

SUPPLEMENTARY INFORMATION

GEOTECHNICAL FEASIBILITY STUDY PALENSKY RESTORATION PROJECT

US 30 Wildlife Undercrossing

Lower Columbia River Highway (US 30), Milepost 12.2

Burlington, Oregon

Prepared for: Wolf Water Resources, Inc.

Project No. 190292 • July 23, 2020 Draft



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1 Introduction

This report summarizes Aspect Consulting, LLC's (Aspect) geotechnical feasibility study for the proposed US 30 Wildlife Undercrossing for the Palensky Restoration Project (Project). The undercrossing will span beneath the Lower Columbia River Highway (US 30) near milepost (MP) 12.2, connecting an upstream drainage to the J.R. Palensky Wildlife Area, in Reach F, near Burlington, Oregon (Site; Figure 1).

Our services were provided to support Wolf Water Resources' (W2R) 60 Percent Project Design and were performed in accordance with our agreed-upon scope of work and signed subconsultant agreement.

1.1 Scope of Services

Our scope of services included a literature review, Site reconnaissance, subsurface explorations, and geotechnical engineering evaluations. This report includes:

- Site plan showing approximate exploration locations
- Site and Project descriptions
- Exploration logs showing the distribution and characteristics of shallow subsurface soils and groundwater based on two borings
- Groundwater conditions, flow, and drainage considerations
- Geologic profile using our field data to illustrate soil and groundwater conditions along the proposed underpass alignment
- Discussion of typical trenchless installation methods, including horizontal directional drilling (HDD), pipe ramming, micro-tunneling, and horizontal auger boring installation with respect to feasibility and constructability following ODOT's Hydraulic Design Manual
- Earthwork and grading, cut, and fill recommendations

1.2 Project Background and Description

In 1991, the 417-acre Burlington Bottoms (since renamed J.R. Palensky Wildlife Area) became the first land in Oregon purchased by the Bonneville Power Administration (BPA) under the Willamette and Columbia River Basins Fish and Wildlife Programs, to provide partial mitigation for the impacts associated with the construction of hydroelectric facilities. The Oregon Department of Fish and Wildlife (ODFW) was contracted by BPA in 1993 to conduct interim management of the property, which included completion of a habitat assessment or habitat evaluation procedure (HEP). A hydrology and hydraulics assessment was also conducted in 1993. Results of the HEP and hydrology study were incorporated into the Environmental Assessment/Management Plan written in 1994 and implemented beginning in 1995, which included custodial oversight and habitat restoration projects.

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The ODFW has maintained custodial ownership of the property and in partnership with the project lead, Columbia River Estuary Study Taskforce (CREST), and other partners that include West Multnomah Soil and Water Conservation District (WMSWCD), Oregon Department of Transportation (ODOT), and the Natural Resources Conservation Service (NRCS), is supporting construction of a wildlife underpass connecting the uplands on the southwest side of US 30 with J.R. Palensky Wildlife Area.

Historical construction of US 30 and the railroad that traverse the southwestern boundary of the J.R. Palensky Wildlife Area dissected several natural drainages from the lower wetland area. Culverts were installed to convey drainage water beneath US 30; however, wildlife has had to cross over the highway for access. We understand a wildlife underpass beneath US 30 is being considered to connect the Project area to a drainage near MP 12.2.

Preliminary information provided by W2R indicates the underpass will be approximately 120 feet long and roughly parallel with the existing stormwater culvert, extending from the drainage area on the southwest side of US 30 and daylighting from the road embankment slope on the other side of the highway. Similar underpasses installed by the Port of Portland and Portland Bureau of Transportation in the vicinity of the site have been 3-foot-diameter wildlife crossing pipe types with low concrete barrier walls on each end. Since open-cut construction across US 30 is infeasible, the underpass will be, installed using trenchless installation methods.

2 Site Description

We reviewed available published data, including geologic maps, aerial and light detection and ranging (LiDAR) imagery, topographic maps, and reports provided by W2R. The following sections describe the surface conditions observed during the Site reconnaissance, topography, geologic setting and local seismic conditions, and the subsurface conditions encountered in our explorations.

2.1 Site Conditions

The Site lies along US 30, on the western side of the J.R. Palensky Wildlife Area (Figure 2). The highway is four lanes, two in each direction, and approximately 80 feet wide (including the shoulders). The northeast side of US 30 is protected by a guardrail with an embankment sloping down to a shallow drainage between the elevated railroad tracks that parallel the highway. Further northeast of the railroad, the J.R. Palensky Wildlife Area expands outward toward the Multnomah Channel waterway. The southwest side of the Site is a 15 to 30 foot wide, relatively flat grassy area adjacent to the lower drainage channel. The channel rim is surrounded by deciduous trees. Basalt outcrops are exposed in the road cuts on either side of the drainage.

The US 30 elevation (EL¹) is relatively flat through the Site at EL 48 feet, approximately 25 feet above the J.R. Palensky Wildlife Area at EL 20 feet.

2.2 Geologic Setting

The Site lies in the Portland Basin, one of four basins constituting the Willamette Lowland and within the greater Willamette Valley and Puget Sound physiographic province, a structural basin filled with late Miocene, Pliocene, and Pleistocene igneous and sedimentary rocks. The Portland Basin extends southward into Oregon, bounded by the Tualatin Mountains (also called the Portland West Hills) on the west and the Cascade Range on the east, north, and south. Northwest- and northeast-trending topographic lineations, faults, and folds exist throughout the Portland Basin (Swanson et. al., 1993). Based on the geologic map (Evarts et al., 2016), the Portland Hills Fault structural feature is approximately 1,500 feet west of the Site and traverses parallel to US 30.

The Missoula Floods, a series of glacial outburst floods that originated in Montana approximately 12,000 to 15,000 years ago, had significant impacts on the geomorphology and depositional history of the Willamette Valley. Widespread inundation of the valley occurred during these floods. Up to 250 feet of silt, sand, and gravel was deposited in the Portland Basin, and up to 130 feet of silt, known as the Willamette Silt, was deposited elsewhere in the valley (Woodward et al., 1998).

The geology at the Site is mapped as Quaternary eolian deposits (Qe) and Quaternary fan deposits from tributaries (Qtf) across the drainage and underlying US 30 (Evarts et al., 2016). The Winter Water Member (Tgww) of the Columbia River Basalt Group (CRBG) is mapped surrounding the southside of the drainage and outcrops are exposed along local

¹ Elevations in this report reference the North American Vertical Datum of 1988 (NAVD88)

roadcuts. Other surrounding units within the lower J.R. Palensky Wildlife Area include Columbia River and Willamette River floodplain deposits (Qcwf and Qcwc).

The Qe deposits are unconsolidated, massive fine sand and silt forming dunes and benches cresting as much as EL 80 feet. The deposits form undulating, apparently wind-fluted topography of southwestern Sauvie Island and locally mantles low benches at the base of the Tualatin Mountains, where mapped bodies may include the cataclysmic-flood deposits, sand, and silt facies (Qfs). Fan deposits (Qtf) consist of unconsolidated silt, sand, and gravel in small fan-shaped accumulations from steep drainages emanating from the Tualatin Mountains southwest of the Site. Most of these fans are younger than 2,000 years, inferred from relation with the Qcwf and Qcwc deposits. The Tgww unit consists of light-gray to black basaltic andesite flows that are typically vesicular to microvesicular. Where exposed in roadcuts and quarries, the flows display hackly (entablature) to blocky to columnar-jointed patterns and vesicular flow tops with pillow lava locally present at base.

In addition, artificial fill underlies the near surface for the road and in close proximity surrounding the existing culverts.

2.2.1 Faults and Seismicity

The Site lies within a tectonically active area that has undergone multiple structural deformation events. Several potentially active Quaternary faults are located in the Site vicinity that include the Portland Hills fault (0.26 miles southwest) and the East Bank fault (2.8 miles southeast) (Personius, 2002). The estimated age of the most recent events suggests possible offset on the Portland Hills and East Bank faults occurred within the last 15,000 years (Personius and Haller, 2017).

The Site area also lies within the zone of strong ground shaking from earthquakes associated with the Cascadia Subduction Zone (CSZ). Subduction zone earthquakes occur due to rupture between the subducting oceanic plate and the overlying continental plate. The CSZ can produce earthquakes up to magnitude 9.3, and the recurrence interval is thought to be on the order of about 500 years. A recent study estimates the most recent subduction zone earthquake occurred in January 26, 1700 (Atwater et al., 2015).

Deep intra-slab earthquakes, which occur from tensional rupture of the sinking oceanic plate, are also associated with the CSZ. An example of this type of seismicity is the 2001 Nisqually earthquake. Deep intra-slab earthquakes typically are magnitude 7.5 or less and occur approximately every 10 to 30 years.

2.3 Subsurface Conditions

Subsurface conditions at the Site were inferred from the field explorations, laboratory testing on the collected soil samples, review of applicable geologic literature, and our experience with the local geology. The locations of our field explorations are presented on Figure 2 and the Geologic Cross Section on Figure 3.

Detailed descriptions of our field explorations, geologic units, laboratory testing, groundwater observations, and generalized engineering properties are presented in the following sections and on subsurface exploration logs in Appendix A.

2.3.1 Subsurface Explorations

On June 4 and 5, 2020, Aspect completed two borings, designated AB-01 and AB-02, at the Site with a track-mounted drill rig operated by Western States Soil Conservation, Inc., using mud rotary drilling techniques. Disturbed soil samples were obtained at 2.5- to 5-foot intervals using the Standard Penetration Test (SPT) in general accordance with the ASTM International (ASTM) D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils* (ASTM, 2018).

Soil observations and classification tests were performed in general accordance with ASTM International (ASTM) D2488, *Standard Practice for Description and Identification of Soils* (Visual-Manual Procedure). The terminology used in the soil classifications and other modifiers are defined and presented on the attached Figure A-1 included in Appendix A. Laboratory test results are presented in Appendix B.

2.3.2 Soils

The soil units observed in our explorations, presented in stratigraphic order from top to bottom, include fill for the road embankment and the drainage underlain by Quaternary fan deposits from tributaries (Qtf). The summary of the subsurface units below the existing ground surface encountered in the borings are as follows:

**ROAD
EMBANKMENT
AND DRAINAGE
FILL**

Boring AB-01 was drilled through the US 30 road embankment, consisting of a pavement section of 12 inches of hot mix asphalt (HMA) and 18 inches aggregate base underlain by approximately 12 feet of compacted fill. The road embankment fill includes an upper 2 feet of medium dense Gravel with Silt and Sand (GP-GM) beneath the aggregate base, 4 feet of very stiff Silt with Sand (ML), and 6 feet of medium dense Gravel (GP).

Boring AB-02, drilled approximately 10 feet southwest of the US 30 shoulder within a grassy landing, encountered approximately 6 feet of very stiff Silt with Sand (ML) over 2 feet of soft Silt (ML) that was used to fill in the drainage area adjacent to the highway.

**QUATERNARY
FAN DEPOSITS
FROM
TRIBUTARIES
(Qtf)**

Fan deposits (Qtf) were encountered in the two borings beneath the upper layers of fill. The deposits consist of:

- 4 to 8 feet of predominately interlayered Silt (ML), Gravelly Silt with Sand (ML), Sandy Silt with Gravel (ML), and Silt with Gravel (ML).
- 10 feet of Gravel with Silt and Sand (GP-GM), Gravel with Sand (GP), and Gravel (GP).
- Underlain by Silt with Sand (ML) or Gravelly Silt (ML) to the total exploration depths.

Wood debris was commonly observed in the soil samples and drill cuttings from rootlets to up to 12-inch wood fragments. The coarse-

grained deposits (GP-GM and GP) are very loose to medium dense and the fine-grained deposits (ML) are soft to stiff.

2.3.3 Groundwater

Groundwater was not directly measured due to the addition of drilling mud to advance the borings. We anticipate groundwater will typically be lower than the currently proposed wildlife undercrossing, assuming it parallels the existing culvert. Groundwater levels will fluctuate seasonally with precipitation, as well as with changes in Site and near-Site usages.

3 Conclusions and Recommendations

Based on our geotechnical evaluation of the Site, including data review, subsurface explorations, and soil laboratory testing, the proposed wildlife undercrossing is feasible. Our key findings and conclusions include:

- The subsurface conditions at the Site consist of fill overlying fan deposits.
- The pipeline will be installed within the drainage and road embankment fill. The southwestern portions will be mostly within the very stiff silt (ML) soils transitioning to silt with sand (ML) and gravel (GP) beneath US 30.
- Groundwater was not measured during drilling and we anticipate it will be below the pipe installation depth and can be locally managed using sump pumps, if encountered in the launch/receiving pit excavations.
- For the trenchless wildlife undercrossing, pipe jacking or pipe ramming methods will be appropriate. More detailed discussion of these techniques is presented in Section 3.1 and 3.2.
- Pipe installation should be performed in accordance with ODOT Standards.
- Excavation of the unconsolidated deposits with conventional equipment is feasible at the Site.

The grading and final development plans for the Project were not completed at the time this report was prepared. Once completed, Aspect should be engaged to review the Project plans and update our recommendations as necessary.

3.1 Trenchless Installation Methods

Trenchless methods allow for the installation of conduits (i.e., utility pipes, viaducts, culverts, etc.) without breaking the ground surface above the pipe. Such methods are frequently more technically difficult; however, these often are the most viable and cost effective approach for crossings under existing roads, railroads, and rivers. The principal techniques utilized in transportation projects include:

- Pipe Jacking
- Horizontal Auger Boring
- Pipe Ramming
- Horizontal Directional Drilling
- Microtunneling

Our explorations indicate the 120-foot-long trenchless section of pipe will encounter “mixed face conditions” consisting of the interbedded layers of fill beneath US 30. The boring AB-01 encountered a layer of silt with sand (ML) over gravel (GP) and we anticipate additional material types may be present between the sample intervals. The trenchless method should be capable of installation within fine- and coarse-grained materials at a shallow depth beneath US 30 and comply with ODOT requirements.

Based on ODOT’s Geotechnical Design Manual (GDM; ODOT, 2019) and Hydraulics Design Manual (ODOT, 2014), ODOT provides details and recommendations on several

trenchless methods for variable subsurface conditions, pipe types and diameters, and installation depths and lengths. The methods are further described below.

3.1.1 Pipe Jacking

In general, pipe jacking consists of using hydraulic jacks to push pipes through the ground. The forward element of the pipe typically consists of a slightly oversized tunnel shield that minimizes pipe damage and side friction. The pipe jacking procedure uses the thrust power of the hydraulic jacks to force the pipe forward through the ground as the pipe jacking face is excavated. The spoils are transported through the inside of the pipe to the drive shaft, where it is removed. After each pipe segment has been installed, the rams of the jacks are retracted so that another pipe segment can be placed in position for the jacking cycle to begin again. Excavation is accomplished by hand mining or mechanical excavation within a shield or by a microtunnel boring machine (MTBM).

The selection of excavation method is based on a careful assessment of subsurface conditions in the installation zone for the presence of bedrock, boulders, cobbles, and fill obstructions (such as stumps or logs) as well as instability. Many methods are difficult to infeasible in areas where bedrock, cemented soils, or large particles (boulders and cobbles) are present. If there is any possibility of excavation face collapse, soil stabilization techniques must be considered. Common soil stabilization techniques are dewatering and grouting. Important optional equipment available for the pipe jacking method includes a pipe lubrication system and intermediate jacking stations. The pipe lubrication system consists of mixing and pumping equipment necessary for applying bentonite or polymer slurry to the external surface of the pipe. An adequate lubrication system can decrease jacking forces by 20 to 30 percent.

3.1.2 Horizontal Auger Boring

Auger boring is similar to pipe jacking except that a rotary cutting head is used to form the bore hole as the pipe is jacked, significantly reducing the necessary jacking forces. Spoils are removed from the pipe by a rotating auger. In general, auger boring allows for little to no steering. The stress and impact associated with an auger working within the casing generally limits the material choice to steel. Frequently, a steel exterior casing is lined with a smaller carrier pipe of different materials.

Auger boring should generally not be used when the presence of cobbles and boulders larger than one third of the casing diameter is possible. This method can also be difficult in loose granular soils below the groundwater table.

3.1.3 Pipe Ramming

Pipe ramming uses a pneumatic hammer to drive a steel casing. The casing itself generally constitutes the drilling tool. Cuttings are removed using an auger or with compressed air or water. In some situations, small-diameter pipes can be driven with a closed end, negating the need for cuttings removal. Pipe ramming is most successful in stable, cohesive soils. With unstable soil conditions, the potential for voids and settlements are large. The method is generally not feasible within gravels and cobbles unless the casing diameter is large relative to the largest anticipated soil particle size.

3.1.4 Microtunnelling

Microtunnelling is a trenchless construction method for installing conduits in a wide range of soil conditions, while maintaining close tolerances to line and grade from the drive shaft to the reception shaft. The microtunnelling process is a cyclic pipe jacking process. For the soil types present (generally silts and clays with shallow groundwater), microtunnelling methods can include slurry tunneling or earth pressure balance (EPB).

Microtunnelling can be applied to a wide range of soil types. The most favorable ground condition for slurry microtunnelling is wet sand.

3.1.5 Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) is a trenchless method of installing underground pipes using a specialized drill rig. Typically, a pilot hole is drilled and then subsequently enlarged with the pipe or casing pulled into the enlarged shaft. The drilling is typically accomplished using a drilling slurry of water and bentonite or polymer and can be applied to a wide range of soil types.

Cobbles and boulders will affect steering, borehole advancement, and borehole stability and cause an inability to maintain drilling fluids within the borehole, increasing costs and delay. Additionally, failure to maintain pressures can result in borehole collapse.

3.2 Trenchless Method Selection

The selection of a particular trenchless technology for use in a project is guided by geotechnical and non-geotechnical issues, including budget, site access, and pipe diameter. Geotechnical conditions will limit the number of options available and may rule out trenchless methods entirely.

Subsurface conditions within the proposed alignment will impact the overall project success. The most critical conditions are gradation (fine-grained cohesive, fine-grained non-cohesive, coarse-grained, etc.), the presence of cobbles or boulders, the presence of rock, the soil density or stiffness, and the depth to groundwater. Guidance prepared by National Cooperative Highway Research Program (NCHRP) indicates the potential for success for a variety of trenchless methods versus the anticipated soil conditions.

We understand the wildlife undercrossing will be 36-inch diameter and extend approximately 120 feet from the drainage to the side of the road embankment. Based on ODOT (ODOT, 2014) any of the above methods are suitable at this size and length.

Assuming the wildlife underpass will be installed primarily through the drainage and road embankment fills at relatively shallow depths, we anticipate the following subsurface conditions (based on our two explorations):

1. Low cohesion to cohesionless, soft to very stiff silt (ML) and silt with sand (ML) transitioning beneath US 30 to layers of cohesionless, very stiff silt with sand (ML) and medium dense gravel (GP) that may contain large cobbles (up to 12 inches diameter). Although not observed in our borings, ODOT road embankments can include large boulders (2- to 3-foot diameter) that may be encountered.

2. No groundwater and no bedrock are anticipated.

The table below is derived from that guidance and replicated from the ODOT GDM (ODOT, 2019).

