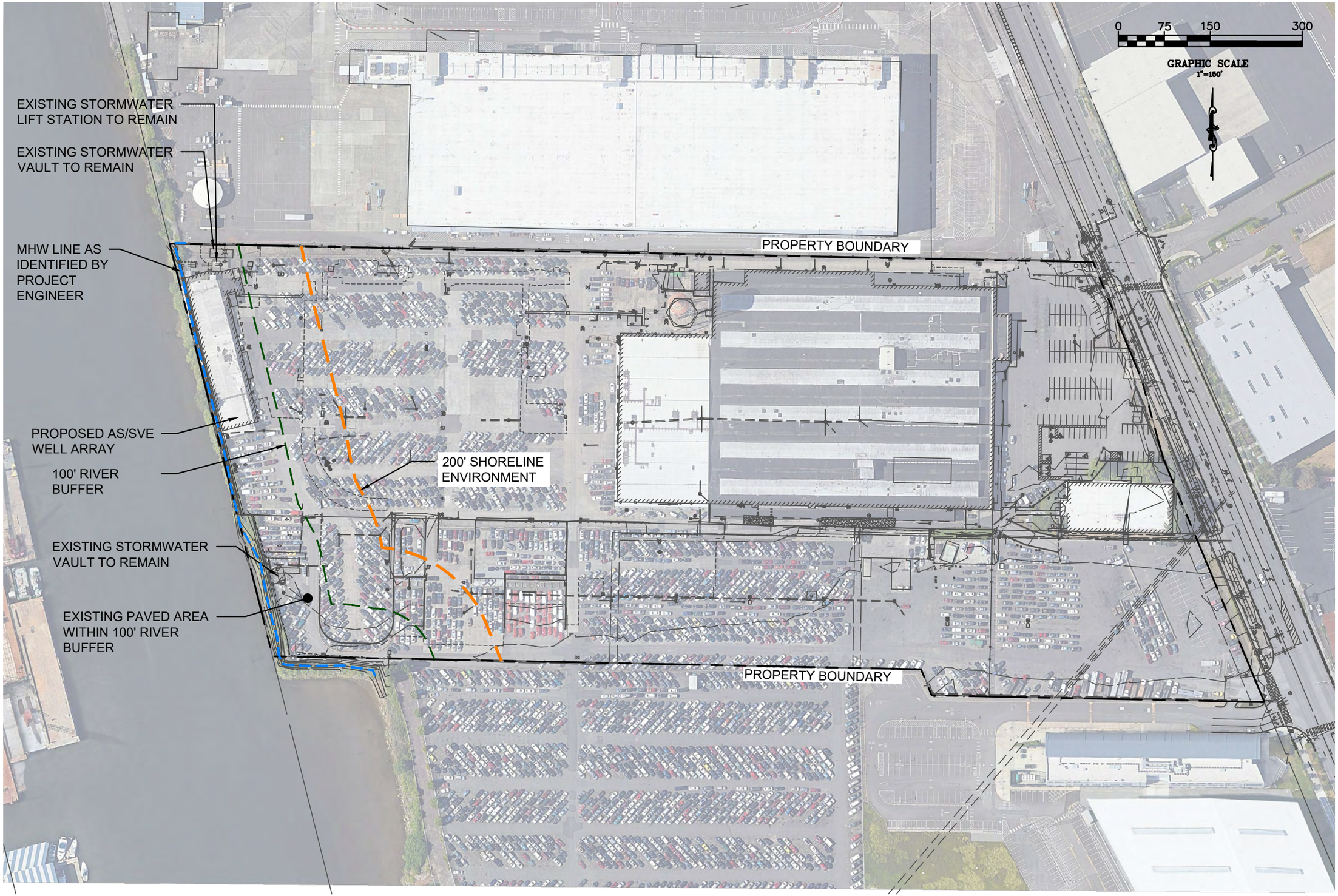
P:\20000s\20538\engineering\20538-m.dwg 4/24/2020 4:43 PM CSALVINO

APPENDIX B: CENTERPOINT PROPOSED RIVER BUFFER PLANS

Appendix B

CenterPoint Proposed River Buffer Plans

CENTERPOINT TUKWILA - EXISTING CONDITIONS



SOURCES:

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

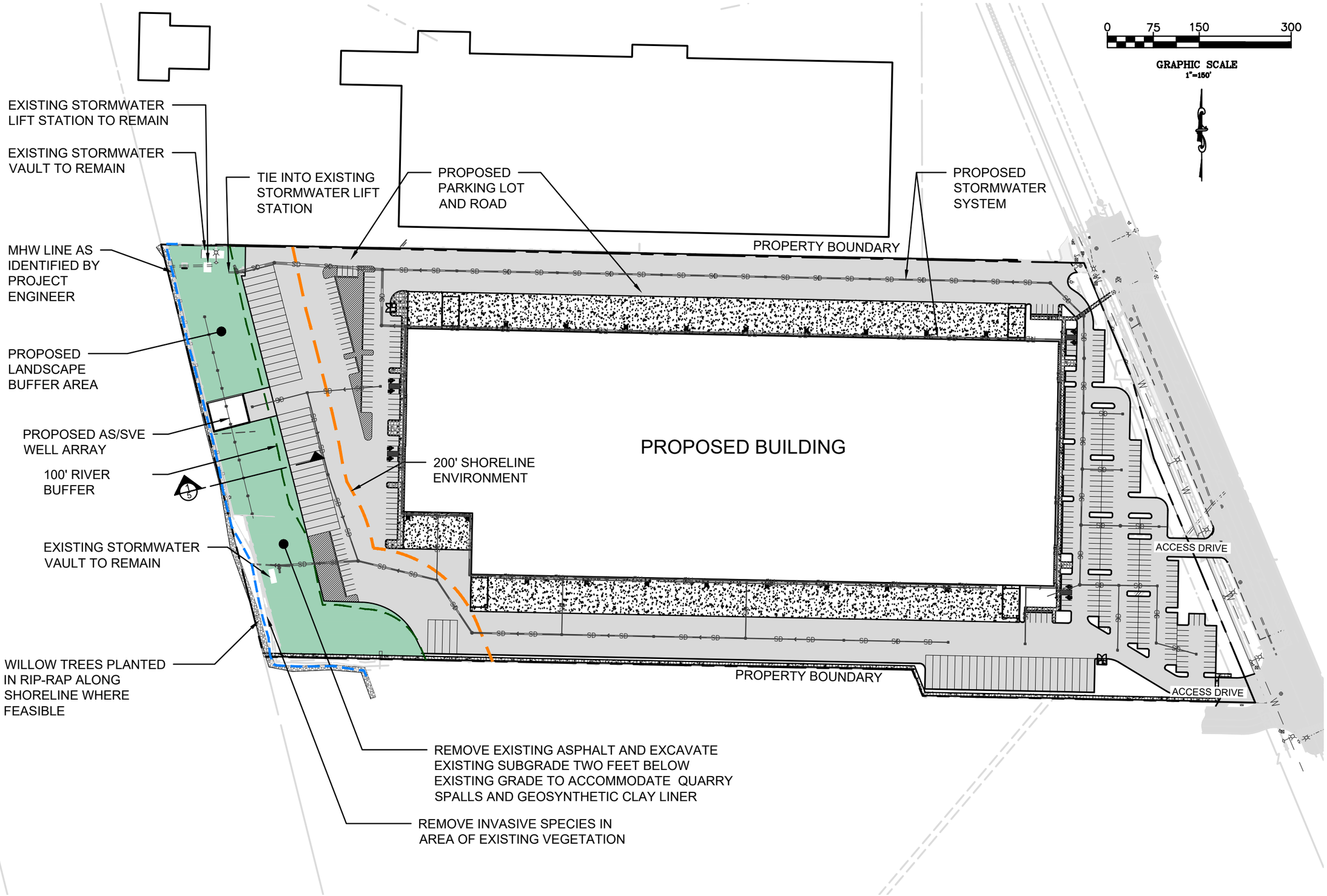
Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 HARBORVIEW DRIVE, SUITE D
GIG HARBOR, WASHINGTON 98335
P. 253.514.8952
F. 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108