Table 1. Typical Trenchless Installation Methods Beneath Roadways

	Cohesive Soils (Clay)			Cohesionless Soils (Sand/Silt)				Boulders ¹
	N<5	5<N<15	N>15	N<10	10<N<30	N>30	High GW	
Pipe Jacking (PJ) with TBM	○	●	●	○	●	●	○	
Pipe Jacking with Hand Mining (HM)	X	●	●	○	●	●	X	<95% φ
Auger Boring (AB)	○	●	●	○	●	●	X	<33% φ
Pipe Ramming	●	●	●	●	○	○	○	<90% φ
Microtunneling (MT)	●	●	●	●	●	●	●	<33% φ ¹
Maxi/Midi-HDD	○	●	●	○	●	●	○	○
Mini-HDD	○	●	●	○	●	●	○	X

■: Site Conditions ●: Recommended ○: Possible X: Unsuitable
 (based on the assumption that work is performed by experienced operators using proper equipment)

¹ Size of largest boulder versus minimum casing diameter (φ).

The selected method should be capable of advancing through the variable soil materials and ensure the borehole will not collapse. Considering the shallow installation depths and the consequences if an uncased borehole collapses beneath US 30, we consider driving a casing a significant factor in reducing risk.

Based on these relationships, we consider pipe jacking and pipe ramming to be the most plausible trenchless methods for installing the wildlife undercrossing, though it will necessitate using either steel pipe (pipe jacking and pipe ramming) or fiber-reinforced mortar pipe (FRMP) (pipe jacking).

4 Construction Considerations

Due to the feasibility-level study, actual construction requirements are yet to be determined. The considerations described below are general; more specific specifications may be needed depending on the selected approach, and should be completed in conformance with ODOT's Oregon Standard Specifications for Construction (ODOT SS) (ODOT, 2018).

Construction and earthwork are typically most economical when performed under dry-weather conditions. Appropriate erosion control measures should be implemented prior to beginning earthwork activities in accordance with the local regulations. In our opinion, excavation can generally be accomplished using standard excavation equipment. While not directly observed in our subsurface exploration, the presence of potential obstructions, such as small boulders, buried logs, or other debris, should be anticipated.

4.1 Site Preparation

Site preparation within the proposed construction footprint should include removal of fill and soils containing roots, organics, debris, and any other deleterious materials. The contractor must use care during Site preparation and excavation operations, so that any bearing surfaces are not disturbed. If disturbance does occur, the disturbed material should be removed to expose undisturbed material as determined by the geotechnical engineer.

All footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. All loose or softened soil should be removed from the footing excavation or compacted in place prior to placing reinforcing steel bars. We recommend that footing excavations be observed by Aspect prior to placing steel and concrete to verify the recommendations in this report have been followed.

4.2 Subgrade Preparation

Following Site preparation, and prior to placing an aggregate base, the exposed subgrade should be evaluated either by proof rolling or another method of subgrade verification. The subgrade should be proof-rolled with a fully loaded dump truck or similar heavy, rubber-tire construction equipment to identify unsuitable areas. If evaluation of the subgrades occurs during wet conditions, or if proof rolling the subgrades will result in disturbance, they should be evaluated by Aspect using a steel foundation probe. We recommend that Aspect be retained to observe the proof rolling and perform the subgrade verifications. Unsuitable areas identified during the field evaluation should be compacted to a firm condition or be excavated and replaced with structural fill.

4.3 Wet Weather Conditions

If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is above optimum and difficult to control, the following recommendations apply:

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- Earthwork should be performed in small areas to minimize exposure.
- Structural fill placed during wet weather should consist of material meeting the criteria as specified in ODOT SS 00330.14 – Selected Granular Backfill.
- Stabilization fill placed during wet weather should consist of material meeting the criteria as specified in ODOT SS 00330.16 – Stone Embankment Material.
- A geotextile fabric should be placed as a barrier between the subgrade and stabilization material meeting ODOT SS 02320.10 and SS 02320.20, Table 02320-4 for soil separation. The geotextile should be installed in conformance with ODOT SS 0350.00 – Geosynthetic Installation.
- Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of the specified structural fill.
- The size, type, and access of construction equipment used may have to be limited to prevent soil disturbance.
- The ground surface within the construction area should be graded to promote runoff of surface water away from the slopes and prevent water ponding.
- The ground surface within the construction area should be properly covered and under no circumstances should be left uncompacted and/or exposed to moisture. Soils that become too wet for compaction should be removed and replaced with specified structural fill.
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed prior to placement, compaction requirements are met, and site drainage is appropriate.
- Erosion and sedimentation control should be implemented in accordance with best management practices (BMPs).

4.4 Excavation

The near-surface soils at the Site can be excavated with conventional earthwork equipment. Open excavation techniques may be used in the clay, silt, silty sand, and sandy silt, provided the excavation is configured in accordance with the Occupational Safety and Health Administration (OSHA) requirements and groundwater seepage is not present, and with the understanding that some sloughing may occur.

Maintenance of safe working conditions, including temporary excavation stability, is the sole responsibility of the contractor. All temporary cuts in excess of 4 feet in height that are not protected by trench boxes, or otherwise shored, should be sloped in accordance with Oregon Administrative Rule (OAR) OAR 437, Division 3 Subdivision P requirements.

Aspect should be retained to review the grading and utility plans when they become available for comparison with encountered field conditions; additional work may be required to better define the impact on the Project.

4.4.1 Temporary and Permanent Slopes

In general, shallow surface soils that will be subject to excavation and sloping on the Site classify OSHA Soil Classification Type C. Temporary excavation side slopes (cut slopes) are anticipated to stand as steep as 1.5H:1V (horizontal:vertical). The cut slope inclinations estimated above are for planning purposes only and are applicable to excavations without inflowing perched groundwater or runoff.

With time and the presence of seepage and/or precipitation, the stability of temporary unsupported cut slopes can be significantly reduced. We recommend planning the construction schedule to have excavation occur during the summer months and to minimize the amount of time that the temporary slopes will be unsupported during construction. The contractor should monitor the stability of the temporary cut slopes and adjust the construction schedule and slope inclination accordingly. Vibrations created by traffic and construction equipment may cause caving and raveling of the face of the temporary slopes. At no time should soil stockpiles, equipment, and other loads be placed immediately adjacent to an excavation.

Permanent slopes for the Project should have a maximum inclination of 2H:1V. Access roads should be located at least 5 feet from the top of temporary slopes. Surface water runoff should be collected and directed away from slopes to prevent water from running down the face.

4.5 Structural Fill Material and Compaction

Structural fill, including base rock, should be placed over subgrades that have been prepared in conformance with Sections 4.1, 4.2, and 4.3 above. The on-Site soils are suitable for reuse in landscape areas and areas that can accommodate some settlement and are not suitable for reuse as structural fill. We recommend the contractor import granular material for use as structural fill. General fill specifics are provided in Table 2.

Table 2. Fill Type and Compaction Requirements

Material	Specification	Lift Thickness ¹ and Compaction ²
Imported Granular Materials	ODOT SS 00330.12 – Borrow Material ³	9 inches 95 percent
Crushed Aggregate Base	ODOT SS 02630.10 – Dense-Graded Aggregate	10 inches 95 percent
Selected Granular Backfill	General – ODOT SS 00330.14 – Selected Granular Backfill	9 inches 95 percent
Stabilization Materials	ODOT SS 00330.15 Selected Stone Backfill	6 inches 95 Percent
	ODOT SS 00330.16 – Stone Embankment Material	6 inches 95 Percent

Notes:

1. Maximum uncompacted thickness
2. Maximum dry density, as determined by ASTM D1557
3. Fraction passing the US Standard No. 4 Sieve, less than 5 percent by dry weight should pass the US Standard No. 200 Sieve

4.6 Trenchless Crossing Considerations

Regardless of the selected method, trenchless construction should be performed in accordance with ODOT SS 00406 – Tunneling, Boring, and Jacking.

Tunneling - Tunneling includes all methods by which an underground passageway is excavated and lining materials are brought in and placed.

Boring - Boring includes all methods by which a conduit, casing, pipe or sleeve is pushed or pulled into place and in which the excavation method precludes the stationing of a worker within the conduit without stopping or removing the excavation Equipment.

Jacking - Jacking includes all methods by which a conduit, casing, pipe or sleeve is pushed or pulled into place with one or more workers inside to excavate and assist in keeping the conduit on the required grade and alignment.

5 Recommendations for Continuing Services

5.1 Continuing Design and Consultation Services

We recommend that Aspect attend design team meetings by telephone as design progresses on an as-needed basis (as determined by W2R) and review the geotechnical elements of the Project plans to see that our geotechnical engineering recommendations have been properly interpreted and incorporated into the design.

5.2 Additional Services During Construction

We are available to provide geotechnical engineering and monitoring services during construction. The integrity of the geotechnical elements depends on proper Site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent.

As with any construction operation, qualified professionals should observe the installation to document progress and to provide information for comparison to the design and baseline documents (e.g., geotechnical data report). Contractor submittals should include the following (after Simicevic and Sterling, 2001):

- Pre-construction surveys, as-built drawings
- Construction logs
- Material certifications and quantities
- Cause and extent of delay (if any)
- Locations of disturbed areas (if any)
- Any unusual or unexpected conditions

We also recommend that a construction log of the operation should consist of the following:

- The position of the pipe in relation to the design alignment and grade
- Pipe inclination and advance rates
- Hammer performance (blow rate, bpm; blow count, bpf or blows per 0.3 m)
- Operating pressure of air compressor or hydraulic pump
- Spoil quantities removed
- A separate log tracking quantity and quality (e.g., viscosity) of lubricant used and pressure of lubricant delivery system

Regardless of the method of pipe installation, uncertainties in the soil stratigraphy and characterization, groundwater levels, operation of construction equipment, surcharge and traffic loading, and other variables exist. Although surface disruptions are generally minimal for pipe ramming installations, the observation of construction operations is to adequately document the installation in the event uncertainties produce undesirable production rates or outcomes.

6 References

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- Simicevic, J., and R. Sterling, 2001, Guidelines for Pipe Ramming. Technical Report, Trenchless Technology Center of Louisiana Technological University, Ruston, LA, Vol. 4, pp.1-21.
- Swanson, R.D., McFarland, W.D., Gonthier, J.B., and Wilkinson, J.W., 1993, A description of hydrogeologic units in the Portland Basin, Oregon and Washington, Portland, OR: U.S. Geological Survey. (Water-resources investigation report 90-4196).
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7 Limitations

Work for this project was performed for Wolf Water Resources (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions, geotechnical engineering calculations, and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. At the time of this report, design plans and construction methods have not been finalized, and the recommendations presented herein are based on preliminary project information. If project developments result in changes from the preliminary project information, Aspect should be contacted to determine if our recommendations contained in this report should be revised and/or expanded upon.

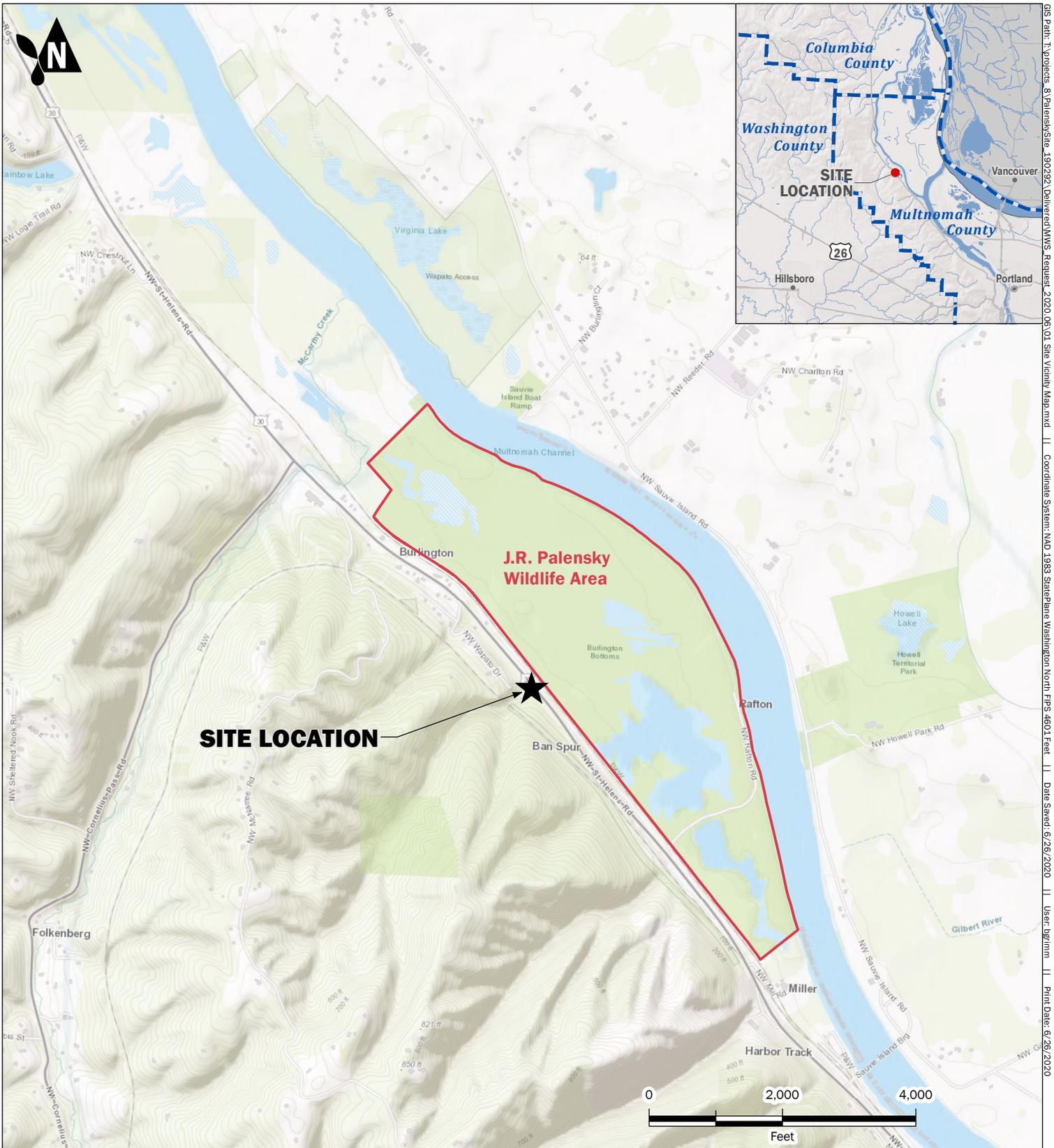
The scope of work does not include services related to construction safety precautions. Site safety is typically the responsibility of the contractor, and our recommendations are not intended to direct the contractor's site safety methods, techniques, sequences, or procedures. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

We appreciate the opportunity to perform these services. If you have any questions please call Mark Swank, CEG, Senior Engineering Geologist, 503.729.1992.

FIGURES



<h2>Site Vicinity Map</h2> <p>Geotechnical Feasibility Study Palensky Restoration Project US 30 Wildlife Undercrossing Lower Columbia River Highway, MP 12.2 Burlington, Oregon</p>			
	JUN-2020	BY: MWS / WEG	FIGURE NO. 1
	PROJECT NO. 190292	REVISED BY: ---	

GIS Path: I:\Projects_8\PalenskySite_190292\Delivered\MWS_Request_2020.05.04_Site_Vicinity_Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 6/28/2020 || User: bgrimm || Print Date: 6/28/2020

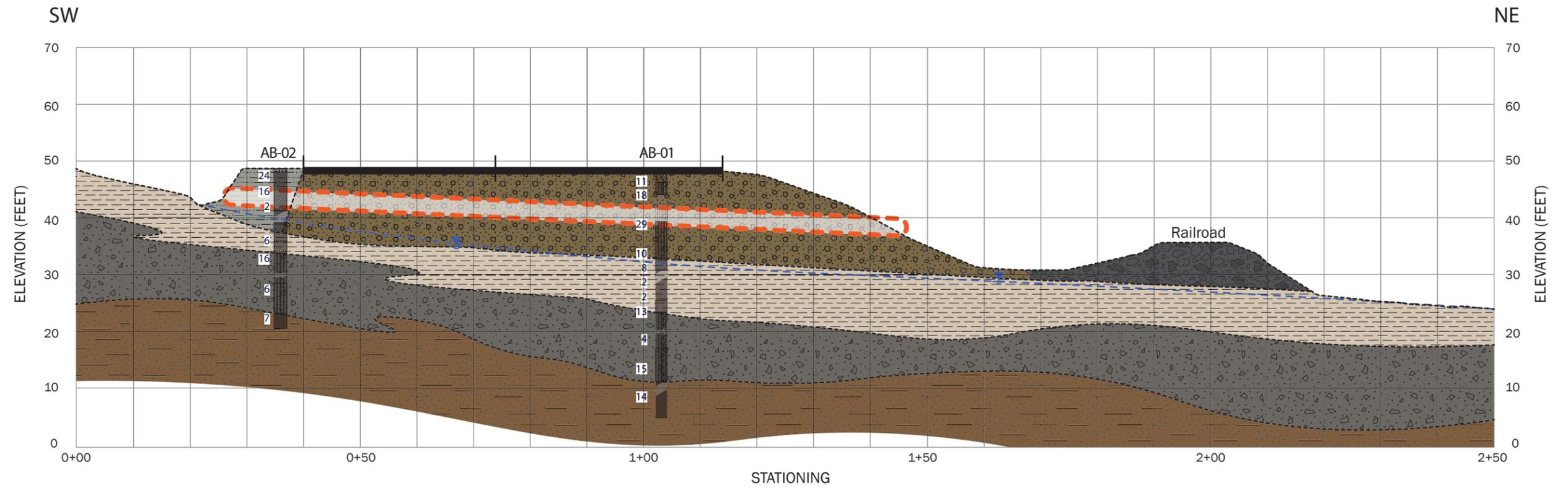
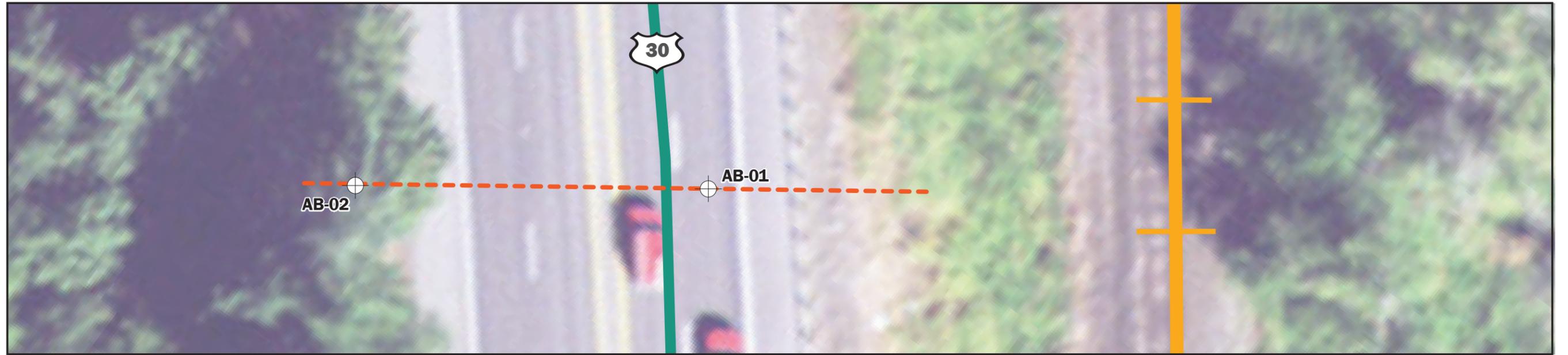


 Boring Location
 Road Centerline (OR Explorer)
 Railroad Line (OR Explorer)

0 150 300
 Feet

Site Exploration Map
 Geotechnical Feasibility Study
 Palensky Restoration Project
 US 30 Wildlife Undercrossing
 Lower Columbia River Highway, MP 12.2
 Burlington, Oregon

JUN-2020 PROJECT NO. 190292	BY: MWS / WEG REVISED BY: ---	FIGURE NO. 2
-----------------------------------	--	------------------------



Legend

-  Boring Location
-  Road Centerline (OR Explorer)
-  Railroad Line (OR Explorer)
-  Wildlife Undercrossing

Lithology Graphics

- | | | | |
|---|--|---|---|
|  | Road Embankment Fill - Gravel (GP and GP-GC); Silt with Sand (ML) |  | Fan Deposits (Qtz) - Silt (ML); Gravelly Silt with Sand (ML); Sandy Silt with Gravel (ML) |
|  | Drainage Fill - Silt (ML); Silt with Sand (ML) |  | Fan Deposits (Qtz) - Gravel with Sand (GP); Gravel with Silt and Sand (GP-GM) |
|  | Railroad Ballast Fill - Gravels containing Cobbles and Boulders (GM and GP-GM) |  | Fan Deposits (Qtz) - Silt with Sand (ML); Gravelly Silt (ML) |

SPT Blow Count
N Value

Material Type (see Lithology Graphics)

Inferred Geologic Contact

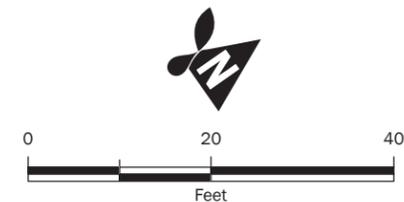
— Offset and direction

— Borehole ID

Water Level in Borehole at time of drilling

Water level in digital pressure transducer, Date

B-01 (Offset 31' SE)



Geologic Cross Section

Geotechnical Feasibility Study
 Palensky Restoration Project
 US 30 Wildlife Undercrossing
 Lower Columbia River Highway, MP 12.2
 Burlington, Oregon

	JUL -2020	BY: MWS	FIGURE NO. 3
	PROJECT NO. 190292	REVISED BY: ---	

APPENDIX A

Subsurface Explorations

A. Subsurface Explorations

On June 4 and 5, 2020, Western States Soil Conservation, Inc., under subcontract to Aspect, drilled two borings, designated AB-01 and AB-02, to total exploration depths between 26.5 and 41.5 feet bgs using mud rotary drilling methods. The boring locations are shown on Figure 2.

Soil sampling was completed at selected depth intervals using the Standard Penetration Test (SPT) in general accordance with ASTM International (ASTM) D1586. The test typically involves driving a 2- or 3-inch-outside-diameter split-barrel sampler a distance of 18 inches into the soil with a 140-pound automatic-trip hammer free falling from a distance of 30 inches. The number of blows for each 6-inch interval is recorded, and the number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance (“N”) or blow count. The resistance, or N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils.

An Aspect representative was present throughout the field exploration program to observe the drilling procedure, collect soil samples, and prepare descriptive logs of each boring. Soils were classified in general accordance with ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*. The summary exploration logs represent our interpretation of the contents of the field logs. The stratigraphic contacts shown on the summary log represent the approximate boundaries between soil types; actual transitions may be more gradual. The subsurface conditions depicted are only for the specific date and location reported, and therefore, are not necessarily representative of other locations and times.

Coarse-Grained Soils - More than 50% ¹ Retained on No. 200 Sieve	Gravels - More than 50% ¹ of Coarse Fraction Retained on No. 4 Sieve	≤ 5% Fines	GW	Well-graded GRAVEL Well-graded GRAVEL WITH SAND
		≥ 15% Fines	GP	Poorly-graded GRAVEL Poorly-graded GRAVEL WITH SAND
	Sands - 50% ¹ or More of Coarse Fraction Passes No. 4 Sieve	≤ 5% Fines	GM	SILTY GRAVEL SILTY GRAVEL WITH SAND
		≥ 15% Fines	GC	CLAYEY GRAVEL CLAYEY GRAVEL WITH SAND
Fine-Grained Soils - 50% ¹ or More Passes No. 200 Sieve	Sands - 50% ¹ or More of Coarse Fraction Passes No. 4 Sieve	≤ 5% Fines	SW	Well-graded SAND Well-graded SAND WITH GRAVEL
		≥ 15% Fines	SP	Poorly-graded SAND Poorly-graded SAND WITH GRAVEL
	Silt and Clays Liquid Limit Less than 50%	≤ 5% Fines	SM	SILTY SAND SILTY SAND WITH GRAVEL
		≥ 15% Fines	SC	CLAYEY SAND CLAYEY SAND WITH GRAVEL
Highly Organic Soils	Silt and Clays Liquid Limit 50% or More		ML	SILT SANDY or GRAVELLY SILT SILT WITH SAND SILT WITH GRAVEL
			CL	LEAN CLAY SANDY or GRAVELLY LEAN CLAY LEAN CLAY WITH SAND LEAN CLAY WITH GRAVEL
	Silt and Clays Liquid Limit 50% or More		OL	ORGANIC SILT SANDY or GRAVELLY ORGANIC SILT ORGANIC SILT WITH SAND ORGANIC SILT WITH GRAVEL
			MH	ELASTIC SILT SANDY or GRAVELLY ELASTIC SILT ELASTIC SILT WITH SAND ELASTIC SILT WITH GRAVEL
Silt and Clays Liquid Limit 50% or More		CH	FAT CLAY SANDY or GRAVELLY FAT CLAY FAT CLAY WITH SAND FAT CLAY WITH GRAVEL	
		OH	ORGANIC CLAY SANDY or GRAVELLY ORGANIC CLAY ORGANIC CLAY WITH SAND ORGANIC CLAY WITH GRAVEL	
			PT	PEAT and other mostly organic soils

"WITH SILT" or "WITH CLAY" means 5 to 15% silt and clay, denoted by a "-" in the group name; e.g., SP-SM • "SILTY" or "CLAYEY" means >15% silt and clay • "WITH SAND" or "WITH GRAVEL" means 15 to 30% sand and gravel. • "SANDY" or "GRAVELLY" means >30% sand and gravel. • "Well-graded" means approximately equal amounts of fine to coarse grain sizes • "Poorly graded" means unequal amounts of grain sizes • Group names separated by "/" means soil contains layers of the two soil types; e.g., SM/ML.

Soils were described and identified in the field in general accordance with the methods described in ASTM D2488. Where indicated in the log, soils were classified using ASTM D2487 or other laboratory tests as appropriate. Refer to the report accompanying these exploration logs for details.

1. Estimated or measured percentage by dry weight
2. (SPT) Standard Penetration Test (ASTM D1586)
3. Determined by SPT, DCPT (ASTM STP399) or other field methods. See report text for details.

MC	=	Natural Moisture Content	GEOTECHNICAL LAB TESTS
GS	=	Grain Size Distribution	
FC	=	Fines Content (% < 0.075 mm)	
GH	=	Hydrometer Test	
AL	=	Atterberg Limits	
C	=	Consolidation Test	
Str	=	Strength Test	
OC	=	Organic Content (% Loss by Ignition)	
Comp	=	Proctor Test	
K	=	Hydraulic Conductivity Test	
SG	=	Specific Gravity Test	

Organic Chemicals			CHEMICAL LAB TESTS
BTEX	=	Benzene, Toluene, Ethylbenzene, Xylenes	
TPH-Dx	=	Diesel and Oil-Range Petroleum Hydrocarbons	
TPH-G	=	Gasoline-Range Petroleum Hydrocarbons	
VOCs	=	Volatile Organic Compounds	
SVOCs	=	Semi-Volatile Organic Compounds	
PAHs	=	Polycyclic Aromatic Hydrocarbon Compounds	
PCBs	=	Polychlorinated Biphenyls	
Metals			
RCRA8	=	As, Ba, Cd, Cr, Pb, Hg, Se, Ag, (d = dissolved, t = total)	
MTCA5	=	As, Cd, Cr, Hg, Pb (d = dissolved, t = total)	
PP-13	=	Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn (d=dissolved, t=total)	

PID	=	Photoionization Detector	FIELD TESTS
Sheen	=	Oil Sheen Test	
SPT ²	=	Standard Penetration Test	
NSPT	=	Non-Standard Penetration Test	
DCPT	=	Dynamic Cone Penetration Test	

Descriptive Term	Size Range and Sieve Number	COMPONENT DEFINITIONS
Boulders	= Larger than 12 inches	
Cobbles	= 3 inches to 12 inches	
Coarse Gravel	= 3 inches to 3/4 inches	
Fine Gravel	= 3/4 inches to No. 4 (4.75 mm)	
Coarse Sand	= No. 4 (4.75 mm) to No. 10 (2.00 mm)	
Medium Sand	= No. 10 (2.00 mm) to No. 40 (0.425 mm)	
Fine Sand	= No. 40 (0.425 mm) to No. 200 (0.075 mm)	
Silt and Clay	= Smaller than No. 200 (0.075 mm)	

% by Weight	Modifier	% by Weight	Modifier	ESTIMATED¹ PERCENTAGE	
<1	=	Subtrace	15 to 25 =		Little
1 to <5	=	Trace	30 to 45 =		Some
5 to 10	=	Few	>50 =		Mostly

Dry	=	Absence of moisture, dusty, dry to the touch	MOISTURE CONTENT
Slightly Moist	=	Perceptible moisture	
Moist	=	Damp but no visible water	
Very Moist	=	Water visible but not free draining	
Wet	=	Visible free water, usually from below water table	

Non-Cohesive or Coarse-Grained Soils		RELATIVE DENSITY
Density³	SPT² Blows/Foot	
Very Loose	= 0 to 4	≥ 2'
Loose	= 5 to 10	1' to 2'
Medium Dense	= 11 to 30	3" to 1'
Dense	= 31 to 50	1" to 3"
Very Dense	= > 50	< 1"

Cohesive or Fine-Grained Soils		CONSISTENCY
Consistency³	SPT² Blows/Foot	
Very Soft	= 0 to 1	Penetrated >1" easily by thumb. Extrudes between thumb & fingers.
Soft	= 2 to 4	Penetrated 1/4" to 1" easily by thumb. Easily molded.
Medium Stiff	= 5 to 8	Penetrated >1/4" with effort by thumb. Molded with strong pressure.
Stiff	= 9 to 15	Indented ~1/4" with effort by thumb.
Very Stiff	= 16 to 30	Indented easily by thumbnail.
Hard	= > 30	Indented with difficulty by thumbnail.

GEOLOGIC CONTACTS		
Observed and Distinct	Observed and Gradual	Inferred

	Exploration Log Key
---	---------------------

AI Path: Q:\ACAD Standards\FIELD REFERENCE\MASTERS\Exploration Log Key-2018.ai // user: jinman // last saved: 09/26/2018



Palensky Restoration Project - 190292

Geotechnical Exploration Log

Project Address & Site Specific Location

Coordinates (Lat, Lon WGS84)

Exploration Number

NW St Helens Road (US 30), MP 12.2, Northbound Outside Lane

45.6429, -122.8374 (est)

AB-01

Contractor
Western States Soil
Conservation, Inc.

Equipment

Sampling Method

Ground Surface Elev. (NAVD88)

Mud Rotary

Autohammer; 140 lb hammer; 30" drop

48' (est)

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

Sam

CME 850

6/4/2020

NA

No Water Encountered

Depth (feet)	Elev. (feet)	Exploration Completion and Notes	Sample Type/ID	Blows/foot					Blows/6'	Tests	Material Type	Description	Depth (ft)
				0	10	20	30	40					
		Boring backfilled with asphalt from 0 to 1 foot bgs.									ASPHALT; 1-foot asphalt.		
		Boring backfilled with gravel from 1 to 2.5 feet bgs.									GRAVEL (GW); 1.5-foot aggregate base course.		
		Boring backfilled with bentonite chips from 2.5 to 41.5 feet bgs.									FILL		
45			S1							9	GRAVEL WITH SILT AND SAND (GP-GM); medium dense, moist, brown; low plasticity; medium to coarse sand; fine to coarse, subangular gravel.		
										7			
										4			
5			S2							10	SILT WITH SAND (ML); very stiff, moist, brown; low plasticity; fine to coarse sand.	5	
										9			
										9			
40			S3							17	GRAVEL (GP); medium dense, moist, dark gray; fine to coarse, subrounded to subangular gravel.	10	
										10			
										19			
35			S4							6	SILT (ML); stiff, very moist, dark gray; medium plasticity; few find sand; trace woody debris.	15	
										7			
										3			
30			S5							1	FAN DEPOSITS FROM TRIBUTARIES (Qtz)		
										4	GRAVELLY SILT WITH SAND (ML); medium stiff, moist, gray to blue gray; low plasticity; medium to coarse sand; fine to coarse, subrounded to subangular gravel.		
										4			
20			S6							2	Grades to soft.	20	
										1			
										1			
25			S7							0	SANDY SILT WITH GRAVEL (ML); soft, moist, gray to blue gray; low plasticity; medium to coarse sand; fine to coarse, subrounded to subangular gravel; woody organics.		
										1			
										1			
25			S8							8	GRAVEL WITH SILT AND SAND (GP-GM); medium dense, moist, gray to gray brown; non-plastic; medium to coarse sand; fine to coarse, subrounded to subangular gravel.	25	
										7			
										6			

LL=36%
PL=27%

Legend

- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit | Liquid Limit

No Water Encountered

Water Level

See Exploration Log Key for explanation of symbols

Logged by: JSJ
Approved by: MWS

Exploration Log
AB-01

Sheet 1 of 2



Palensky Restoration Project - 190292

Geotechnical Exploration Log

Project Address & Site Specific Location
 NW St Helens Road (US 30), MP 12.2, Northbound Outside Lane

Coordinates (Lat, Lon WGS84)
 45.6429, -122.8374 (est)
 Ground Surface Elev. (NAVD88)
 48' (est)

Exploration Number

AB-01

Contractor
 Western States Soil Conservation, Inc.

Equipment

Mud Rotary

Sampling Method

Autohammer; 140 lb hammer; 30" drop

Operator

Sam

Exploration Method(s)

CME 850

Work Start/Completion Dates

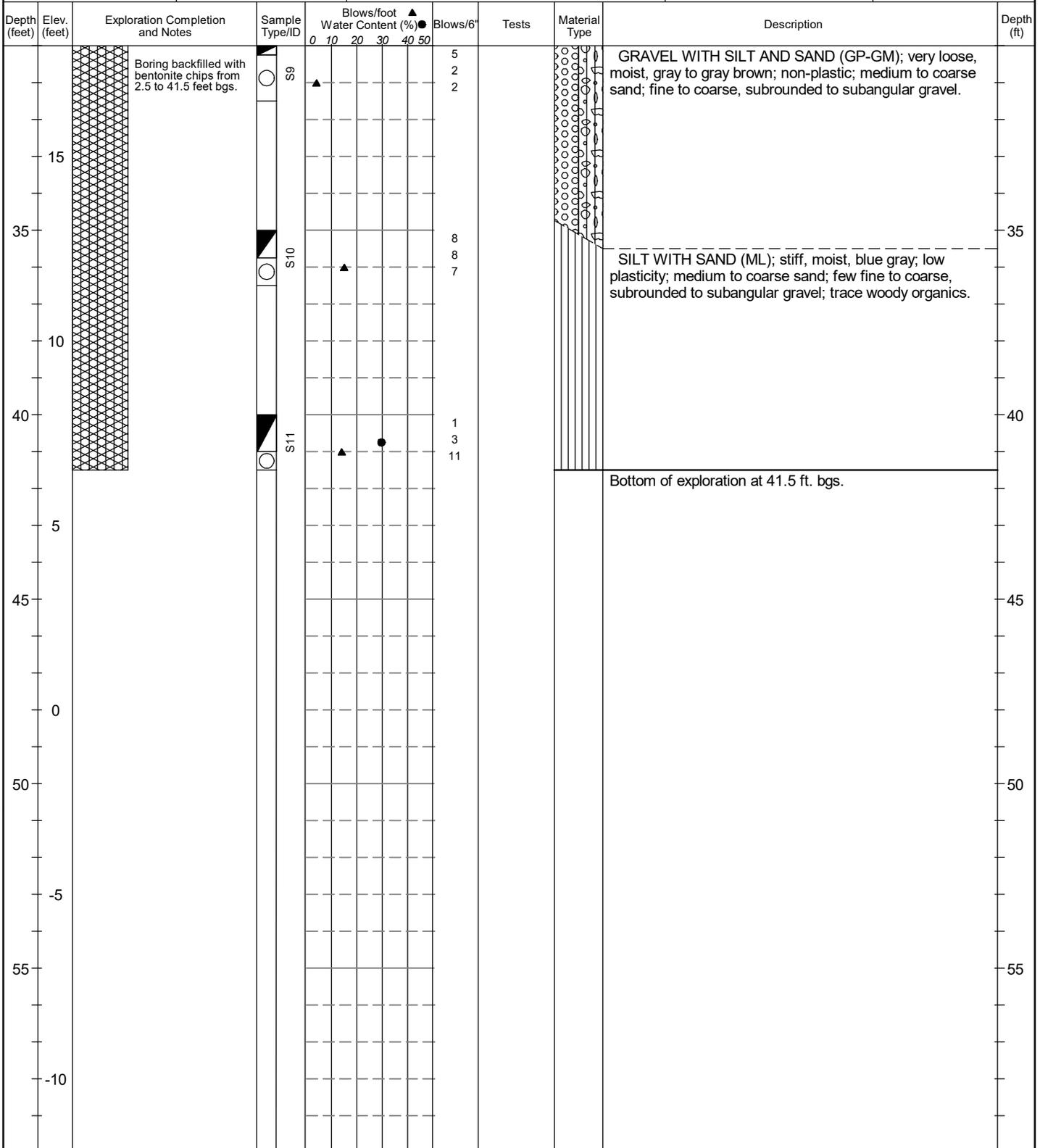
6/4/2020

Top of Casing Elev. (NAVD88)

NA

Depth to Water (Below GS)

No Water Encountered



Legend

- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit | Liquid Limit

No Water Encountered

Water Level

See Exploration Log Key for explanation of symbols

Logged by: JSJ
 Approved by: MWS

Exploration Log AB-01

Sheet 2 of 2



Palensky Restoration Project - 190292

Geotechnical Exploration Log

Project Address & Site Specific Location

Coordinates (Lat, Lon WGS84)

Exploration Number

NW St Helens Road (US 30), MP 12.2, Southbound Shoulder

45.6428, -122.8376 (est)

AB-02

Contractor
Western States Soil
Conservation, Inc.