THE SE¼ OF SECTION 33, TOWNSHIP 24N, RANGE 04E, W.M.

DATE:	10/29/2020
JOB:	1853.0001
BY:	MW
SCALE:	AS SHOWN
SHEET	1 OF 7

CENTERPOINT TUKWILA - PROPOSED PROJECT



SOURCES:

BARGHAUSEN CONSULTING ENGINEERS, INC.

18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 HARBORVIEW DRIVE, SUITE D
GIG HARBOR, WASHINGTON 98335
P. 253.514.8952
F. 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
THE SE¼ OF SECTION 33, TOWNSHIP 24N, RANGE 04E, W.M.

DATE:	10/29/2020
JOB:	1853.0001
BY:	MW
SCALE:	AS SHOWN
SHEET	2 OF 7

CENTERPOINT TUKWILA - PLANTING PLAN VIEWPORTS 1 & 2

VIEWPORT 1

0 15 30 60

GRAPHIC SCALE
1"= 30'

VIEWPORT 2

SCALE: 1"=30'

NOTE:

- SEE SHEET 4 FOR PLANT LIST AND SYMBOLS AND SHEET 5 FOR FULL PLANT SCHEDULE WITH QUANTITIES.
- LANDSCAPING WILL INCORPORATE CONTINUED ACCESS FOR AS/SVE SYSTEM.

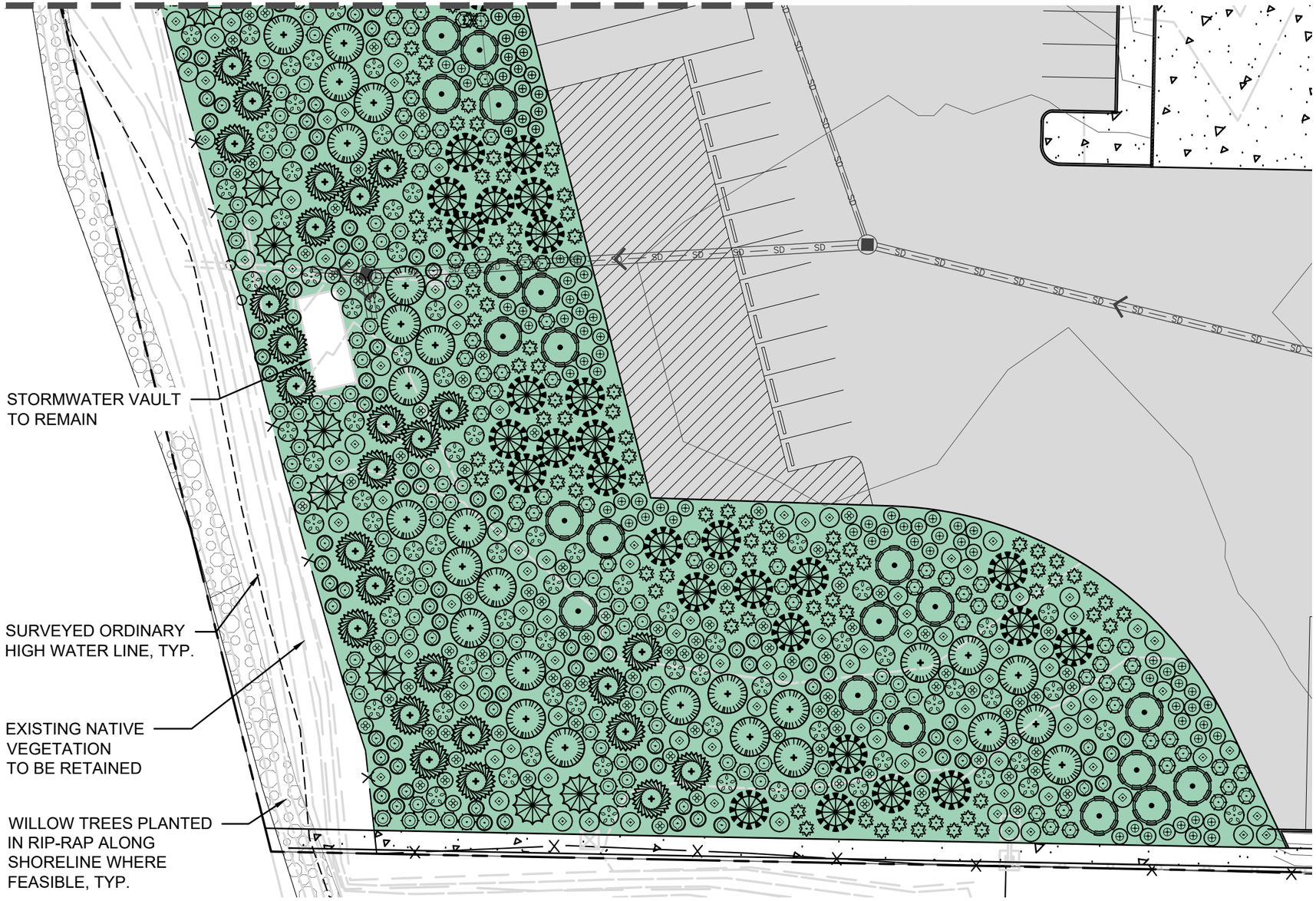
SOURCES:
BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 HARBORVIEW DRIVE, SUITE D
GIG HARBOR, WASHINGTON 98335
P. 253.514.8952
F. 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
THE SE ¼ OF SECTION 33, TOWNSHIP 24N, RANGE 04E, W.M.

DATE:	10/29/2020
JOB:	1853.0001
BY:	MW
SCALE:	AS SHOWN
SHEET	3 OF 7

CENTERPOINT TUKWILA - PLANTING PLAN VIEWPORT 3



VIEWPORT 3

0 15 30 60

GRAPHIC SCALE
1"= 30'

PLANT LIST

TREES

SCIENTIFIC NAME
PICEA SITCHENSIS
PINUS CONTORTA
PRUNUS EMARGINATA
PSEUDOTSUGA MENZIESII
SALIX LASIANDRA
THUJA PLICATA

SHRUBS

SCIENTIFIC NAME
LONICERA INVOLUCRATA
MAHONIA AQUIFOLIUM
RIBES SANGUINEUM
ROSA GYMNOCARPA
ROSA NUTKANA
RUBUS PARVIFLORUS
SAMBUCUS RACEMOSA
SYMPHORICARPOS ALBUS

GROUNDCOVERS

DRY SOIL SEED MIX
(76,347 SF)

NOTE: SEE SHEET 5 FOR FULL PLANT SCHEDULE WITH QUANTITIES.

SOURCES:

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 HARBORVIEW DRIVE, SUITE D
GIG HARBOR, WASHINGTON 98335
P. 253.514.8952
F. 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108

THE SE¼ OF SECTION 33, TOWNSHIP 24N, RANGE 04E, W.M.

DATE:	10/29/2020
JOB:	1853.0001
BY:	MW
SCALE:	AS SHOWN
SHEET	4 OF 7

PLANT SCHEDULE

			50% trees, 50% shrubs, 100% coverage				
Plant Name							
Scientific	**Common**	**Plant Status**	**Shoreline Buffer Area Plant Quantities**	**Spacing**	**Size**	**Condition**	**Planting Area**
Trees		Area:	74,087				
Picea sitchensis	Sitka spruce	FAC	75	**10 - 12 ft**	**6 - 8 ft**	**Container**	**Moist**
Pinus contorta	Shore pine	FAC	75	**10 - 12 ft**	**6 - 8 ft**	**Container**	**Dry/Moist**
Prunus emarginata	Bitter cherry	FACU	46	**10 - 12 ft**	**6 - 8 ft**	**Container**	**Dry**
Pseudotsuga menziesii	Douglas fir	FACU	55	**10 - 12 ft**	**6 - 8 ft**	**Container**	**Dry**
*Salix lasiandra**	Pacific willow*	FACW	140	**10 - 12 ft**	**3 - 4 ft**	**Stakes***	**Riverbank***
Thuja plicata	Western red cedar	FAC	46	**10 - 12 ft**	**6 - 8 ft**	**Container**	**Dry/Moist**
	Total		**437**			*** Plant 2 stakes per symbol**	
Shrubs/Herbaceous Plants							
Lonicera involucrata	Black twinberry	FAC	210	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Moist/Wet**
Mahonia aquifolium	Tall Oregon grape	FACU	210	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Dry**
Ribes sanguineum	Red-flowering currant	FACU	230	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Dry**
Rosa gymnocarpa	Bald hip rose	FACU	230	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Dry/Moist**
Rosa nutkana	Nootka rose	FAC	180	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Dry/Moist**
Rubus parviflorus	Thimbleberry	FACU	210	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Dry**
Sambucus racemosa	Red elderberry	FACU	210	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Dry**
Symphoricarpos albus	Snowberry	FACU	230	**4 - 5 ft**	**3 - 5 ft**	**Container**	**Dry**
	Total		**1,710**				
Dry Soil Seed Mix 30 lbs/acre (all disturbed buffer areas)			**% by wt.**				
Agrostis exarata	Spike bentgrass	FACW	10				
Deschampsia cespitosa	Tufted hairgrass	FACW	10				
Deschampsia danthonioides	Annual hairgrass	FACW	10				
Deschampsia elongata	Slender hairgrass	FAC	10				
Elymus glaucus	Blue wildrye	FACU	25				
Hordeum brachyantherum	Meadow barley	FACW	25				
Lupinus polyphyllus	Streamside lupine	FAC	10				
Total			**100**				

1 - Scientific names and species identification taken from Flora of the Pacific Northwest, 2nd Edition (Hitchcock and Cronquist, Ed. by Giblin, Ledger, Zika, and Olmstead, 2018).

2 - Over-sized or container plants are suitable for replacement pending project biologist's approval.

3 - Final plans are subject to regulatory approval.