Equipment

Sampling Method

Ground Surface Elev. (NAVD88)

Mud Rotary

Autohammer; 140 lb hammer; 30" drop

47' (est)

Operator

Exploration Method(s)

Work Start/Completion Dates

Top of Casing Elev. (NAVD88)

Depth to Water (Below GS)

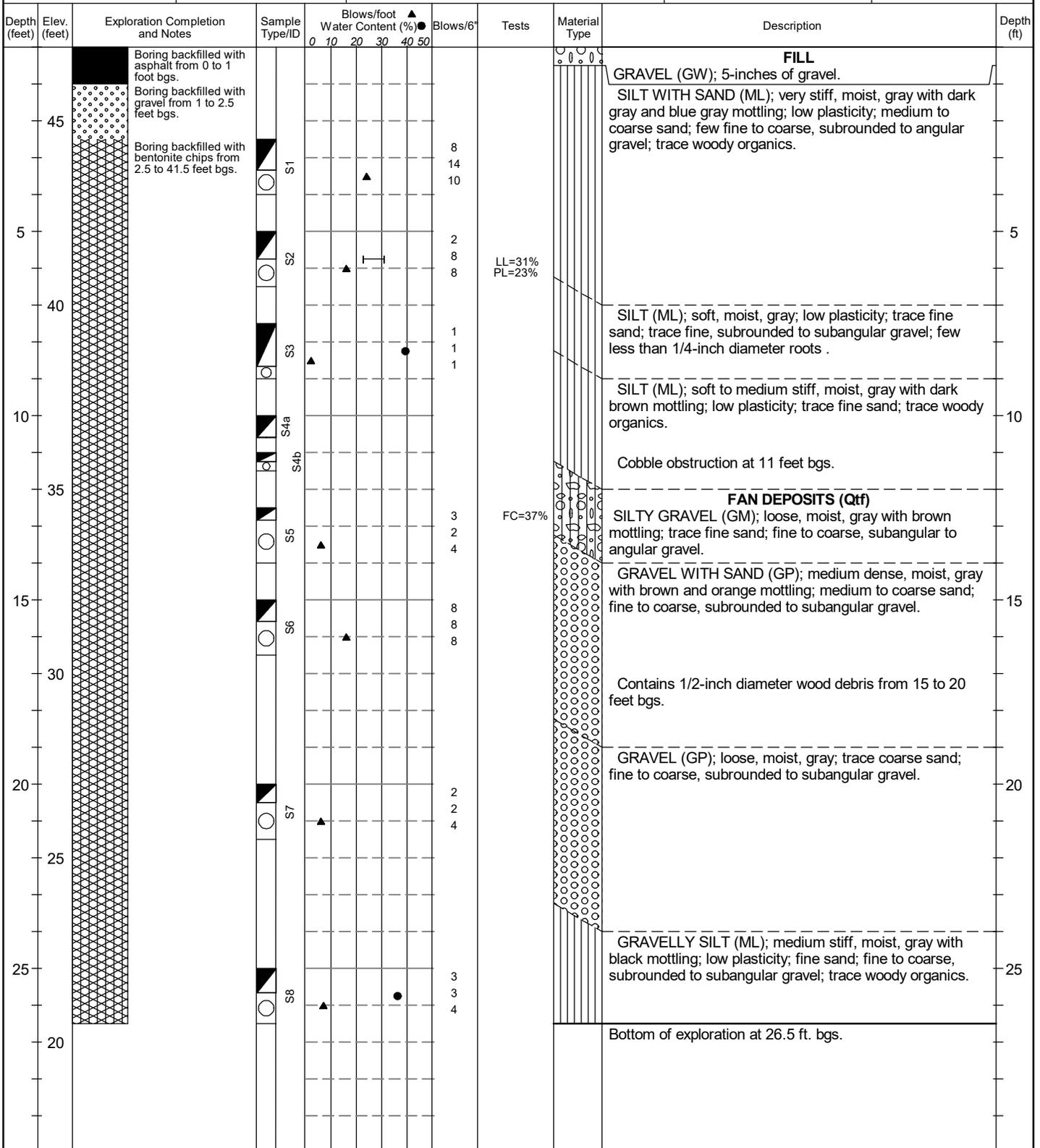
Sam

CME 850

6/5/2020

NA

No Water Encountered



Legend

- No Soil Sample Recovery
- Split Barrel 2" X 1.375" (SPT)

Plastic Limit ——— Liquid Limit

No Water Encountered

Water Level

See Exploration Log Key for explanation of symbols

Logged by: JSJ
Approved by: MWS

Exploration Log AB-02

Sheet 1 of 1

APPENDIX B

Laboratory Test Results

B. Geotechnical Laboratory Tests

A geotechnical laboratory testing program was developed to determine index and engineering properties of materials at the Site. Soil and rock samples used in the testing program were collected from the borings. The tests that were performed and the procedures followed are outlined below.

B.1. Soil Classification

Soil samples from the explorations were visually classified in the field and then taken to our office, where the classifications were verified in a relatively controlled environment. Field and laboratory observations include density/consistency, moisture condition, and grain size and plasticity estimates. The classifications of selected samples were checked by grain-size analysis and plasticity index testing. Classifications were made in general accordance with the Unified Soil Classification System (USCS), ASTM International (ASTM) D2488.

B.2. Moisture-Content Determination

Moisture contents were determined for samples recovered in the explorations in general accordance with ASTM D2216, as soon as possible following their arrival to the laboratory. Moisture contents are shown on the exploration logs and shown in this appendix and on the boring logs.

B.3. Grain-Size Analyses

Grain-size analyses were performed in accordance with ASTM D6913 on selected soil samples collected from the explorations. The analyses consisted of washing the sample over a No. 200 sieve, to separate the fines content. The results of the tests are presented in this appendix and on the boring logs.

B.4. Atterberg Limits

Select subsurface soil samples from the soil borings were submitted for analysis of plasticity index by the ASTM D4318 test method. This test method allows for the laboratory determination of the liquid limit and the plastic limit of the fines in a soil sample. Test results are shown in this appendix and on the boring logs.

TECHNICAL REPORT

Report To:	Ms. Jasmin Jamal Aspect Consulting 522 SW Avenue, Suite 1300 Portland, Oregon 97204	Date:	07/13/2020
		Lab No.:	20-136
Project:	Laboratory Testing –Palensky Restoration Project Project #190292	Project No.:	3106.1.1

Report of: Atterberg limits, moisture content, and amount of material finer than the No. 200 sieve.

Sample Identification

NTI completed Atterberg limits, moisture content, and amount of material finer than the No. 200 sieve on samples delivered to our laboratory on July 6, 2020. Testing was performed in accordance with the standards indicated. Our laboratory test results are summarized below.

Laboratory Testing

Atterberg Limits (ASTM D4318)			
Sample ID	Liquid Limit	Plastic Limit	Plasticity Index
AB01, S5 @ 17.5'	36	27	9
AB02, S2 @ 5.0'	31	23	8

Moisture Content of Soil (ASTM D 2216)	
Sample ID	Moisture Content (Percent)
AB01, S11 @ 40.0'	29.9
AB02, S3 @ 7.5'	39.6
AB02, S8 @ 25.0'	36.5

Amount of Material Finer than the No. 200 Sieve (ASTM D1140)	
Sample ID	Percent Passing the No. 200 Sieve
AB02, S5 @ 12.5'	37.4

Attachments: Laboratory Test Results

Copies: Addressee

APPENDIX C

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

This Report and Project-Specific Factors

Aspect Consulting, LLC (Aspect) considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.

MEMORANDUM

Project No.: 190292-B

June 7, 2022

To: Ms. Amanda (AJ) Jones, PE
Senior Engineer | Partner
Wolf Water Resources

From:



Expires 5/01/2023

Mark Swank, RG, CEG
Associate Engineering Geologist
mswank@aspectconsulting.com



Expires 12/31/2022

Michael B. Reiter, PE
Project Geotechnical Engineer
mreiter@aspectconsulting.com

Re: Geotechnical Engineering Evaluation – Retaining Wall Addendum_Revision 1
Palensky Wildlife Underpass Project
Highway 30 & Cornelius Pass Road, Reach F, Burlington, Oregon
Aspect Project No. 190292-B

Introduction

Aspect Consulting, LLC (Aspect) completed this geotechnical engineering addendum for the retaining walls for the US 30 Wildlife Undercrossing that will span beneath the Lower Columbia River Highway (US 30) near milepost (MP) 12.2, connecting an upstream drainage to the J.R. Palensky Wildlife Area, in Reach F, near Burlington, Oregon (Figure 1). Our services included a walking Site reconnaissance, supplemental explorations, and this technical memorandum summarizing our findings, engineering evaluation and design recommendations, and construction considerations.

Aspect previously completed a geotechnical engineering evaluation for the Wildlife Undercrossing; that information has been used as appropriate to complete the retaining wall designs. We understand the Oregon Department of Transportation (ODOT) is not requiring additional explorations.

Project Understanding

Based on the 90 percent plans (dated April 2022) provided by Murraysmith, the Wildlife Undercrossing will be a 54-inch steel casing approximately 130 feet long that roughly parallels the existing stormwater culvert, extending from the drainage area on the southwest side of US 30 and

daylighting from the road embankment slope on the northeast side of the highway. The undercrossing will be installed using trenchless methods. Cast-in-place (CIP) cantilever retaining walls will be constructed on either side of the undercrossing inlets/outlets. The plans refer to the walls as channelizing walls. We assume the primary purpose of the walls is to channel wildlife to the undercrossing (i.e., not to facilitate significant re-grading of the roadway embankment or adjacent drainages), although each channelizing wall will also function as a headwall at the proposed undercrossing daylight location. The westside channelizing wall will be approximately 170 feet long (installed within the drainage area) and the eastside channelizing wall will be approximately 435 feet long (installed along the US 30 road embankment slope).

Site Description

The Site lies along US 30, on the western side of the J.R. Palensky Wildlife Area (Figure 2). The highway is four lanes, two in each direction, and approximately 80 feet wide (including the shoulders). The east side of US 30 is protected by a guardrail with an embankment sloping down to a shallow drainage between the elevated railroad tracks that parallel the highway. Further east of the railroad, the J.R. Palensky Wildlife Area expands outward toward the Multnomah Channel waterway. The west side of the Site is a 15- to 30-foot-wide relatively flat, grassy area adjacent to the lower drainage channel. The channel rim is surrounded by deciduous trees. Basalt outcrops are exposed in the road cuts on either side of the drainage.

The US 30 elevation (EL¹) is relatively flat through the Site at EL 48 feet, approximately 25 feet above the J.R. Palensky Wildlife Area at EL 20 feet.

Surface Conditions

On February 8, 2022, a Certified Engineering Geologist (CEG) from Aspect completed a walking reconnaissance of the Site to observe the current surface conditions. The reconnaissance was performed by walking the westside drainage area and the eastside road embankment, traversing the slopes, noting visible features such as slope height and inclinations, scarps, cracks, exposed soils and rock, vegetation, burrows, etc.



Photograph 1. Westside Drainage



Photograph 2. Culvert in Westside Drainage

¹ Elevations in this report reference the North American Vertical Datum of 1988 (NAVD88)

The westside area of US 30 is a relatively low depression that is heavily vegetated with trees and shrubs that collects water from the upper drainage and funnels it to a corrugated metal pipe on its northwest side. The culvert carries the water beneath US 30 and discharges on the eastside between the road embankment and the railroad tracks. The retaining wall will be constructed along the tree-line as shown in Photographs 1 and 2. The ground surface soils appear to be fine-grained and contain coarse-grained sand and gravel where the bank is incised near the culvert.

The eastside area of US 30 is the road embankment that slopes down to the railroad tracks. The slope generally varies between 1.5H:1V to 2.5H:1V (horizontal:vertical) with a shallow drainage between the toe of the embankment and the railroad ballast. Overhead powerlines and poles are embedded near mid-slope and appear to be tilting downslope as shown in Photographs 3 and 4. Light rip-rap with subangular basalt rock up to 18-inch diameter in a sand and small gravel matrix covers the ground surface. Several voids were observed that may indicate the embankment materials contain less of the sand and gravel at depth and is more open.



Photograph 3. Eastside US 30 Looking SE



Photograph 4. Eastside US 30 Looking NW

Subsurface Conditions

Subsurface conditions at the Site were inferred from our field explorations, laboratory testing on the collected soil samples, review of applicable geologic literature, and our experience with the local geology. The locations of our field explorations are presented on Figure 2 and the Geologic Cross Section on Figure 3.

On February 8, 2022, Aspect completed four supplemental hand auger explorations on the west side of US 30, designated AHA-01 through AHA-04. On June 4 and 5, 2020, Aspect previously completed two borings, designated AB-01 and AB-02, at the Site with a track-mounted drill rig operated by Western States Soil Conservation, Inc., using mud rotary drilling techniques. Disturbed soil samples were obtained at 2.5- to 5-foot intervals using the Standard Penetration Test (SPT) in general accordance with the ASTM International (ASTM) D1586, *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils* (ASTM, 2018).

Soil observations and classification tests were performed in general accordance with ASTM International (ASTM) D2488, *Standard Practice for Description and Identification of Soils* (Visual-Manual Procedure). The terminology used in the soil classifications and other modifiers are defined and presented on the attached Figure A-1 included in Appendix A.

Soils

The soil units observed in our explorations, presented in stratigraphic order from top to bottom, are described below in the westside drainage based on our hand augers and those extrapolated from our previous AB-01 boring in the eastside embankment.

Westside Drainage:

Hand Auger	Exploration Depth	ASTM Soil-Type Stratigraphy
AHA-01	3 feet	0 to 3 feet: Brown sandy silt (ML); non-plastic; fine sand. 3 feet: Refusal on gravel.
AHA-02	7 feet	0 to 2 feet: Brown silt (ML); very stiff, non-plastic; fine sand. 2 to 4 feet: Brown silt (ML); medium stiff; non-plastic; few fine to coarse sand; few fine, rounded gravel. 4 to 5 feet: Gray brown silty sand (SM); loose; non-plastic; fine sand. 5 to 7 feet: Dark brown silt (ML); medium stiff; low plasticity; few fine sand.
AHA-03	1 foot	0 to 1 foot: Refusal on gravel.
AHA-04	1 foot	0 to 1 foot: Refusal on gravel.

Eastside Embankment:

***ROAD
EMBANKMENT***

Boring AB-01 was drilled through the US 30 road embankment, consisting of a pavement section of 12 inches of hot mix asphalt (HMA) and 18 inches aggregate base underlain by approximately 12 feet of compacted fill. The road embankment fill includes an upper 2 feet of medium dense Gravel with Silt and Sand (GP-GM) beneath the aggregate base, 4 feet of very stiff Silt with Sand (ML), and 6 feet of medium dense Gravel (GP).

***QUATERNARY FAN
DEPOSITS FROM
TRIBUTARIES
(Q_{tf})***

Fan deposits (Q_{tf}) were encountered in AB-01 beneath the upper layers of fill at 15 feet bgs and consist of:

8 feet of predominately interlayered Silt (ML), Gravelly Silt with Sand (ML), Sandy Silt with Gravel (ML), and Silt with Gravel (ML).

10 feet of Gravel with Silt and Sand (GP-GM), Gravel with Sand (GP), and Gravel (GP).

Underlain by Silt with Sand (ML) or Gravelly Silt (ML) to the total exploration depths.

Wood debris was commonly observed in the soil samples and drill cuttings from rootlets to up to 12-inch wood fragments. The coarse-grained deposits (GP-GM and GP) are very loose to medium dense and the fine-grained deposits (ML) are soft to stiff.

Groundwater

Groundwater was not directly measured due to the addition of drilling mud to advance AB-01. We anticipate groundwater is hydraulically connected to the water levels in the drainage on the westside and will be encountered during construction and will not be encountered on the eastside.

Groundwater levels will fluctuate seasonally with precipitation, as well as with changes in Site and near-Site usages.

Retaining Wall Design Recommendations

Based on our communications with Murraysmith, we have assumed the westside channelizing wall will have a minimum height of approximately 5 feet with a maximum height of 9.5 feet in the vicinity of the undercrossing ingress and egress, and the eastside channelizing wall will have a minimum height of approximately 5.5 feet with a maximum height of 7.25 feet. Based on the results of our subsurface explorations, we assume the westside channelizing wall will generally bear on approximately 1 to 7 feet of medium stiff to very stiff, non-plastic silt (ML) and loose sand (SM) fill and fan deposits, underlain by loose to medium dense gravelly fan deposits. We assume the westside channelizing wall will retain fill consisting of soft to very stiff, non-plastic to low plasticity silt (ML).

On the east side of US 30, we assume the eastside channelizing wall will generally bear on and retain medium dense gravel (GP) and stiff to very stiff, low to medium plasticity silt (ML). The fill on the eastside is generally underlain by several feet of soft to medium stiff gravelly fan deposits. Based on our review of the 90 percent plans, we assume the westside channelizing wall will retain a generally level backslope and the eastside channelizing wall will retain a backslope inclined at approximately 2H:1V (horizontal:vertical). We assume both walls will have generally level foreslopes in front of the wall.

The assumptions described above form the basis of our geotechnical engineering conclusions and recommendations for the channelizing walls.

We have provided recommendations below for foundation subgrade preparation, bearing resistance, and lateral earth pressures to support the design and construction of the walls. We assume the walls will be designed by others in accordance with applicable ODOT and American Association of State Highway and Transportation Officials Load and Resistance Factor Design (LRFD) standards (AASHTO, 2020).

Foundation Subgrade Preparation

The foundation soils are relatively compressible and susceptible to consolidation under applied loads, however it is our opinion that the Project will not result in a significant net increase in applied loads, because there is minimal re-grading proposed around the channelizing walls and little significant new fill placement behind the walls. The most significant grading is proposed around the headwall portions of the channelizing walls, near the wildlife undercrossing ingress/egress, where cuts of up to several feet are proposed.

We recommend an overexcavation approach to mitigate risk of consolidation settlements associated with compressible foundation soils. For both walls, we recommend removing the top 36 inches (minimum) of compressible subgrade soil and replacing it with a granular fill pad consisting of ODOT SS 02630.10 - Dense Graded Aggregate. The fill pads should be compacted to a firm and unyielding condition and should extend outward and downward from the outer edges of foundations by at least 6 inches.

A geotextile fabric should be placed as a barrier between the subgrade and pad meeting ODOT SS 02320.10 and SS 02320.20, Table 02320-4 for soil separation. The geotextile should be installed in conformance with ODOT SS 0350.00 – Geosynthetic Installation. If the east wall subgrade preparation exposes voids in the embankment fill, it is acceptable in our opinion to exclude the geotextile at this location to minimize the risk of the geotextile bridging a void and subsequently yielding after the wall is constructed. If the overexcavation provisions above are implemented during construction, we estimate post construction consolidation settlements will be less than 1 inch.

Foundation Bearing Resistance

For spread footing foundations between 4 and 8 feet wide, bearing on the subgrades described above, and embedded at least 18 inches below adjacent grade, a maximum nominal (unfactored) bearing resistance of 3.0 kips per square foot (ksf) can be used for the west wall and a maximum nominal (unfactored) resistance of 5.0 ksf can be used for the east wall. We recommend a maximum Service Limit State bearing resistance of 1.5 ksf be used for the west wall and 2.5 ksf be used for the east wall.

The recommended LRFD resistance factors required to calculate Strength and Extreme Limit State Bearing Resistances from the provided Nominal Bearing Resistance are provided in Table 2. A resistance factor need not be applied to Service Limit State Bearing Resistance.