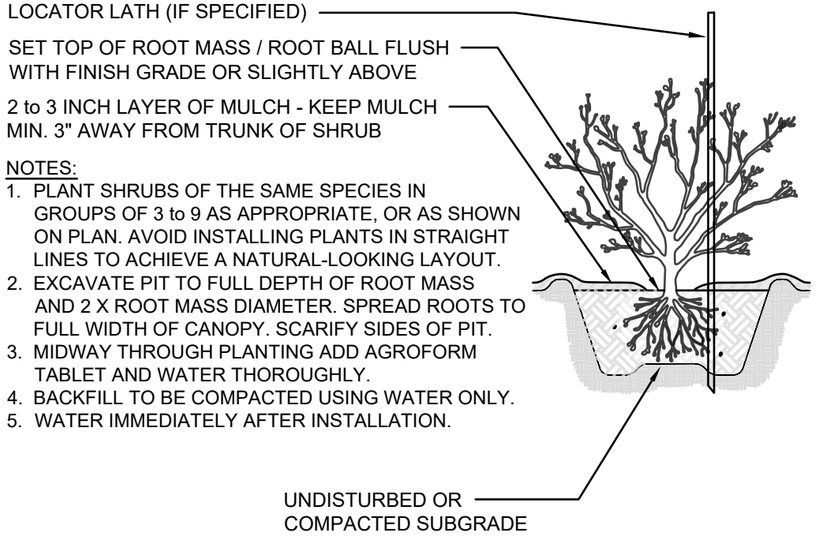
4 - All disturbed buffer areas to receive Dry Soil Seed Mix.

5 - Planting density adjustments in some locations may be appropriate based on retention of existing native vegetation and density of invasive species.

* - Plant two Pacific willow stakes per symbol.

SHRUB PLANTING DETAIL

NOT TO SCALE

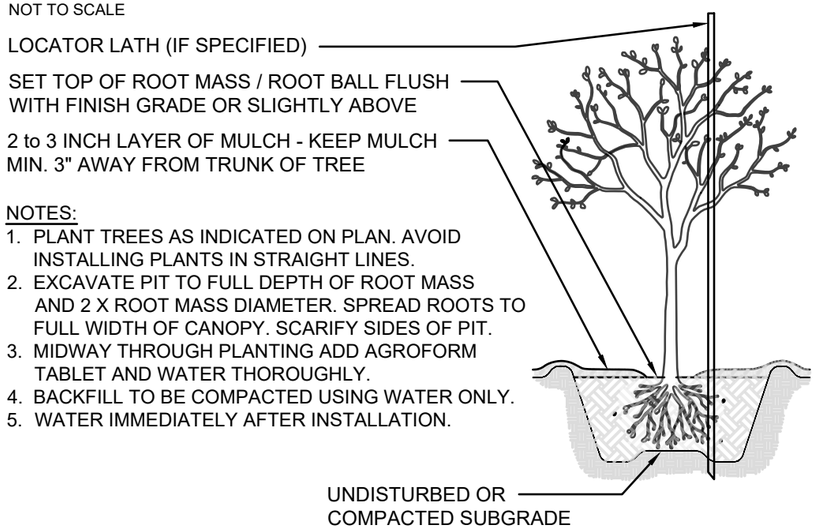


NOTES:

1. PLANT SHRUBS OF THE SAME SPECIES IN GROUPS OF 3 to 9 AS APPROPRIATE, OR AS SHOWN ON PLAN. AVOID INSTALLING PLANTS IN STRAIGHT LINES TO ACHIEVE A NATURAL-LOOKING LAYOUT.
2. EXCAVATE PIT TO FULL DEPTH OF ROOT MASS AND 2 X ROOT MASS DIAMETER. SPREAD ROOTS TO FULL WIDTH OF CANOPY. SCARIFY SIDES OF PIT.
3. MIDWAY THROUGH PLANTING ADD AGROFORM TABLET AND WATER THOROUGHLY.
4. BACKFILL TO BE COMPACTED USING WATER ONLY.
5. WATER IMMEDIATELY AFTER INSTALLATION.

TREE PLANTING DETAIL

NOT TO SCALE



NOTES:

1. PLANT TREES AS INDICATED ON PLAN. AVOID INSTALLING PLANTS IN STRAIGHT LINES.
2. EXCAVATE PIT TO FULL DEPTH OF ROOT MASS AND 2 X ROOT MASS DIAMETER. SPREAD ROOTS TO FULL WIDTH OF CANOPY. SCARIFY SIDES OF PIT.
3. MIDWAY THROUGH PLANTING ADD AGROFORM TABLET AND WATER THOROUGHLY.
4. BACKFILL TO BE COMPACTED USING WATER ONLY.
5. WATER IMMEDIATELY AFTER INSTALLATION.

SOURCES:
BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

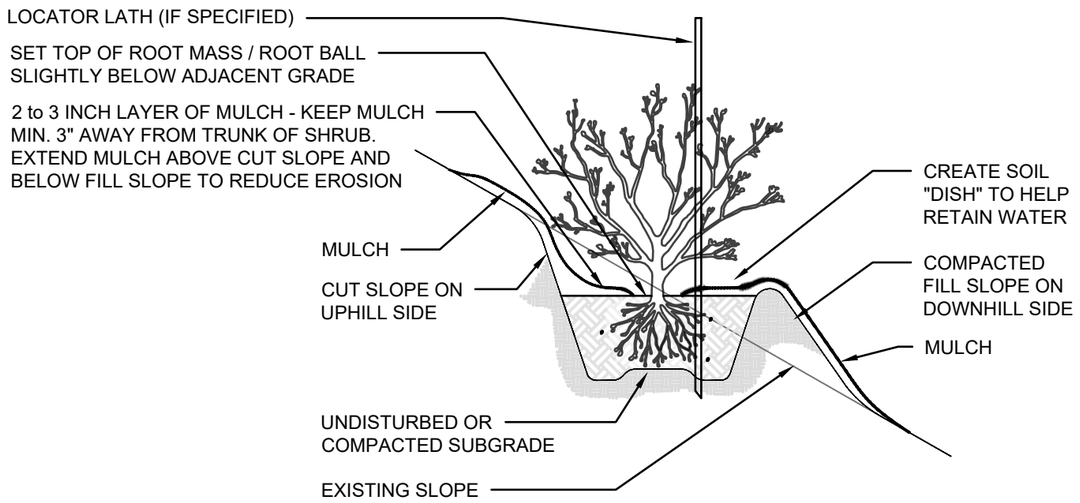
Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 HARBORVIEW DRIVE, SUITE D
GIG HARBOR, WASHINGTON 98335
P. 253.514.8952
F. 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
THE SE¼ OF SECTION 33, TOWNSHIP 24N, RANGE 04E, W.M.