Table 1. LRFD Resistance Factors for Shallow Foundations

Limit State	Bearing Resistance	Shear Resistance to Sliding	Passive Pressure Resistance to Sliding
Strength	0.45	0.8	0.5
Extreme	0.9	0.9	0.9

Lateral Earth Pressures

The lateral earth pressures acting on the channelizing walls for active, at-rest, and passive conditions are presented in Table 2. To invoke active earth pressure conditions, a wall must be capable of yielding laterally at least 0.001H to 0.002H, where H is the exposed height of the wall; otherwise, at-rest conditions should be assumed. These values assume adequate drainage is provided to prevent the buildup of unbalanced hydrostatic pressures behind the wall.

Table 2. Lateral Earth Pressure Parameters

Earth Pressure Condition	Backslope/ Foreslope Condition ⁶	Earth Pressure Coefficient	Equivalent Fluid Density ³ (pcf) ¹	Uniform Lateral Surcharge/Seismic Pressure (psf) ¹
Eastside Channelizing Wall				
Active ²	2H:1V	0.38	45	0.38S ⁴
At-Rest	2H:1V	0.43	52	0.43S ⁴
Passive ⁵	Level	3.7	443	-
Seismic ⁷	2H:1V	-	-	9.0H
Westside Channelizing Wall				
Active ²	Level	0.33	40	0.33S ⁴
At-Rest	Level	0.50	60	0.50S ⁴
Passive ⁵	Level	3.0	360	-
Seismic ⁷	Level	-	-	7.7H

Notes:

1. psf = pounds per square foot; pcf = pounds per cubic foot.
2. To invoke active earth pressure condition, the wall must be capable of yielding laterally at least 0.001 to 0.002H, where H is the exposed height of the wall.
3. The equivalent fluid densities provided above are distributed triangularly along the exposed height of the wall. The uniform lateral surcharge pressures are distributed uniformly (rectangularly) along the exposed height of the wall.
4. S is the vertical surcharge pressure at the ground surface immediately above/behind the wall. The vertical surcharge pressure causes a lateral earth pressure to act on the wall, which is calculated as the product of S and the appropriate lateral earth pressure coefficient. The resultant uniform rectangular lateral pressure should be applied to the full height of the wall. For seismic, the load is an equivalent lateral uniform load applied along the height of the wall.
5. Ultimate passive pressures are presented; a Strength Limit State resistance factor (ϕ_{ep}) of 0.50 should be applied for design. Passive resistance within a depth of 2 feet of the ground surface in front of the walls should be ignored.
6. Active, at-rest, and seismic = backslope, passive = foreslope.
7. Based on an equivalent pseudo-static analysis with a design ground acceleration of 0.342g.

Foundation Sliding Resistance

For passive resistance against the sides of foundations, the nominal passive resistance values provided above may be used for design. For frictional resistance along the bottoms of cast-in-place concrete footings, an unfactored sliding coefficient of 0.6 may be used. Resistance factors are included above in Table 2.

Global Stability Analysis

We evaluated the global stability of the eastside and westside retaining walls using the Slide computer software program (Rocscience, 2018). Global stability analyses evaluate the potential for slope failures to extend below the retaining wall. External stability (overturning and sliding stability) and structural capacity of the retaining walls should be evaluated by the Project structural engineer.

We formulated our global stability analyses using the 90 percent drawings and the data from our subsurface explorations. Based on the data from our borings, laboratory testing, and our experience, we designated the soil units and engineering properties presented in Table 3.

Table 3. Soil Units and Engineering Properties

Soil Unit	Total Unit Weight (pcf)	Strength Parameters	
		Cohesion (psf)	Friction Angle (degrees)
Road Embankment Fill	120	0	35
Drainage Fill	120	0	35
Retaining Wall Granular Backfill	120	0	38
Railroad Ballast Fill	130	0	38
Fine-Grained Fan Deposits (Qtf)	115	0	30
Coarse-Grained Fan Deposits (Qtf)	120	0	32

Notes:

pcf = pounds per cubic foot
 psf = pounds per square foot

We evaluated the global stability of both retaining walls under static and seismic loading conditions. For seismic conditions, ODOT requires seismic design for retaining walls to be in accordance with the requirements in Section 11 (Walls, Abutments, and Piers) of the most recently adopted edition of the AASHTO LRFD Bridge Design Specifications, 9th Edition (AASHTO, 2020). We applied a horizontal seismic coefficient of 0.171g (where g is the acceleration of gravity) to represent the horizontal inertial forces in the slope induced by earthquake ground shaking. This value is equal to one-half of the acceleration coefficient (A_s) for an earthquake ground motion based on a seismic event with 7 percent probability of exceedance in 75 years (approximately 975-year recurrence interval).

Global Stability Analysis Results

The Slide program performs slope stability computations based on the modeled slope conditions and calculates a factor of safety against slope failure. The factor of safety is defined as the ratio of resisting forces to destabilizing forces. For slopes that support structures, the 2018 ODOT GDM recommends minimum equivalent factors of safety of 1.5 under static conditions and 1.1 under seismic conditions. The results of our global stability analyses are summarized in Table 4 and the graphical outputs are presented in Appendix A. The results indicate both retaining wall are stable under static and seismic conditions from a global stability standpoint. We assume the checks for

internal stability and external stability (e.g., sliding, bearing resistance, and settlement) will be completed by others.

Table 4. Summary of Profile A-A' Slope Stability Analysis Results

Condition	Factor of Safety	
	Eastside Wall	Westside Wall
Static	1.9	3.1
Seismic	1.3	2.1

Construction Considerations

Construction Excavation and Protection

Temporary excavations may be required to construct the walls. Maintenance of safe working conditions, including temporary excavation stability, is the sole responsibility of the contractor. All temporary cuts in excess of 4 feet in height that are not protected by trench boxes, or otherwise shored, should be sloped in accordance with Oregon Administrative Rule (OAR) OAR 437, Division 3 Subdivision P requirements.

In general, the deposits that will be subject to excavation and sloping on the Site classify as OSHA Soil Classification Type C. Temporary excavation slopes (cut slopes) are anticipated to stand as steep as 1.5H:1V within Type C soils. The presence of seepage may require that temporary excavation slopes be flattened to remain stable. With time and the presence of seepage and/or precipitation, the stability of temporary unsupported cut slopes can be significantly reduced. We recommend planning the construction schedule to have excavation occur during the summer months and to minimize the amount of time that the temporary slopes will be unsupported during construction.

The contractor should monitor the stability of the temporary cut slopes and adjust the construction schedule and slope inclination accordingly. Vibrations created by traffic and construction equipment may cause caving and raveling of the face of the temporary slopes. At no time should soil stockpiles, equipment, and other loads be placed immediately adjacent to an excavation.

Structural Fill and Compaction

Backfill behind walls should meet the requirements of ODOT SS 00330.14 – Selected Granular Backfill and be compacted in maximum 8-inch lifts to a minimum of 92 percent of the maximum dry density determined via ASTM D1557. Within 3 feet of the wall face, the compaction effort can be reduced to 90 percent of the maximum dry density determined via ASTM D1557.

Wall Drainage

To ensure proper drainage behind the walls, there should be a zone at least 1 foot wide of a clean, free-draining material meeting the requirements of ODOT SS 00330.14 – Selected Granular Backfill. The walls should be provided with a drain located at the rear of the wall. The drain should consist of a rigid, plastic, perforated drain pipe with a minimum diameter of 6 inches. The drains should daylight into an appropriate area to convey flow away from the walls.

References

American Association of State Highway and Transportation Officials (AASHTO), 2020, AASHTO LRFD Bridge Design Specifications, 8th Edition, Washington DC.

Oregon Department of Transportation (ODOT), 2019, Geotechnical Design Manual, Geo-Environmental Section, Version 2.1, May 6, 2019.

Oregon Department of Transportation (ODOT), 2021, Oregon Standard Specifications for Construction, Salem, Oregon.

Rocscience, 2018, Slide 8.08 Analysis Program. Build date October 16, 2017.

Limitations

Work for this project was performed for Wolf Water Resources (Client), and this report was prepared consistent with recognized standards of professionals in the same locality and involving similar conditions, at the time the work was performed. No other warranty, expressed or implied, is made by Aspect Consulting, LLC (Aspect).

Recommendations presented herein are based on our interpretation of site conditions and judgment in accordance with our mutually agreed-upon scope of work. Our recommendations are unique and specific to the project, site, and Client. Application of this report for any purpose other than the project should be done only after consultation with Aspect.

Variations may exist between the soil and groundwater conditions reported and those actually underlying the site. The nature and extent of such soil variations may change over time and may not be evident before construction begins. If any soil conditions are encountered at the site that are different from those described in this report, Aspect should be notified immediately to review the applicability of our recommendations.

Risks are inherent with any site involving slopes and no recommendations, geologic analysis, or engineering design can assure slope stability. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the client. It is the Client's responsibility to see that all parties to this project, including the designer, contractor, subcontractors, and agents, are made aware of this report in its entirety. The scope of our work also does not include the assessment of environmental characteristics, particularly those involving potentially hazardous substances in soil or groundwater.

All reports prepared by Aspect for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect. Aspect's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix B titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

Wolf Water Resources
June 7, 2022

MEMORANDUM

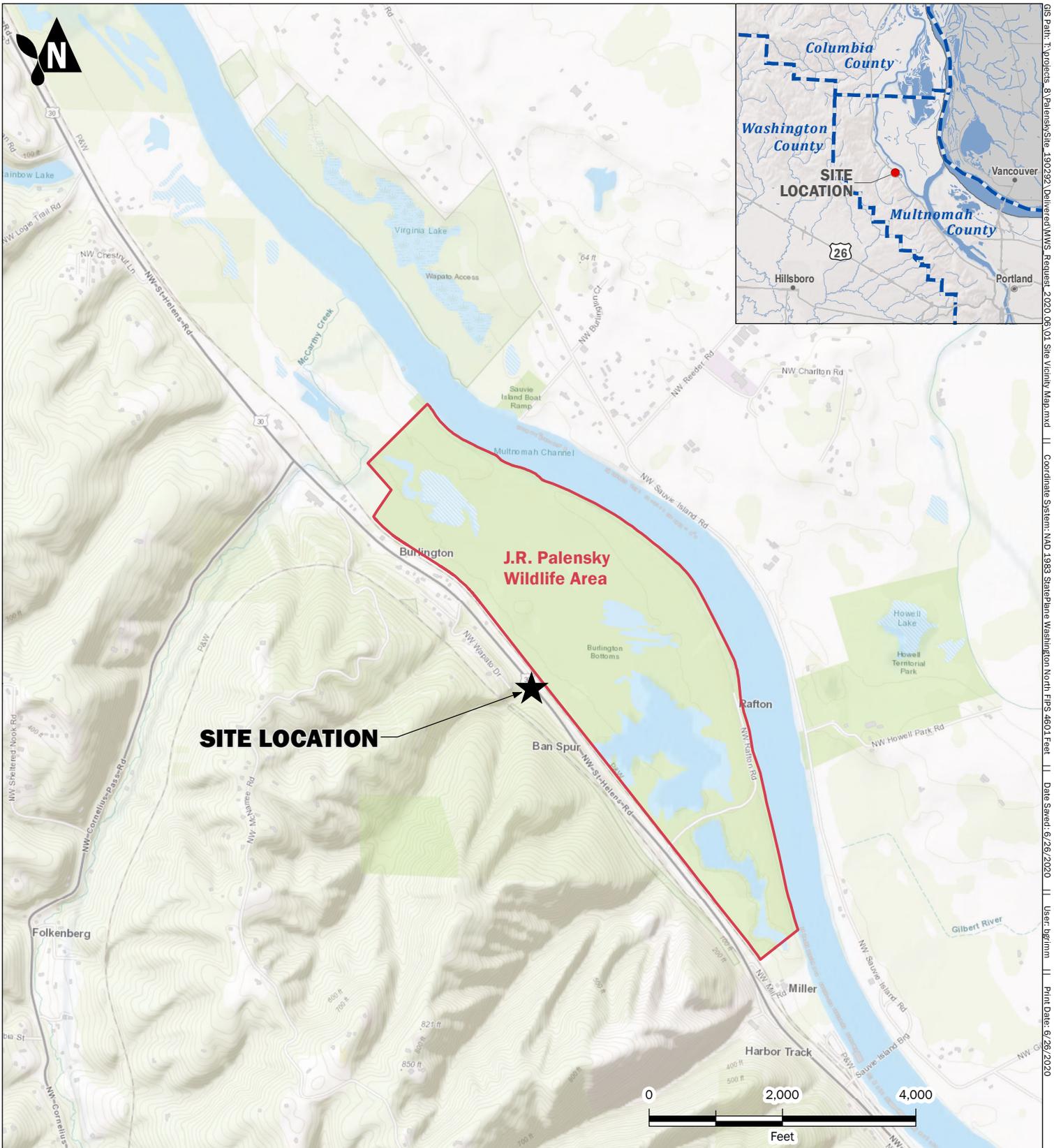
Project No.: 190292-B

We appreciate the opportunity to perform these services. If you have any questions please call Mark Swank, LEG, at 971.865.5893.

Attachments: Figure 1 – Site Vicinity Map
 Figure 2 – Site Exploration Map
 Figure 3 – Geologic Cross Section
 Appendix A – Slope Stability Analysis
 Appendix B – Report Limitation and Guidelines for Use

V:\190292 Palensky Restoration Project\Deliverables\Geotechnical Engineering Evaluation – Retaining Wall Addendum\Geotech Eng Eval – Retaining Wall Addendum.docx

FIGURES



<h2>Site Vicinity Map</h2> <p>Geotechnical Feasibility Study Palensky Restoration Project US 30 Wildlife Undercrossing Lower Columbia River Highway, MP 12.2 Burlington, Oregon</p>			
	JUN-2020	BY: MWS / WEG	FIGURE NO. 1
	PROJECT NO. 190292	REVISED BY: ---	

GIS Path: I:\Projects_8\PalenskySite_190292\Delivered\MWS_Request_2020.05.04_Site_Vicinity_Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 6/28/2020 || User: bgrimm || Print Date: 6/28/2020

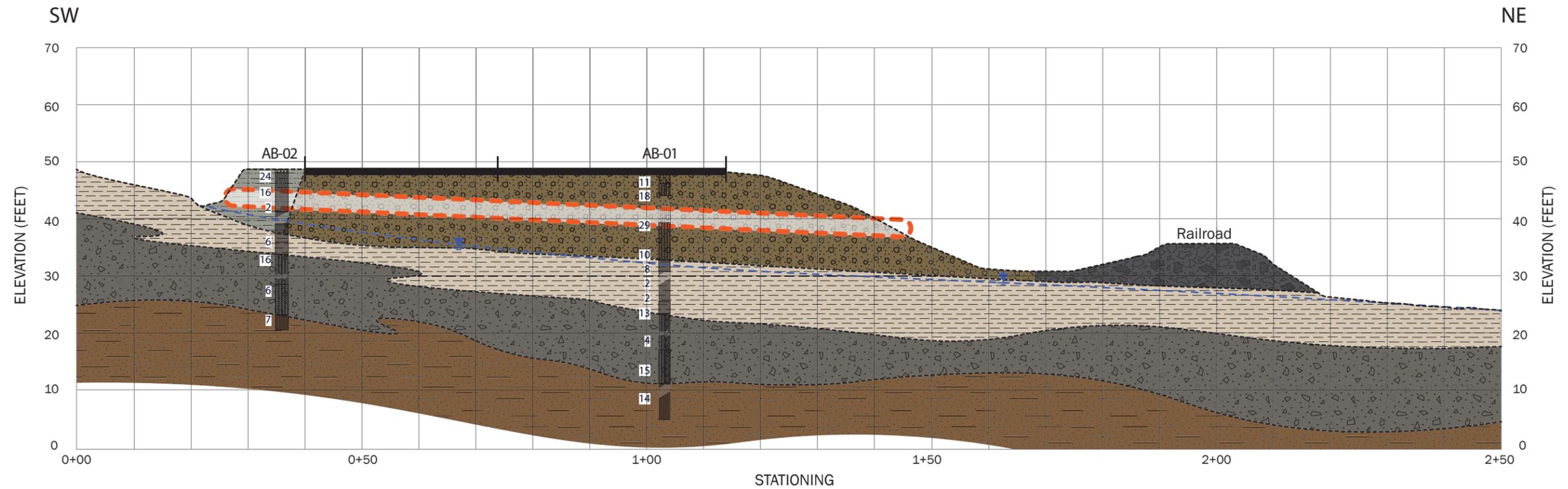
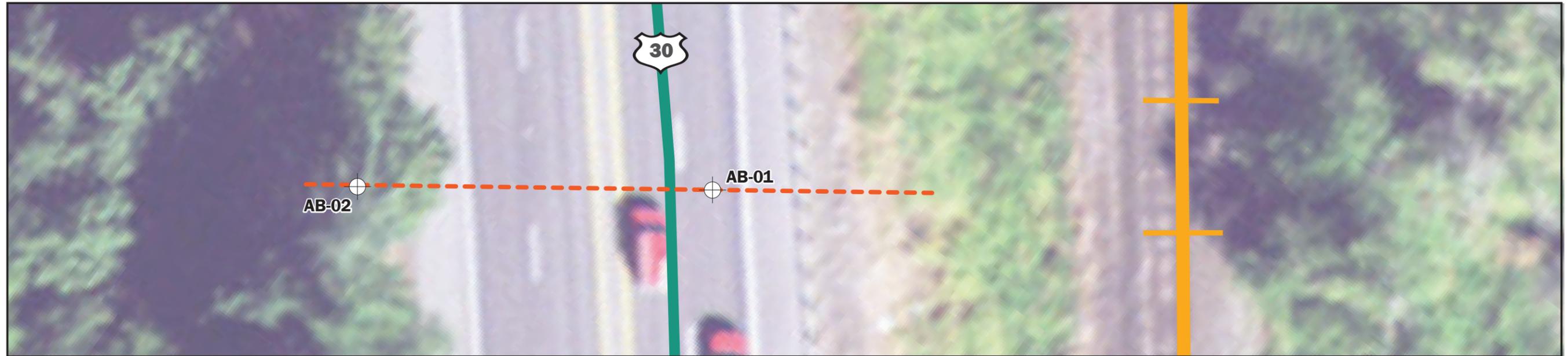


 Boring Location
 Hand Auger Location
 Retaining Wall Location
 Road Centerline
 Railroad Line (OR Explorer)
 SSA Profile Line

0 150 300
 Feet

Site Exploration Map
 Geotechnical Feasibility Study
 Palensky Restoration Project
 US 30 Wildlife Undercrossing
 Lower Columbia River Highway, MP 12.2
 Burlington, Oregon

	MAY-2022	BY: MWS / WEG	FIGURE NO.
	PROJECT NO. 190292	REVISED BY: ---	2



Legend

- Boring Location
- Road Centerline (OR Explorer)
- Railroad Line (OR Explorer)
- Wildlife Undercrossing

Lithology Graphics

- Road Embankment Fill - Gravel (GP and GP-GC); Silt with Sand (ML)
- Fan Deposits (Qtz) - Silt (ML); Gravelly Silt with Sand (ML); Sandy Silt with Gravel (ML)
- Drainage Fill - Silt (ML); Silt with Sand (ML)
- Fan Deposits (Qtz) - Gravel with Sand (GP); Gravel with Silt and Sand (GP-GM)
- Railroad Ballast Fill - Gravels containing Cobbles and Boulders (GM and GP-GM)
- Fan Deposits (Qtz) - Silt with Sand (ML); Gravelly Silt (ML)

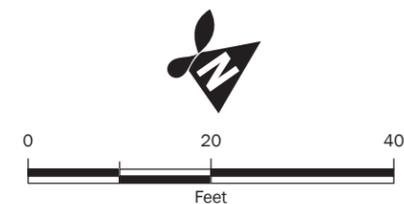
SPT Blow Count
N Value

Material Type (see Lithology Graphics)

Inferred Geologic Contact

AB-01 (Offset 31' SE)

- Offset and direction
- Borehole ID
- Water Level in Borehole at time of drilling
- Water level in digital pressure transducer, Date



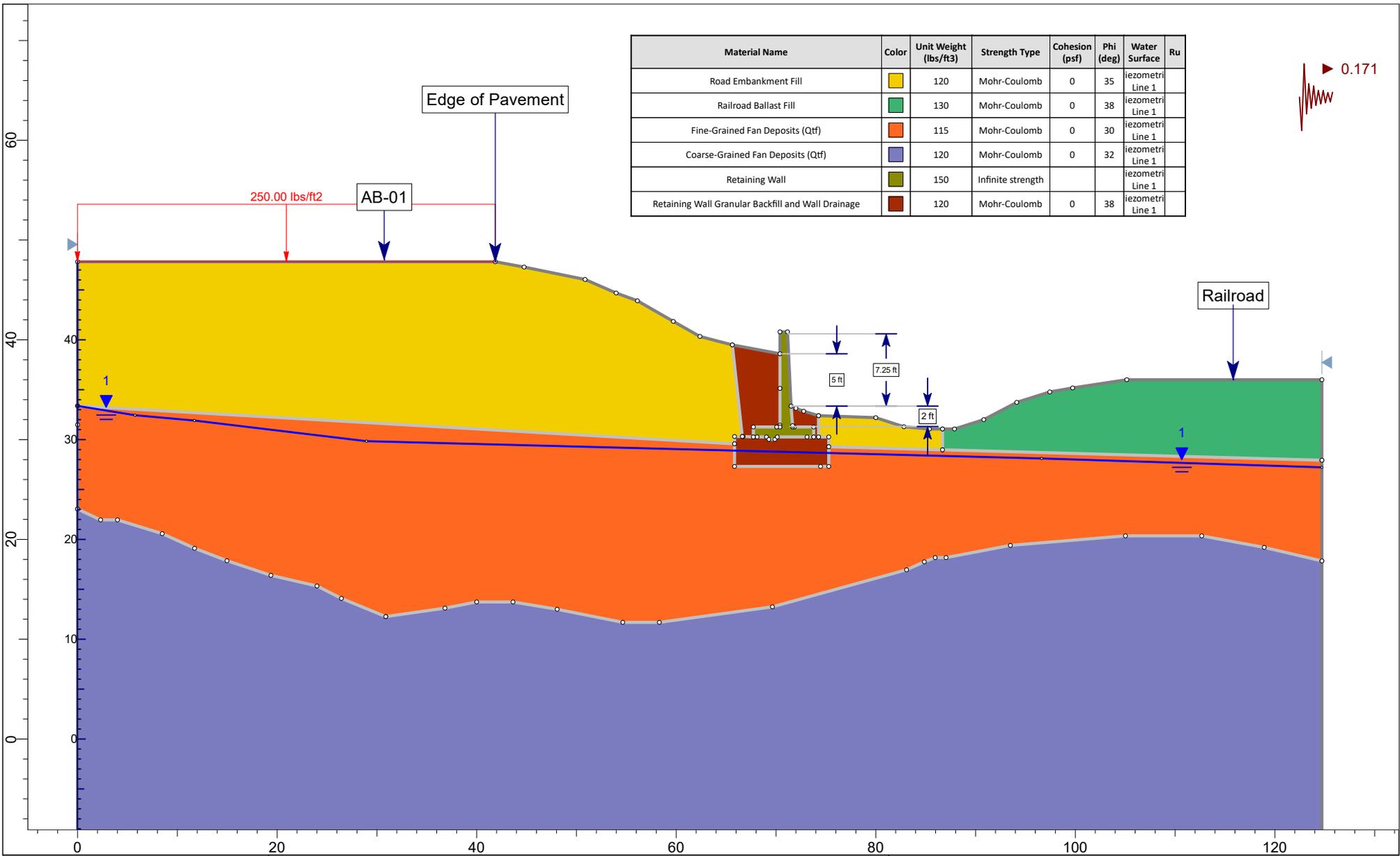
Geologic Cross Section

Geotechnical Feasibility Study
 Palensky Restoration Project
 US 30 Wildlife Undercrossing
 Lower Columbia River Highway, MP 12.2
 Burlington, Oregon

	JUL -2020	BY: MWS	FIGURE NO. 3
	PROJECT NO. 190292	REVISED BY: ---	

APPENDIX A

Slope Stability Analysis



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Road Embankment Fill	Yellow	120	Mohr-Coulomb	0	35	iezoetri Line 1	
Railroad Ballast Fill	Green	130	Mohr-Coulomb	0	38	iezoetri Line 1	
Fine-Grained Fan Deposits (Qtf)	Orange	115	Mohr-Coulomb	0	30	iezoetri Line 1	
Coarse-Grained Fan Deposits (Qtf)	Blue	120	Mohr-Coulomb	0	32	iezoetri Line 1	
Retaining Wall	Grey	150	Infinite strength			iezoetri Line 1	
Retaining Wall Granular Backfill and Wall Drainage	Brown	120	Mohr-Coulomb	0	38	iezoetri Line 1	

0.171

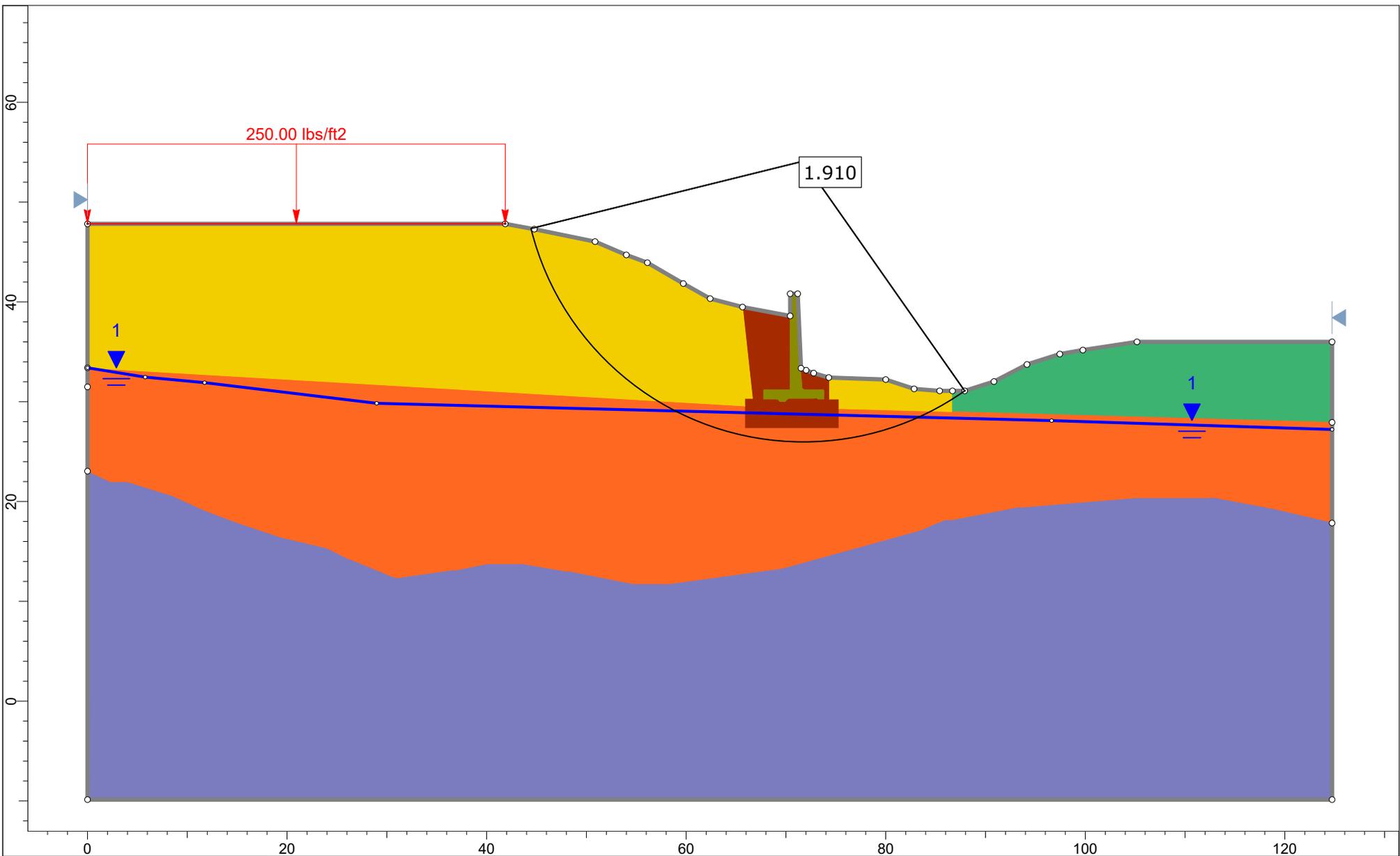
Legend

- Search Grid
- Search Limits
- Modeled Groundwater Level
- Boring Location and Depth

Model Setup

Slope Stability Analysis

Geotechnical Engineering Evaluation - Retaining Wall Addendum
Palensky Restoration Project
Lower Columbia River Highway, MP 12.2



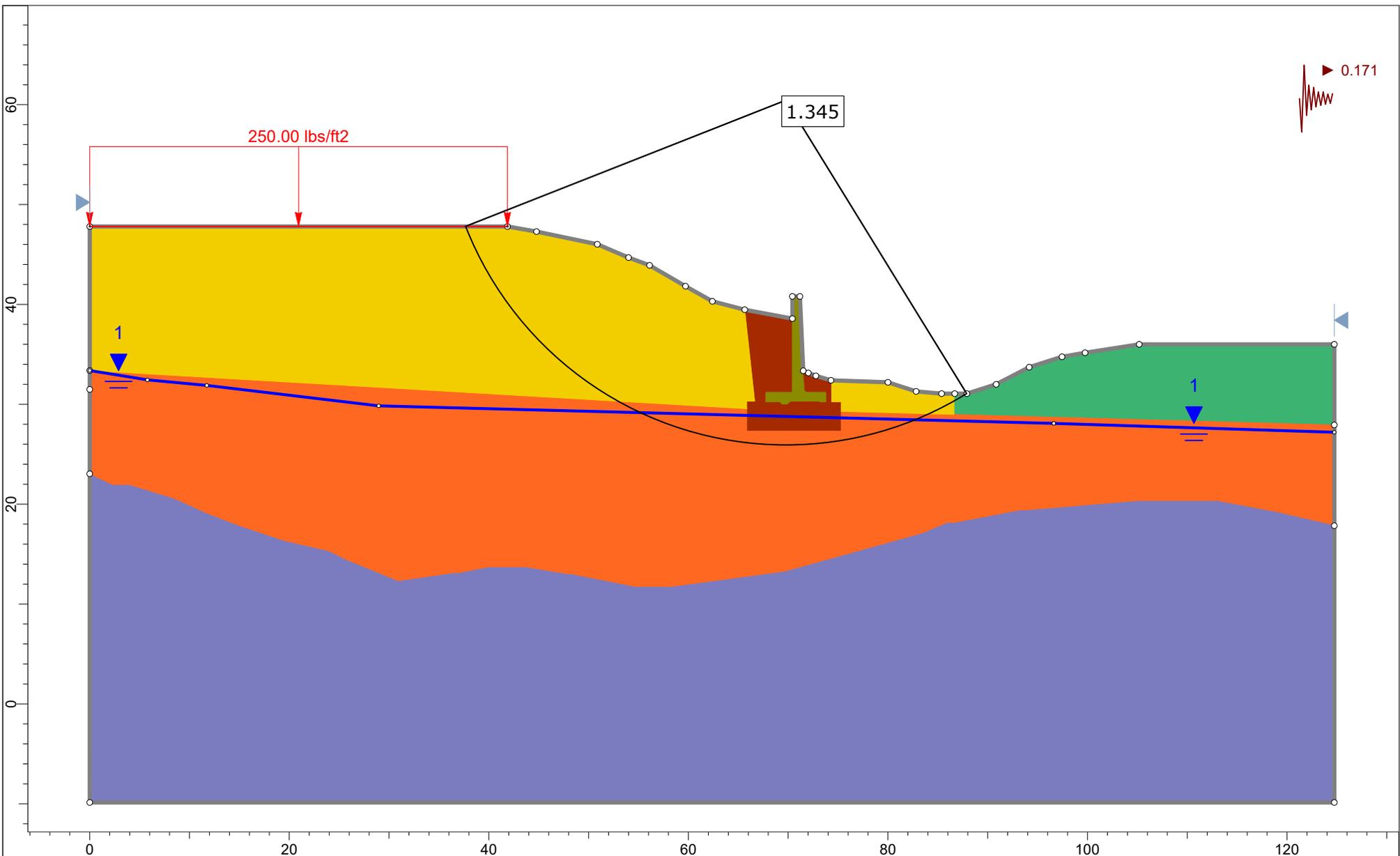
Legend

-  Search Grid
-  Search Limits
-  Modeled Groundwater Level
-  Boring Location and Depth

Static

Slope Stability Analysis

Geotechnical Engineering Evaluation - Retaining Wall Addendum
 Palensky Restoration Project
 Lower Columbia River Highway, MP 12.2



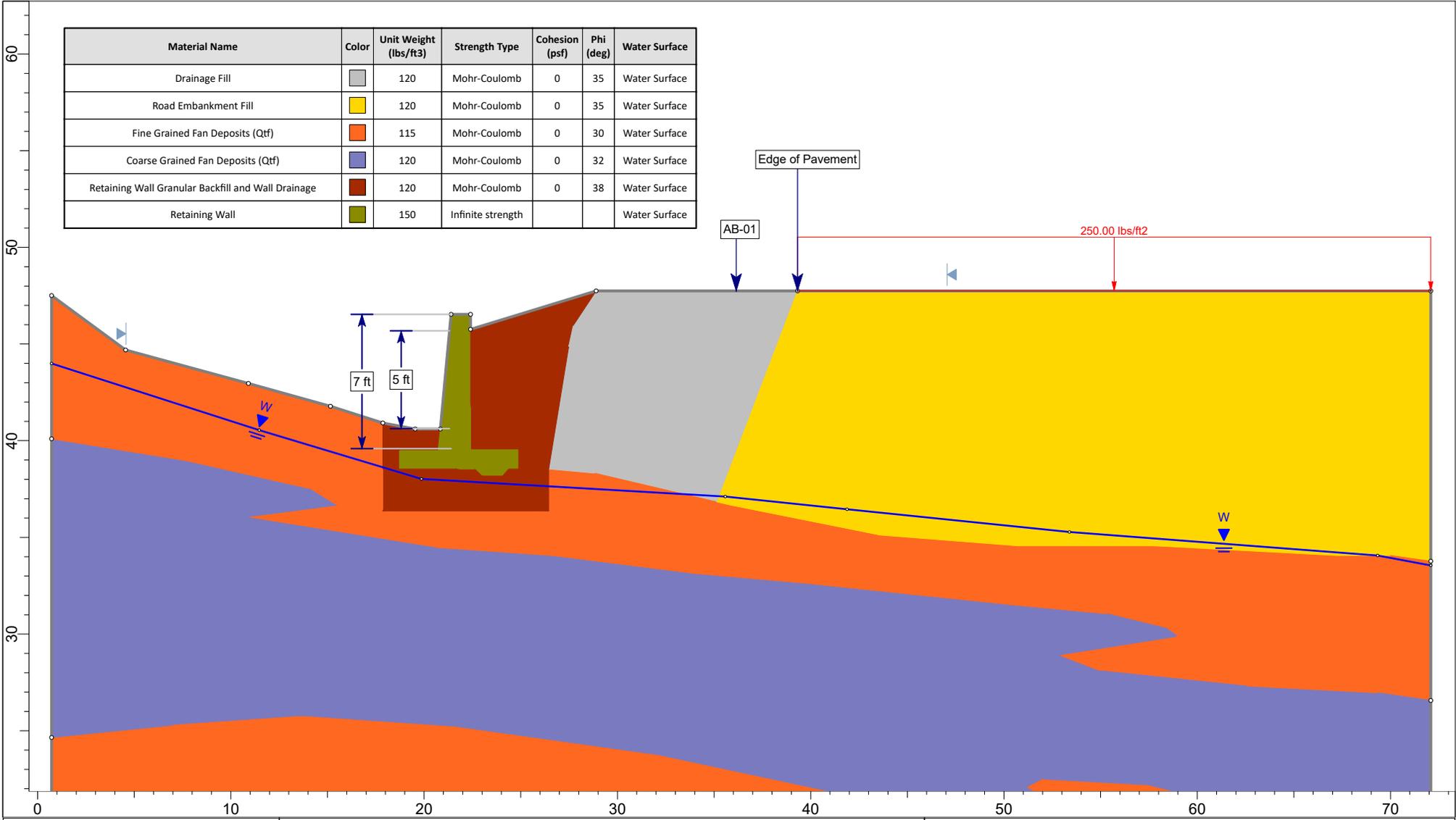
Legend

-  Search Grid
-  Search Limits
-  Modeled Groundwater Level
-  Boring Location and Depth

Seismic

Slope Stability Analysis

Geotechnical Engineering Evaluation - Retaining Wall Addendum
 Palensky Restoration Project
 Lower Columbia River Highway, MP 12.2