DATE: 10/29/2020
JOB: 1853.0001
BY: MW
SCALE: AS SHOWN
SHEET 5 OF 7

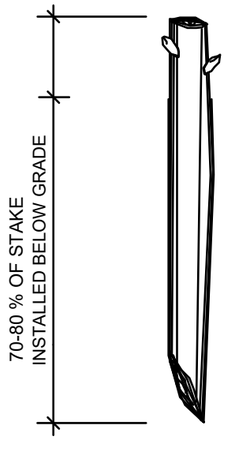
TREE AND SHRUB PLANTING ON STEEP SLOPE

NOT TO SCALE



LIVE STAKE PLANTING DETAIL

NOT TO SCALE



STORAGE OF LIVE STAKES

ALL WOODY PLANT CUTTINGS COLLECTED MORE THAN 12 HR PRIOR TO INSTALLATION, MUST BE CAREFULLY BOUND, SECURED, AND STORED OUT OF DIRECT SUNLIGHT AND SUBMERGED IN CLEAN FRESH WATER FOR A PERIOD OF UP TO TWO WEEKS.

OUTDOOR TEMPERATURES MUST BE LESS THAN 50 DEGREES F AND TEMPERATURE INDOORS AND IN STORAGE CONTAINERS MUST BE BETWEEN 34 AND 50 DEGREES F.

IF THE LIVE STAKES CANNOT BE INSTALLED DURING THE DORMANT SEASON, CUT DURING THE DORMANT SEASON AND HOLD IN COLD STORAGE AT TEMPERATURES BETWEEN 33 AND 39 DEGREES F FOR UP TO 2 MONTHS.

NOTES:

1. LIVE STAKES TO BE 1 TO 2 INCH DIAMETER 24 TO 32 INCHES LENGTH.
2. USE 1/2 INCH DIAMETER REBAR OR ROCK BAR TO MAKE PILOT HOLE.
3. INSTALL LIVE STAKES TAPER END DOWN WITH BUDS POINTED UP.
4. MINIMUM TWO BUDS ABOVE GRADE.
5. SET LIVE STAKES WITH DEAD-BLOW HAMMER.
6. WATER IMMEDIATELY AFTER INSTALLATION.

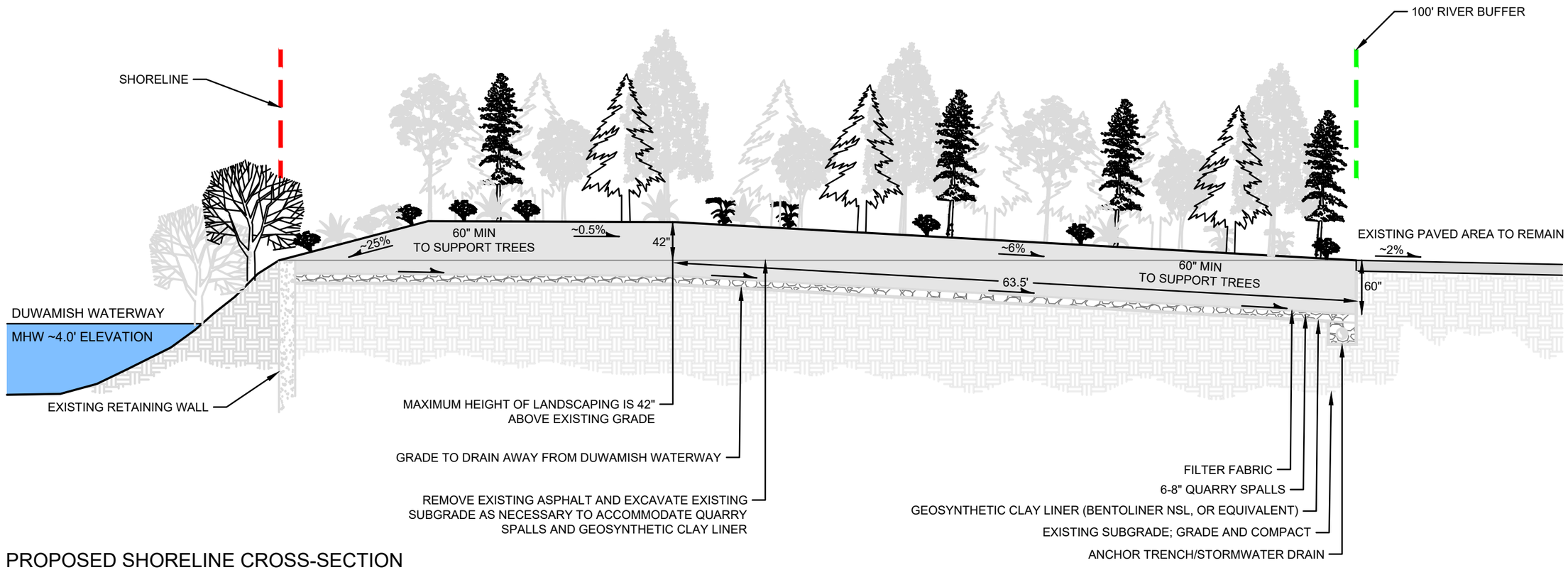
SOURCES:
BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 HARBORVIEW DRIVE, SUITE D
GIG HARBOR, WASHINGTON 98335
P. 253.514.8952
F. 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
THE SE¼ OF SECTION 33, TOWNSHIP 24N, RANGE 04E, W.M.

DATE: 10/29/2020
JOB: 1853.0001
BY: MW
SCALE: AS SHOWN
SHEET 6 OF 7

CENTERPOINT TUKWILA - PROPOSED SHORELINE CROSS-SECTION



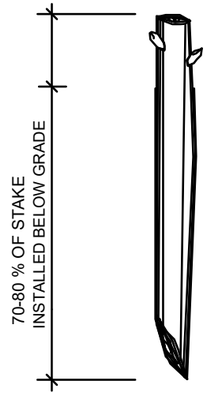
PROPOSED SHORELINE CROSS-SECTION

10 0 10

SCALE IN FEET

LIVE STAKE PLANTING DETAIL

NOT TO SCALE



STORAGE OF LIVE STAKES

ALL WOODY PLANT CUTTINGS COLLECTED MORE THAN 12 HR PRIOR TO INSTALLATION, MUST BE CAREFULLY BOUND, SECURED, AND STORED OUT OF DIRECT SUNLIGHT AND SUBMERGED IN CLEAN FRESH WATER FOR A PERIOD OF UP TO TWO WEEKS.