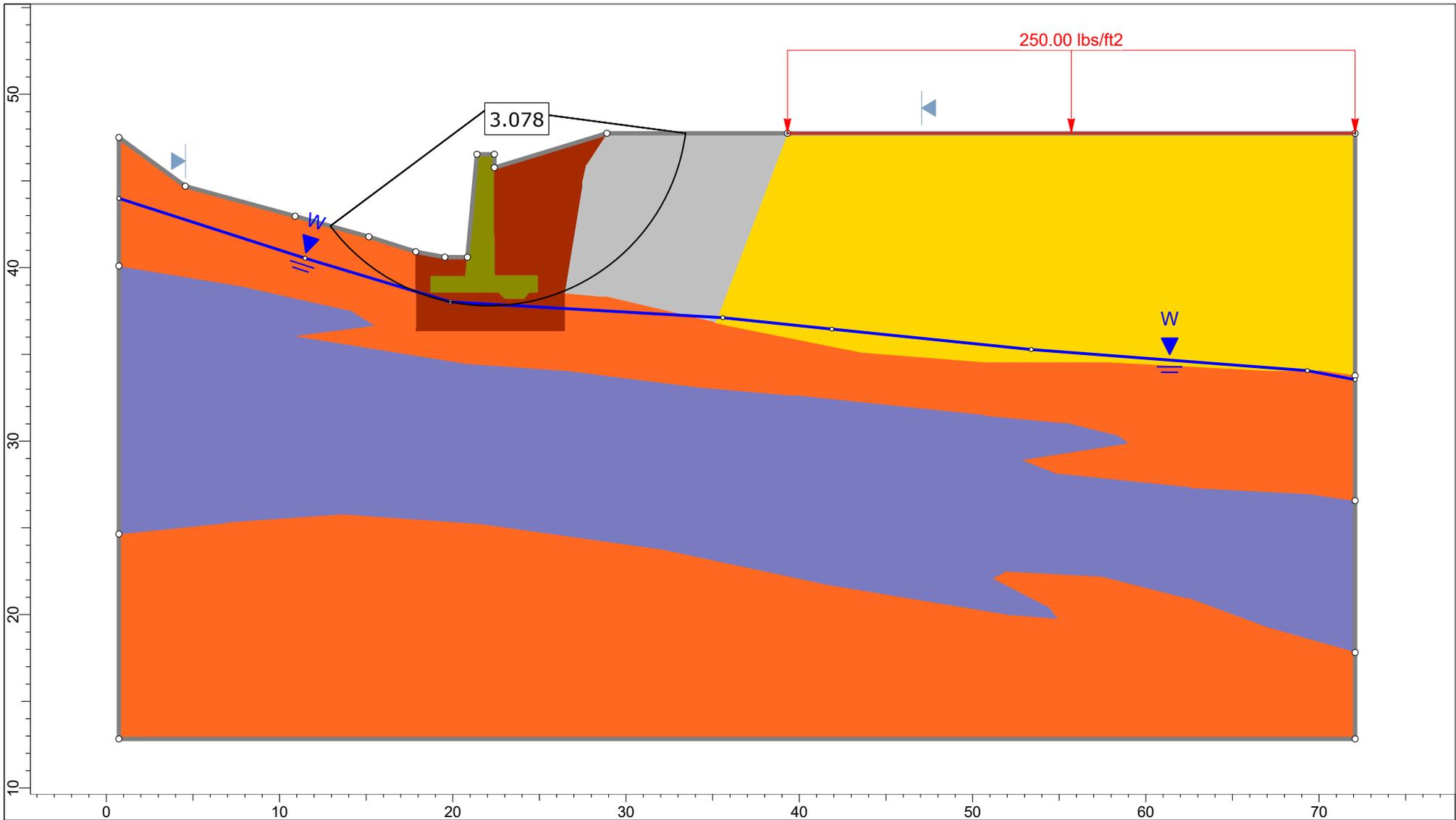


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Drainage Fill	Grey	120	Mohr-Coulomb	0	35	Water Surface
Road Embankment Fill	Yellow	120	Mohr-Coulomb	0	35	Water Surface
Fine Grained Fan Deposits (Qtf)	Orange	115	Mohr-Coulomb	0	30	Water Surface
Coarse Grained Fan Deposits (Qtf)	Blue	120	Mohr-Coulomb	0	32	Water Surface
Retaining Wall Granular Backfill and Wall Drainage	Brown	120	Mohr-Coulomb	0	38	Water Surface
Retaining Wall	Green	150	Infinite strength			Water Surface

- Legend**
- Search Grid
 - Search Limits
 - Modeled Groundwater Level
 - Boring Location and Depth

Model Setup Master Scenario

Slope Stability Analysis
 Geotechnical Engineering Evaluation - Retaining Wall Addendum
 Palensky Restoration Project
 Lower Columbia River Highway, MP 12.2



Legend

-  Search Grid
-  Search Limits
-  Modeled Groundwater Level
-  Boring Location and Depth

Static

Slope Stability Analysis

Geotechnical Engineering Evaluation - Retaining Wall Addendum
 Palensky Restoration Project
 Lower Columbia River Highway, MP 12.2

SLIDEINTERPRET 8.032

SCALE: 1" = 10'

O:\Portland_Projects\190000_Projects\190292_Palensky Site\Data\Analyses\SSA\190292
 Palensky West Retaining Wall b.slm



6/6/2022

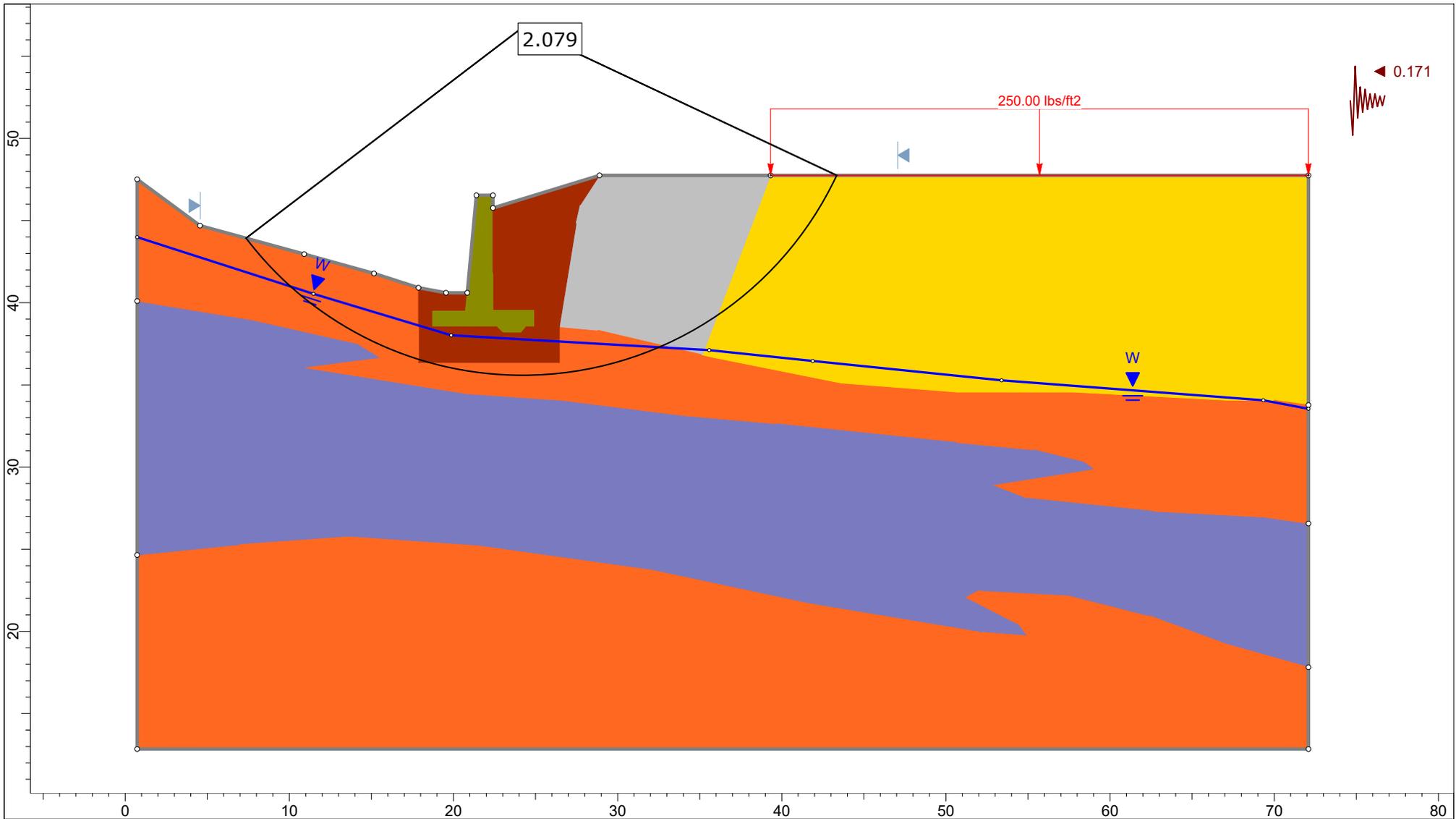
PROJECT NO.
190292

BY:
STM

REVIEWED BY:
REVISED BY:

APPENDIX:

A-5



Legend

-  Search Grid
-  Search Limits
-  Modeled Groundwater Level
-  Boring Location and Depth

Seismic

Slope Stability Analysis

Geotechnical Engineering Evaluation - Retaining Wall Addendum
 Palensky Restoration Project
 Lower Columbia River Highway, MP 12.2

SLIDEINTERPRET 8.032

SCALE: 1" = 10'

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 Palensky West Retaining Wall b.slm



6/6/2022

PROJECT NO.
190292

BY:
STM

REVIEWED BY:
REVISED BY:

APPENDIX:

A-6

APPENDIX B

Report Limitations and Guidance for Use

REPORT LIMITATIONS AND GUIDELINES FOR USE

This Report and Project-Specific Factors

Aspect Consulting, LLC (Aspect) considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual limitations. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with our Agreement with the Client and recognized geoscience practices in the same locality and involving similar conditions at the time this report was prepared.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability, or groundwater fluctuations. If any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques, and personnel used to perform a geotechnical or geologic study differ significantly from those used to perform an environmental study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions, or recommendations (e.g., about the likelihood of encountering underground storage tanks or regulated contaminants). Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

We appreciate the opportunity to perform these services. If you have any questions please contact the Aspect Project Manager for this project.



APPLICATION AND PERMIT TO OCCUPY OR PERFORM OPERATIONS UPON A STATE HIGHWAY

See Oregon Administrative Rule, Chapter 734, Division 55

PERMIT NUMBER

DRAFT

GENERAL LOCATION				PURPOSE OF APPLICATION (TO CONSTRUCT/OPERATE/MAINTAIN)		
HIGHWAY NAME AND ROUTE NUMBER				<input type="checkbox"/> POLE LINE	TYPE	MIN. VERT. CLEARANCE
HIGHWAY NUMBER	COUNTY			<input type="checkbox"/> BURIED CABLE	TYPE	
BETWEEN OR NEAR LANDMARKS				<input type="checkbox"/> PIPE LINE	TYPE	
HWY. REFERENCE MAP	DESIGNATED FREEWAY <input type="checkbox"/> YES <input type="checkbox"/> NO	IN U.S. FOREST <input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> NON-COMMERCIAL SIGN AS DESCRIBED BELOW		
APPLICANT NAME AND ADDRESS				<input type="checkbox"/> MISCELLANEOUS OPERATIONS AND/OR FACILITIES AS DESCRIBED BELOW		
FOR ODOT USE ONLY						
BOND REQUIRED <input type="checkbox"/> YES <input type="checkbox"/> NO		REFERENCE: OAR 734-055-0035(2)	AMOUNT OF BOND			
INSURANCE REQUIRED <input type="checkbox"/> YES <input type="checkbox"/> NO		REFERENCE: OAR 734-055-0035(1)	SPECIFIED COMP. DATE			

DETAIL LOCATION OF FACILITY (For more space attach additional sheets)

MILE POINT	TO	MILE POINT	ENGINEERS STATION	ENGINEERS STATION	SIDE OF HWY OR ANGLE OF CROSSING	DISTANCE FROM		BURIED CABLE OR PIPE		SPAN LENGTH
						CENTER OF PVT	R/W LINE	DEPTH/VERT.	SIZE AND KIND	

DESCRIPTION OF DESIRED USE

SPECIAL PROVISIONS (FOR ODOT USE ONLY)

TRAFFIC CONTROL REQUIRED

OPEN CUTTING OF PAVED OR SURFACED AREAS ALLOWED

- ◆ YES [OAR 734-055-0025(6)] NO ◆ YES [OAR 734-055-0100(2)] NO [OAR 734-055-0100(1)]

◆ **AT LEAST 48 HOURS BEFORE BEGINNING WORK, THE APPLICANT OR HIS CONTRACTOR SHALL NOTIFY THE DISTRICT REPRESENTATIVE _____ AT PHONE NO.: _____ OR EMAIL OR FAX THIS PAGE TO THE DISTRICT OFFICE AT: _____ . SPECIFY TIME AND DATE WORK IS TO OCCUR.**

◆ A COPY OF THIS PERMIT AND ALL ATTACHMENTS SHALL BE AVAILABLE AT THE WORK AREA DURING CONSTRUCTION.

◆ **ATTENTION: Oregon Law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0001 through OAR 952-001-0090. You may obtain copies of the rules by calling the center at (503) 232-1987.**

CALL BEFORE YOU DIG 1-800-332-2344

COMMENTS (FOR ODOT USE ONLY)

IF THE PROPOSED APPLICATION WILL AFFECT THE LOCAL GOVERNMENT, THE APPLICANT SHALL ACQUIRE THE LOCAL GOVERNMENT OFFICIAL'S SIGNATURE BEFORE ACQUIRING THE DISTRICT MANAGER'S SIGNATURE.

LOCAL GOVERNMENT OFFICIAL SIGNATURE		TITLE	DATE
X			
APPLICANT SIGNATURE	APPLICATION DATE	TITLE	TELEPHONE NO.
X			
When this application is approved by the Department, the applicant is subject to, accepts and approves the terms and provisions contained and attached: and the terms of Oregon Administrative Rules, Chapter 734, Division 55, which is by this reference made a part of this permit.			DISTRICT MANAGER OR REPRESENTATIVE
			X
			APPROVAL DATE

Multnomah County Floodplain Development and Grading and Erosion Control Permit Conditions:

ON-GOING RESPONSIBILITIES, OBLIGATIONS, MODIFICATIONS, AND

LIMITATIONS:

This permit is based on written narrative(s), plan(s), and an elevation certificate provided by the applicant. No development shall occur under this permit other than that which is specified within these documents. It shall be the responsibility of the property owner to comply with these documents and the limitations described herein.

1. All work shall conform to the stamped construction drawings/plans complying with the applicable requirements of Multnomah County Code (MCC) 39.5030 [MCC 39.5050(B)].
2. Permit Expiration -This land use permit shall expire as follows:
 - a. This permit shall expire six (6) years after the date the permit was issued, unless the development was established according to all specifications and ongoing responsibilities and obligations. Expiration of this permit means that a new application is required for uses that are not established within the approval period. No extension of time may be granted for this permit. [MCC 39.1183]
3. The County may supplement described erosion control techniques if turbidity or other down slope erosion impacts result from on-site grading work. The Portland Building Bureau (Special Inspections Section), the local Soil and Water Conservation District, or the U.S. Soil Conservation Service can also advise or recommend measures to respond to unanticipated erosion effects. [MCC 39.6230(C)(I)]

PRIOR TO ANY LAND DISTURBING ACTIVITIES, THE APPLICANT(S), OWNERS(S), OR THEIR REPRESENTATIVE(S) SHALL:

4. Post a notice card at the driveway entrance in a clearly visible location. The notice shall be posted when you are ready to start the grading work approved in this permit. This notice is to remain posted until such time as the grading work is completed. In the event the notice is lost, destroyed, or otherwise removed prior to completion of the grading work, the applicant shall immediately contact the Land Use Planning office to obtain a replacement. [MCC 39.6230(C)(2)]
5. Flag, fence, or otherwise mark, the project area as described in the Site Plans. These measures shall remain undisturbed except as otherwise allowed by this district. Such flagging, fencing, and/or markings shall be maintained until construction is complete. [Condition No. 3a of T2-2019-I 1541, MCC 39.6230(A)(2)(h), MCC 39.6230(A)(2)(i), MCC 39.6230(A)(2)(O), MCC 39.6230(8)(1), and MCC 39.6230(C)(2)]

During Construction/ On-Going Restrictions, the applicant(s), owner(s), or their representative(s) shall:

6. Ensure that the flood carrying capacity for the altered or relocated portion of the watercourse will be maintained. [MCC 39.5045(A)(1)]
7. Ensure that the area subject to inundation by the base flood discharge will not be increased. [MCC 39.5045(A)(2)]
8. Ensure that the alteration or relocation will cause no measurable increase in base flood levels. [MCC 39.5045(A)(3)]
9. Conduct all in-water work between July 1 to October 31; unless the State of Oregon grants an extension or alteration of the timeframe for the in-water work period.
10. Stage equipment or vehicles no closer than 100 feet from the stream or water body. [Condition No. 4b of T2-2019-11541 and MCC 39.6230(A)(2)(e)]
11. Inspect any equipment or vehicle working in-stream, daily, prior to entering the water body to ensure there are no leaks or hazardous materials present.
12. Refuel equipment within the vehicle staging area.
13. Not store hazardous materials as determined by DEQ.
14. Store any stockpiled soil or earth materials a minimum of 100-feet from the top of bank of a stream, from the ordinary high watermark of a water body, or from a wetland. Stockpiled soil and earth shall be stored in a manner to prevent its movement into McCarthy Creek or the Multnomah Channel. If these materials must be stored overnight or longer, they shall be covered with mulch or protective covering to prevent movement into undesignated areas. Stored earthen materials shall be backfilled in the designated fill areas as soon as practical and reseeded with temporary vegetation until permanent plantings are made unless permanent plantings will be completed within one week of backfilling into designated fill areas. [MCC 39.6230(A)(2)(d), MCC 39.6230(A)(2)(e), MCC 39.6230(A)(2)(1), MCC 39.6230(A)(2)(m)]
15. Remove any sedimentation caused by development activities from all neighboring surfaces and/or drainage systems. If any features within adjacent public right-of-way are disturbed, the applicant(s), owner(s), or their representatives shall be responsible for returning such features to their original condition or a condition of equal quality. [MCC 39.6230(A)(2)(1) and MCC 39.6230(B)(1)]
16. Dispose of construction debris off-site. On-site disposal of construction debris is not authorized under this permit. Any spoil materials removed off-site shall be taken to a location approved for the disposal of such material by applicable Federal, State and local authorities. [MCC 39.6230(A)(2)(m) and MCC 39.6230(A)(2)(n)]
17. Not dump or dispose of hazardous or toxic materials, synthetics (i.e. tires), petroleum-based materials, or other solid wastes, which may cause adverse leachates or other off-site water

quality effects. This permit does not authorize dumping or disposing of hazardous or toxic materials, synthetics (i.e. tires), petroleum-based materials, or other solid wastes [MCC 39.6230(A)(2)(n)]

18. Follow the following procedures if any Cultural Resources and/or Archaeological Resources are located or discovered on the tax lots or within the project area, including finding any evidence of historic campsites, old burial grounds, implements, or artifacts:
 - a. Halt Construction - All construction activities within 100 feet of the discovered cultural resource shall cease. The cultural resources shall remain, as found; further disturbance is prohibited.
 - b. Notification-The project applicant shall notify the County Planning Director and the State Historic Preservation Office (SHPO) within 24 hours of the discovery. If the cultural resources are prehistoric or otherwise associated with Native Americans, the project applicant shall also notify the Indian tribal governments within 24 hours.
 - c. Survey and Evaluation - The applicant shall follow any and all procedures outlines by SHPO and if necessary obtain the appropriate permits (see ORS 273.705 and ORS 358.905 to 358.955).
 - d. All survey and evaluation reports and mitigation plans shall be submitted to the Planning Director and SHPO. Indian tribal governments also shall receive a copy of all reports and plans if the cultural resources are prehistoric or otherwise associated with Native Americans.
 - 1) Construction activities may recommence when SHPO requirements are satisfied.
19. Follow the following procedures if human remains are discovered during excavation of construction (human remains means articulated or disarticulated human skeletal remains, bones, or teeth, with or without attendant burial artifacts):
 - b. Halt Activities -All survey, excavation, and construction activities shall cease. The human remains shall not be disturbed any further.
 - c. Notification- Local law enforcement officials at the Multnomah County Planning Director, State Historic Preservation Office and the Indian tribal governments shall be contacted immediately.
 - d. Inspection-The State Medical Examiner shall inspect the remains at the project site and determine if they are prehistoric/historic or modern. Representatives from the Indian tribal governments shall have an opportunity to monitor the inspection.
 - e. Jurisdiction - If the remains are modern, the appropriate law enforcement officials will assume jurisdiction and this protection process may conclude.