OUTDOOR TEMPERATURES MUST BE LESS THAN 50 DEGREES F AND TEMPERATURE INDOORS AND IN STORAGE CONTAINERS MUST BE BETWEEN 34 AND 50 DEGREES F.

IF THE LIVE STAKES CANNOT BE INSTALLED DURING THE DORMANT SEASON, CUT DURING THE DORMANT SEASON AND HOLD IN COLD STORAGE AT TEMPERATURES BETWEEN 33 AND 39 DEGREES F FOR UP TO 2 MONTHS.

NOTES:

1. LIVE STAKES TO BE 1 TO 2 INCH DIAMETER 24 TO 32 INCHES LENGTH.
2. USE 1/2 INCH DIAMETER REBAR OR ROCK BAR TO MAKE PILOT HOLE.
3. INSTALL LIVE STAKES TAPER END DOWN WITH BUDS POINTED UP.
4. MINIMUM TWO BUDS ABOVE GRADE.
5. SET LIVE STAKES WITH DEAD-BLOW HAMMER.
6. WATER IMMEDIATELY AFTER INSTALLATION.

SOURCES: BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 HARBORVIEW DRIVE, SUITE D
GIG HARBOR, WASHINGTON 98335
P: 253.514.8952
F: 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

CENTERPOINT TUKWILA
8801 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON 98108
THE SE ¼ OF SECTION 33, TOWNSHIP 24N, RANGE 04E, W.M.

DATE:	10/29/2020
JOB:	1853.0001
BY:	MW
SCALE:	AS SHOWN
SHEET	7 OF 7

Appendix C

CenterPoint Specifications for Clay Cap and Other Materials

PRODUCT DATA SHEET

GSE BentoLiner NSL Geosynthetic Clay Liner

GSE BentoLiner "NSL" is a needle-punched reinforced composite geosynthetic clay liner (GCL) comprised of a uniform layer of granular sodium bentonite encapsulated between a woven and a nonwoven geotextile. The product is intended for moderate to steep slopes and moderate to high load applications where increased internal shear strength is required.

[*]

AT THE CORE:

This composite clay liner is intended for moderate to steep slopes and moderate to high load applications where increased internal shear strength is required.

Product Specifications

Tested Property	Test Method	Frequency	Value
Geotextile Property			
Cap Nonwoven, Mass/Unit Area	ASTM D 5261	1/200,000 ft²	6.0 oz/yd² MARV(1)
Carrier Woven, Mass/Unit Area	ASTM D 5261	1/200,000 ft²	3.1 oz/yd² MARV
Bentonite Property			
Swell Index	ASTM D 5890	1/100,000 lb	24 ml/2 g min
Moisture Content	ASTM D 4643	1/100,000 lb	12% max
Fluid Loss	ASTM D 5891	1/100,000 lb	18 ml max
Finished GCL Property			
Bentonite, Mass/Unit Area(2)	ASTM D 5993	1/40,000 ft²	0.75 lb/ft² MARV
Tensile Strength(3)	ASTM D 6768	1/40,000 ft²	30 lb/in MARV
Peel Strength	ASTM D 6496 ASTM D 4632(4)	1/40,000 ft²	3.5 lb/in MARV 21 lb MARV
Hydraulic Conductivity(5)	ASTM D 5887	1/Week	5×10^{-9} cm/sec max
Index Flux(5)	ASTM D 5887	1/Week	1×10^{-8} m³/m²/sec max
Internal Shear Strength(6)	ASTM D 6243	Periodically	500 psf Typical
TYPICAL ROLL DIMENSIONS			
Width x Length(7)	Typical	Every Roll	15.5 ft x 150 ft
Area per Roll	Typical	Every Roll	2,325 ft²
Packaged Weight	Typical	Every Roll	2,600 lb

NOTES:

- (1) Minimum Average Roll Value.
- (2) At 0% moisture content.
- (3) Tested in machine direction.
- (4) Modified ASTM D 4632 to use a 4 in wide grip. The maximum peak of five specimens averaged in machine direction.
- (5) Deaired, deionized water @ 5 psi maximum effective confining stress and 2 psi head pressure.
- (6) Typical peak value for specimen hydrated for 24 hours and sheared under a 200 psf normal stress.
- (7) Roll widths and lengths have a tolerance of ±1%.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

[DURABILITY RUNS DEEP]

For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

GSE ENVIRONMENTAL™

GSE ENVIRONMENTAL™

BENTOLINER GCL PRODUCTS

INSTALLATION QUALITY ASSURANCE MANUAL

Contents

1.0 INTRODUCTION

This manual provides an overview of the GSE Installation Quality Assurance procedures consistent with industry accepted practices to ensure that the GSE BentoLiner GCL products installed will best perform for its intended purpose. In addition, all installation work will be performed in strict accordance per the customer's specifications. Please read the procedures below completely before you begin. If you need further clarification, contact the GSE Engineering Support Staff for assistance or please refer to ASTM D 6102, Standard Guide for Installation of Geosynthetic Clay Liners and ASTM D 5888, Standard Guide for Storage and Handling of Geosynthetic Clay Liners. Remember safety first and use safe practices always on every project.

2.0 UNLOADING PROCEDURES

As with all lifting or unloading operations, appropriate equipment and experienced personnel should be employed along with proper safe handling methods. The party responsible for unloading the GSE BentoLiner should contact GSE prior to shipment to determine the correct unloading methods and equipment if different from the pre-approved and specified methods as described below.

Lifting GCL rolls can typically be accomplished with by using a 2.5 in - 3.0 in (63 mm - 75 mm) outside diameter (O.D.) steel pipe (preferably solid), with a wall thickness capable of providing sufficient beam strength to support the weight of the roll, which average less than 3,000 lb (1,364 kg) and the length is approximately 18 ft (5.5 m). This core pipe is inserted through the hollow center of the GCL cardboard core. Heavy-duty slings or chains, which are approximately 10 ft (3.1 m) long, each are attached to each end of the pipe, which are then fastened to a I-beam spreader bar or a GSE approved alternative. Care should be taken to ensure that lifting chains or straps do not rub, chafe, or otherwise damage the GCL. A crane, backhoe, front-end loader or another suitable piece of construction equipment can then lift the entire assembly.

An all-terrain, extendable boom forklift, such as a Lull or Caterpillar Telehandler, can be fitted with a special, solid steel "carpet pole" or stinger, typically 14.0 ft (4.3 m) in length having an outside diameter of no more then 3.38 in (8.6 mm). The carpet pole can be inserted into the hollow cardboard core of the GCL roll.

The roll should not be fully suspended until the pole extends through the entire length of the core tube or you run the risk that the core may break creating additional handling and unloading difficulties

A properly structured and supported pole can be used to unload GCL rolls onsite. As an alternative, straps that are appropriately rated can be used as a GSE approved lifting method to unload GCL rolls. Lifting straps are supplied on every roll. Each GCL roll label contains roll weight information that should be consulted in determining appropriate lifting equipment and factors of safety.

The CQA inspector or owner's representative should verify that only appropriate handling equipment is utilized, i.e. equipment that does not pose any danger to personnel or undue risk of damage or deformation to the liner material.

3.0 STORAGE

While stored GCL needs to be kept dry and away from potential flooding or high storm runoff. On the job site storage methods include; storing the rolls tarped on pallets; storing the rolls under roof in a clean, dry protected area; and storing the rolls on a flat, dry, stable surface suitably covered with protective waterproof tarps. Rolls can be stacked as long as it is done in a manner that prevents them from rolling, shifting, or spontaneously moving. Maximum roll height should be determined by CQA personnel, but never more than can be safely managed considering site conditions, equipment and personnel.

Stored rolls should be tarped and remain in their original, unopened plastic shipping sleeves to prevent damage and undue prehydration prior to installation. Any rolls that come in contact with water should be examined by CQA or an owner's representative prior to installation. Prehydrated or physically damaged rolls should be set aside for further examination to determine the plausibility of repair or need to replace.

4.0 SUBGRADE PREPARATION

The surface upon which the GSE BentoLiner is installed should be smooth and free of wheel ruts, debris, roots, sticks, and rocks larger than 1.0 in (25 mm). Site specific compaction requirements should be followed in accordance with the project plans and specifications. At a minimum, the site should be smooth rolled the level of compaction such that installation equipment and other construction vehicles traffic does not cause rutting greater than 1.0 in (25 mm) deep. Furthermore, all protrusions extending more than 0.5 in (12 mm) from the subgrade shall be removed, crushed, or pushed into the subgrade.

In applications where the product is the sole barrier, subgrade surfaces consisting of gravel or granular soils may not be acceptable due to their large void content. For these applications, the subgrade shall be greater than 80% fines and contain no particles larger than 1 in (25 mm). In all high head, water containment applications, i.e. maximum water depth greater than 1 ft (30.5 cm), GSE recommends the use of a coated or laminated GCL such as GSE BentoLiner CNSL.

Immediately prior to deployment of the GCL, the subgrade shall be final compacted to fill in any remaining voids or desiccation cracks and to ensure that no sharp irregularities or abrupt elevation changes exist greater than 1.0 in (25 mm). The surfaces to be lined shall be maintained in this condition and free of standing water. GCL can be deployed on a frozen subgrade, if the subgrade would meet all the conditions as previously outlined if unfrozen.

The subgrade surface and preparation should be inspected and certified by the CQA inspector prior to GSE BentoLiner placement. Upon approval by the CQA inspector, it is the geosynthetic installer's responsibility to communicate to the engineer of any changes in the condition of the subgrade that might render it out of compliance, with any of the requirements of the project specification or ASTM Standard D 6102.

5.0 DEPLOYMENT

As rolls are selected for deployment, the labels should be removed and recorded by the installer, along with any other pertinent information. The rolls should only be transported from the storage area using approved lifting equipment as described in section 2.0. The roll is supported during deployment, so that the fabric designated as the upper surface faces out, away from the installation vehicle. The free end of the roll can then be secured, while the vehicle supporting the roll slowly backs away, deploying the GCL as it moves. Alternatively, the free end can be manually pulled across an area to be lined by the installation crew while the equipment simply suspends the roll. Equipment traveling directly on GCL for deployment of overlying geosynthetics should be limited to lightweight ATVs maximum bearing capacity of 8.0 psi (34.5 kPa) or equivalent.

Successive panels are overlapped according to project specifications and/or within the overlap lines stenciled on the upper surface of each panel. Wherever possible, installation of GSE BentoLiner should begin at high elevation and proceed to low elevation. This allows any precipitation to accumulate and drain quickly without adversely affecting the GCL. The edges of exposed GCL should be weighted down with sandbags or equivalent ballast to prevent uplift in the event of substantially strong winds.

Only as much GSE BentoLiner as can be fully covered by the end of the day should be deployed or such amount that can be covered in a reasonably short time in the event of heavy precipitation. When GCL is being installed under a geomembrane, the leading edge should be folded back under the membrane at the end of the construction day. Temporary ballasting, such as sandbags, to prevent uplift and the infiltration of runoff water should secure the leading edge of the membrane.

GSE BentoLiner panels should be installed in a relaxed condition, free of wrinkles and folds. When fitting the product into small areas or around construction details, use a sharp utility or hook blade knife to cut the liner to the appropriate dimensions. Adjacent panels should overlap at the edges as described in section 6.0 below.

6.0 OVERLAPS & SEAMS

Unless specified differently adjacent lengthwise (longitudinal) seams should be overlapped a minimum of 6.0 in (150 mm). Granular bentonite should be used to augment all overlapped seams. Loose granular bentonite is placed between ajoining panels into the overlap area at a rate of 0.25 lb per linear foot (350 g per linear meter) of seam. Widthwise overlaps at the butt ends of rolls should be a minimum 12.0 in (300 mm). Seams should be shingled in a down slope direction, so that water flows across the seam from upslope sheet to the down slope sheet.

When the liner is cut to fit in small areas, i.e. into corners or around structures, adjacent panels should overlap a minimum of 1.0 ft (300 mm), adding abundant loose granular bentonite into the overlapped areas.

7.0 ATTACHMENT DETAILS

The product should be installed around penetrations, structures, pipes, structures and other appurtenances according to the contract drawings. GSE BentoLiner may be secured to appurtenances by use of a stainless steel batten or clamps, mechanical fasteners, or other appropriate device if necessary to minimizing movement. The use of additional granular bentonite or bentonite paste is recommended to maximize the seal around structures or protuberances.

8.0 ANCHORING

GSE BentoLiner is typically anchored in a trench around the perimeter of the lined area, which provides the required pullout resistance. In most cases, GCL can be anchored in the same trench as any adjacent geosynthetic liner components (if used). Dimensions and locations of the trench should be provided in the project drawings. Alternately, the material may be anchored by deploying additional run out of material, a minimum of 3.0 ft (1.0 m), past the slope crest and toe. Typically GCL should not be deployed in tension. The force holding the GCL in place should be provided by friction between the GCL and adjacent materials

Steps should be taken to ensure that precipitation does not accumulate in the trench prior to backfilling. The GCL should only cover the front face and bottom of the anchor trench. The trench should be back filled and properly compacted prior to placing cover soil on the slopes.

9.0 REPAIRS

In the event an area of GSE BentoLiner becomes damaged, torn, or punctured during installation, the affected area should be repaired. On relatively level surfaces, the damaged area should be covered with a separate piece of GSE BentoLiner extending at least 12.0 in (300 mm) beyond the damaged area in every dirRection. Granular bentonite should be used to augment the patch overlays as is required for all other seams. Patches on side slopes can be temporarily secured with construction adhesive such as Liquid Nails or tape.

Areas that are exposed to standing water or excess precipitation with resulting bentonite hydration, typically as defined as greater than 30% moisture, prior to soil covering, should be examined for bentonite displacement and damage by subsequent activities. If it is determined that the GCL has been hydrated and damaged, the GCL should be covered with new material over the affected area or removed and replaced. All GSE BentoLiner material exposed to hydrocarbon fuels, chemicals, pesticides, non-compatible leachates, or other harmful liquids during the installation should be removed and replaced with non-affected material.

10.0 INSPECTION

Prior to soil covering the panels, penetrations and any other details should be visually inspected to ensure full coverage and proper orientation. Once the installed GSE BentoLiner material has been approved the next layer of geosynthetics or soil covering may be applied.

11.0 COVER MATERIAL

Only the amount of GSE BentoLiner GCL that can be anchored, inspected, and covered the same day should be installed. In cases where the GSE BentoLiner GCL is the sole hydraulic barrier, the GCL should be covered with the specified thickness of cover soil (a minimum 1.0 ft (300 mm)) immediately following deployment. Where GSE BentoLiner GCL is used in conjunction with other membrane components, it should be covered with the geomembrane after placement, as soon as possible to protect it from the climatic elements.

When a geomembrane is being installed over the GCL, the leading edge of the GSE BentoLiner should be folded back under the geomembrane so that the geomembrane extends beyond the GCL a minimum of 2.0 ft (600 mm). The leading edge of the membrane should subsequently be weighted with sand bags or suitable ballast to safeguard against wind uplift and to prevent runoff water from undermining the liner.

When GSE BentoLiner is used with no overlying geomembrane, the soil cover should be placed within 2.5 ft (800 mm) of the leading edge of the GCL. The leading edge can then be covered with plastic sheeting that is folded under the exposed edge approximately 12.0 in (300 mm). Sand bags or suitable ballast should be placed on the liner to hold the plastic in place and to partially confine the GCL. The next morning the ballast and the plastic can be removed and subsequent rolls of GCL placed as described in section 5.0.

Cover soil placed directly on GCL should have a gradation to not damage or puncture the GCL. Cover soil should be free of all rocks greater than 0.75 in (18 mm) diameter, sharp or angular objects, sticks, roots or debris. Appropriate placement methods should be used at all times to protect the GCL. Compatibility of GSE BentoLiner GCL with the soil should be verified. Cover material should be pushed across the seams from top to bottom to prevent the cover material from lodging between the overlapped panel seams.

12.0 HYDRATION & ACTIVATION

In applications where the product is used as the sole hydraulic barrier, such as secondary containment, the GCL must first be hydrated with fresh water. Non-aqueous chemicals will not activate the bentonite. Therefore, bentonite hydration via rainwater or sprinkler and irrigation is necessary. When hydrated, the GSE BentoLiner is an excellent barrier to hydrocarbon fuels, fertilizers, and other such chemicals.

Only after the cover material has been placed should the GSE BentoLiner be allowed to hydrate. Once hydration has occurred no vehicles should be allowed to traffic the area directly above the GCL, unless minimum 1.0 ft (300 mm) separation exists between the GCL and the vehicle to adequately distribute the vehicle load. This should be increased to a minimum of 2.0 ft (600 mm) in high traffic areas such as roadways.

Periodic inspection of the liner to ensure proper coverage and adequate moisture content is recommended when GSE BentoLiner is used alone under a minimum 1.0 ft (300 mm) depth of cover soil. In arid regions, it may be necessary to irrigate the containment area, at a predetermined interval and/or a laminated or coated GCL used and deployed with the plastic component up in order to minimize dessication and wet - dry cycling.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

[DURABILITY RUNS DEEP]

GSE ENVIRONMENTAL™

REV 17JAN2013

Date Sampled: 1/21/2021

Time sampled: 13:00

Date tested: 1/21/2021

Technician: Walt

Sample- Dry/Wet: Dry

WSDOT Pit # D334

Material: 3/4" Minus

Sample weight (g)
2453

NOTES

BELT SWIPE

		3/4" Minus				
Sieve Size	Cum. Wt (g)	% retained	% passed	Spec. passing		
3/4"	0	0.0%	100%	100%	-	100%
1/2"	123	5.0%	95%	90%	-	100%
3/8"	300	12.2%	88%	70%	-	90%
#4	1112	45.3%	55%	30%	-	60%
#8	1720	70.1%	30%	20%	-	40%
#30	2208	90.0%	10%	5%	-	15%
#40	2275					
#100	2376	96.9%	3%	2%	-	5%
#200	2409	98.2%	2%	0%	-	3%