- f. Treatment - Prehistoric/historic remains of Native Americans shall generally be treated in accordance with the procedures set forth in Oregon Revised Statutes, Chapter 97.740 to 97.760.
20. Seed and mulch all disturbed soils to prevent erosion and sedimentation in the channel.

Multnomah County Willamette River Greenway Permit Conditions:

The conditions listed are necessary to ensure that approval criteria for this land use permit are satisfied.

Where a condition relates to a specific approval criterion, the code citation for that criterion follows in parenthesis.

1. Approval of this land use permit is based on the submitted written narrative(s) and plan(s). No work shall occur under this permit other than that which is specified within these documents. It shall be the responsibility of the property owner(s) to comply with these documents and the limitations of approval described herein.
2. Permit Expiration -
 - a) This land use permit shall expire as follows:
 - i. When construction has not commenced within two (2) years of the date of the final decision, or; [MCC 39.1185(B)(I)]
 - ii. When the structure has not been completed within four (4) years of the date of commencement of construction, or; [MCC 39.1185(B)(2)]
 - b) For purposes of Condition 2.a.i, notification of commencement of construction will be given to Multnomah County Land Use Planning Division a minimum of seven (7) days prior to date of commencement. Work may commence once notice is completed. Commencement of construction shall mean actual construction of the foundation or frame of the approved structure. For utilities and developments without a frame or foundation, commencement of construction shall mean actual construction of support structures for an approved above ground utility or development or actual excavation of trenches for an approved underground utility or development. For roads, commencement of construction shall mean actual grading of the roadway.
 - c) For purposes of Condition 2.a.ii, completion of the structure shall mean completion of the exterior surface(s) of the structure and compliance with all conditions of approval in the land use approval.

Note: The property owner may request to extend the time:frame within which this permit is

valid, as provided under MCC 39 .1195, as applicable. The request for a permit extension must be submitted prior to the expiration of the approval period.

3. Prior to work commencing, and through the duration of the project, the applicant, owner, or their representatives shall:
 - a) Flag, fence, or otherwise mark the project area as described in the Site Plans. These measures shall remain undisturbed except as otherwise allowed by this district. Such markings shall be maintained until construction is complete. [MCC 39.5935(0) and MCC 39.5940(B)(3)]
4. As an on-going condition, the applicant, owner, or their representatives shall:
 - a) Conduct all in-water work between July 1 to October 31, unless the State of Oregon grants an extension or alteration of the timeframe for the in-water work period. [MCC 39.5935(0) and MCC 39.5940(B)(3)]
 - b) Stage equipment or vehicles no closer than 100 feet from the stream or water body. [MCC 39.5935(0) and MCC 39.5940(B)(3)]
 - c) Inspect any equipment or vehicle working in-stream, daily, prior to entering the water body to ensure there are no leaks or hazardous materials present. [MCC 39.5935(0) and MCC 39.5940(B)(3)]
 - d) Refuel equipment within the vehicle staging area. [MCC 39.5935(0) and MCC 39.5940(B)(3)]
 - e) Not store hazardous materials as determined by DEQ. [MCC 39.5935(0) and MCC 39.5940(B)(3)]
5. The following procedures shall be in effect if any Cultural Resources and/or Archaeological Resources are located or discovered on the tax lots or within the project area, including finding any evidence of historic campsites, old burial grounds, implements, or artifacts:
 - a) Halt Construction - All construction activities within 100 feet of the discovered cultural resource shall cease. The cultural resources shall remain as found; further disturbance is prohibited.
 - b) Notification-The project applicant shall notify the County Planning Director and the State Historic Preservation Office (SHPO) within 24 hours of the discovery. If the cultural resources are prehistoric or otherwise associated with Native Americans, the project applicant shall also notify the Indian tribal governments within 24 hours.
 - c) Survey and Evaluation - The applicant shall follow any and all procedures outlines by SHPO and if necessary obtain the appropriate permits (see ORS 273.705 and ORS 358.905 to 358.955).

- d) All survey and evaluation reports and mitigation plans shall be submitted to the Planning Director and SHPO. Indian tribal governments also shall receive a copy of all reports and plans if the cultural resources are prehistoric or otherwise associated with Native Americans.
 - e) Construction activities may recommence when SHPO requirements are satisfied. [MCC 39.5935(N) and Comprehensive Plan Policy 6.4: Cultural and Archeological Resources]
6. The following procedures shall be in effect if human remains are discovered during excavation or construction (human remains means articulated or disarticulated human skeletal remains, bones, or teeth, with or without attendant burial artifacts):
- a) Halt Activities - All survey, excavation, and construction activities shall cease. The human remains shall not be disturbed any further.
 - b) Notification - Local law enforcement officials, the Multnomah County Planning Director, State Historic Preservation Office and the Indian tribal governments shall be contacted immediately.
 - c) Inspection-The State Medical Examiner shall inspect the remains at the project site and determine if they are prehistoric/historic or modern. Representatives from the Indian tribal governments shall have an opportunity to monitor the inspection.
 - d) Jurisdiction -If the remains are modern, the appropriate law enforcement officials will assume jurisdiction and this protection process may conclude.
 - e) Treatment-Prehistoric/historic remains of Native Americans shall generally be treated in accordance with the procedures set forth in Oregon Revised Statutes, Chapter 97.740 to 97.760. [MCC 39.5935(N) and Comprehensive Plan Policy 6.4: Cultural and Archeological Resources]
7. At the completion of the proposed development and construction activities, the applicant, owner, or their representatives shall:
- a) Seed and mulch all disturbed soils to prevent erosion and sedimentation in the channel. [MCC 39.5935(O) and MCC 39.5940(B)(3)]
 - b) Revegetate the site with native plants and species as proposed in the Site Plans, and Wetland determination, project impacts, and monitoring plan written by April Silva, Lead Ecologist, Columbia River Estuary Study Taskforce (CREST). [MCC 39.5935(1) and MCC 39.5940(D)]
 - c) Provide a post-construction report. The report shall be prepared, stamped and signed by an Oregon Professional Engineer and provided to Multnomah County Land Use Planning within 90 days of completion of the project. The post-construction report shall confirm

the project has been in completed in compliance with approved designs and all conditions of Multnomah County Land Use Permit T2-2019-11541. Any variation from approved designs or conditions of approval shall be clearly indicated. The post-construction report shall include:

- i. Dated pre- and post-construction photos taken of the side channel and areas of disturbance for construction. The photos should clearly show the site conditions before and after construction.
- ii. A narrative that describes any deviation from the approved plans. [MCC 39.5940(D)]

Department of State Lands Removal Fill General Conditions:

IN ACCORDANCE WITH ORS 196.800 TO 196.990 PERFORMANCE OF THE OPERATIONS DESCRIBED ARE SUBJECT TO THE SPECIAL CONDITIONS LISTED ON EXHIBIT A AND TO THE FOLLOWING GENERAL CONDITIONS:

1. The removal fill permit does not authorize trespass on the lands of others. The permit holder must obtain all necessary access permits or rights-of-way before entering lands owned by another.
2. The removal fill permit does not authorize any work that is not in compliance with local zoning or other local, state, or federal regulation pertaining to the operations authorized by this permit. The permit holder is responsible for obtaining the necessary approvals and permits before proceeding under this permit.
3. All work done under the removal fill permit must comply with Oregon Administrative Rules, Chapter 340; Standards of Quality for Public Waters of Oregon. Specific water quality provisions for this project are set forth on Attachment A.
4. Violations of the terms and conditions of this permit are subject to administrative and/or legal action, which may result in revocation of the permit or damages. The permit holder is responsible for the activities of all contractors or other operators involved in work done at the site or under this permit.
5. Employees of the Department of State Lands (DSL) and all duly authorized representatives of the Director must be permitted access to the project area at all reasonable times for the purpose of inspecting work performed under this permit.
6. Any permit holder who objects to the conditions of this permit may request a hearing from the Director, in writing, within twenty-one (21) calendar days of the date this permit was issued.

7. In issuing these conditions, DSL makes no representation regarding the quality or adequacy of the project design, materials, construction, or maintenance, except to approve the project's design and materials, as set forth in the permit application, as satisfying the resource protection, scenic, safety, recreation, and public access requirements of ORS Chapters 196, 390, and related administrative rules.

8. CREST and the contractor must defend and hold harmless the State of Oregon, and its officers, agents and employees from any claim, suit, or action for property damage or personal injury or death arising out of the design, material, construction, or maintenance of the permitted improvements.

9. Authorization from the U.S. Army Corps of Engineers may also be required.

NOTICE: If removal is from state-owned submerged and submersible land, the permittee must comply with leasing and royalty provisions of ORS 274.530. If the project involves creation of new lands by filling on state-owned submerged or submersible lands, you must comply with ORS 274.905 to 274.940 if you want a transfer of title; public rights to such filled lands are not extinguished by issuance of this permit. This permit does not relieve the permittee of an obligation to secure appropriate leases from DSL, to conduct activities on state-owned submerged or submersible lands. Failure to comply with these requirements may result in civil or criminal liability. For more information about these requirements, please contact Department of State Lands, 503-986-5200.

EXHIBIT A – DEPARTMENT OF STATE LANDS SPECIAL CONDITIONS

READ AND BECOME FAMILIAR WITH CONDITIONS OF YOUR PERMIT.

The project site may be inspected by the Department of State Lands (DSL) as part of our monitoring program. A copy of this permit must be available at the work site whenever authorized operations are being conducted.

1. Responsible Party: By signature on the application, Jason Smith is acting as the representative of Columbia River Estuary Study Taskforce (C.R.E.S.T) . By proceeding under this permit, Columbia River Estuary Study Taskforce (C.R.E.S.T) agrees to comply with and fulfill all terms and conditions of this permit, unless the permit is officially transferred to another party as approved by DSL. In the event information in the application conflicts with these permit conditions, the permit conditions prevail.

2. Authorization to Conduct Removal and/or Fill: removal within wetlands and waterway impacts with associated removal and fill of material in Multnomah County, as referenced in the plan set drawings.

3. Work Period in Jurisdictional Areas: Fill or removal activities below the ordinary high water elevation of McCarthy Creek and Multnomah Channel must be conducted between July 1 and October 31, unless otherwise coordinated with Oregon Department of Fish and Wildlife and approved in writing by DSL. If fish eggs are observed within the project area, work must cease, and DSL contacted immediately.

4. Changes to the Project or Inconsistent Requirements from Other Permits: It is the permittee's responsibility to ensure that all state, federal and local permits are consistent and compatible with the final approved project plans and the project as executed. Any changes made in project design, implementation or operating conditions to comply with conditions imposed by other permits resulting in removal-fill activity must be approved by DSL prior to implementation.

5. DSL May Halt or Modify: DSL retains the authority to temporarily halt or modify the project or require rectification in case of unforeseen adverse effects to aquatic resources or permit non-compliance.

6. DSL May Modify Conditions Upon Permit Renewal: DSL retains the authority to modify conditions upon renewal, as appropriate, pursuant to the applicable rules in effect at the time of the request for renewal or to protect waters of this state.

Pre-Construction

7. Local Government Approval Required Before Beginning Work: Prior to the start of construction, the permittee must obtain a Type 2 Willamette River Greenway Permit, Type 2 Lot of Record Verification, Type 1 Floodplain Development Permit, and Type 1 Erosion & Sediment Control Permit from the Multnomah County.

8. Stormwater Management Approval Required Before Beginning Work: Prior to the start of construction, the permittee must obtain a National Pollution Discharge Elimination System (NPDES) permit from the Oregon Department of Environmental Quality (DEQ), if one is required by DEQ.

9. Pre-construction Resource Area Fencing or Flagging: Prior to any site grading, the boundaries of the avoided wetlands, waterways, and riparian areas adjacent to the project site must be surrounded by noticeable construction fencing or flagging. The marked areas must be maintained during construction of the project and be removed immediately upon project completion.

General Construction Conditions

10. Water Quality Certification: The Department of Environmental Quality (DEQ) may evaluate this project for a Clean Water Act Section 401 Water Quality Certification (WQC). If the evaluation results in issuance of a Section 401 WQC, that turbidity condition will govern any allowable turbidity exceedance and monitoring requirements.

11. Erosion Control Methods: The following erosion control measures (and others as appropriate) must be installed prior to construction and maintained during and after construction as appropriate, to prevent erosion and minimize movement of soil into waters of this state.

a. All exposed soils must be stabilized during and after construction to prevent erosion and sedimentation.

b. Filter bags, sediment fences, sediment traps or catch basins, leave strips or berms, or other measures must be used to prevent movement of soil into waterways and wetlands.

c. To prevent erosion, use of compost berms, impervious materials or other equally effective methods, must be used to protect soil stockpiled during rain events or when the stockpile site is not moved or reshaped for more than 48 hours.

d. Unless part of the authorized permanent fill, all construction access points through, and staging areas in, riparian and wetland areas must use removable pads or mats to prevent soil compaction. However, in some wetland areas under dry summer conditions, this requirement may be waived upon approval by DSL. At project completion, disturbed areas with soil exposed by construction activities must be stabilized by mulching and native vegetative plantings/seeding. Sterile grass may be used instead of native vegetation for temporary sediment control. If soils are to remain exposed more than seven days after completion of the work, they must be covered with erosion control pads, mats or similar erosion control devices until vegetative stabilization is installed.

e. Where vegetation is used for erosion control on slopes steeper than 2:1, a tackified seed mulch must be used so the seed does not wash away before germination and rooting.

f. Dredged or other excavated material must be placed on upland areas having stable slopes and must be prevented from eroding back into waterways and wetlands.

g. Erosion control measures must be inspected and maintained as necessary to ensure their continued effectiveness until soils become stabilized.

h. All erosion control structures must be removed when the project is complete, and soils are stabilized and vegetated.

12. Fuels, Hazardous, Toxic, and Waste Material Handling: Petroleum products, chemicals, fresh cement, sandblasted material and chipped paint, material treated with leachable preservatives or other deleterious waste materials must not be allowed to enter waters of this state. Machinery and equipment staging, cleaning, maintenance, refueling, and fuel storage must be at least 150 feet from OHW or HMT and wetlands to prevent contaminants from entering waters of the state. Refueling is to be confined to a designated area to prevent spillage into waters of this state. Barges must have containment system to effectively prevent petroleum products or other deleterious material from entering waters of this state. Project-related spills into waters of this state or onto land with a potential to enter waters of this state must be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311.

13. Archaeological Resources: If any archaeological resources, artifacts or human remains are encountered during construction, all construction activity must immediately cease. The State Historic Preservation Office must be contacted at 503-986-0674. You may be contacted by a Tribal representative if it is determined by an affected Tribe that the project could affect Tribal cultural or archeological resources.

14. Construction Corridor: There must be no removal of vegetation or heavy equipment operating or traversing outside the designated construction corridor or footprint.

15. Operation of Equipment in the Water: Heavy equipment may be positioned on or traverse the area below ordinary high water or highest measured tide only when the area is free of flowing or standing water. All machinery operated below ordinary high water (OHW) or highest measured tide (HMT) elevation must use vegetable-based hydraulic fluids, be steam cleaned and inspected for leaks prior to each use, and be diapered to prevent leakage of fuels, oils, or other fluids below OHW or HMT elevation. Any equipment found to be leaking fluids must be immediately removed from and kept out of OHW or HMT until repaired.

16. Work Area Isolation: The work area must be isolated from the water during construction by using a coffer dam or similar structure. All structures and materials used to isolate the work area must be removed immediately following construction and water flow returned to pre-construction conditions.

17. Fish Salvage Required: Fish must be salvaged from the isolation area. Permits from NOAA Fisheries and Oregon Department of Fish and Wildlife, Fish Research are required to salvage fish. Fish salvage permit information may be obtained by contacting ODFW Fish Research at 503-947-6254 or Fish.Research@state.or.us.

18. Fish Passage Required: The project must meet Oregon Department of Fish and Wildlife requirements for fish passage, as required in ORS 509.585 and as outlined in the ODFW Fish Passage Authorization PA-02-0299, which is included in the project's application.

19. Raising or Redirecting Water: The project must not cause water to rise or be redirected and result in damage to structures or property on the project site as well as adjacent, nearby, upstream, and downstream of the project site.

20. Trenching in Wetlands: During trenching or excavation, the top layer of soil must be separated from the rest of the excavated material and put back on top when the trench or pit is back-filled. If the native underlying soils are not used as bedding material and a coarser, non-native soil or other material is used, preventative measures such as clay or concrete plugs must be used so that underground hydraulic piping does not dewater the site and adjacent wetlands.

21. Temporary Ground Disturbances: All temporarily disturbed areas must be returned to original ground contours at project completion.



**US Army Corps
of Engineers**
Portland District

**DEPARTMENT OF THE ARMY PERMIT
REGIONAL GENERAL PERMIT
FOR
Bonneville Power Administration
Funded Habitat Improvement Projects
Within the Columbia River Basin in Oregon (RGP-6)**

Permit No.: NWP-2011-127-1

Effective Date: This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Expiration Date: July 31, 2023

Issuing Office: U.S. Army Corps of Engineers, Portland District, Regulatory Branch (Corps)

This regional general permit (RGP) authorizes project proponents who receive funding through the Bonneville Power Administration (BPA) to place fill material and certain structures in waters of the United States (subject to the terms and conditions herein) for the purpose of habitat improvement. This general permit is issued upon the recommendation of the Chief of Engineers as provided by 33 CFR 325.2(e)(2), pursuant to Section 404 of the Clean Water Act (P.L. 95-217) and Section 10 of the Rivers and Harbors Act of 1899.

Project proponents should contact the Corps if questions arise regarding compliance with any of the terms and conditions of this RGP. Project proponents should also contact the Corps if there are questions about whether a specific activity is exempt from regulation or is outside of the Corps' jurisdiction.

PROJECT LOCATION

Projects will occur within waters of the U.S., as defined in 33 CFR 328.3, in the Columbia River Basin in Oregon. This geographic scope encompasses the Columbia River estuary and main stem, as well as tributary watersheds.

PURPOSE OF RGP

The purpose of the RGP is to expedite the authorization of recurring activities that are similar in nature and have minor individual and cumulative adverse impacts on the aquatic environment. Use of the RGP is intended to reduce the amount of paperwork and time required to authorize qualifying projects by referencing, where appropriate, environmental compliance work completed by BPA. The RGP makes use of applicable programmatic Endangered Species Act and Essential Fish Habitat consultations and is the subject of programmatic State water quality certification and coastal zone

management consistency concurrence.

BPA RESPONSIBILITIES PERTINENT TO THIS RGP

Endangered Species Act Consultation. Pursuant to Section 7 of the Endangered Species Act of 1973 (ESA, 16 U.S.C. 1531 et seq.), BPA is required to consult with National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) to ensure that actions it funds are not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

Magnuson-Stevens Fishery Conservation and Management Act. BPA is required to consult with NMFS on activities that may adversely affect essential fish habitat, under the Magnuson Stevens Fishery Conservation and Management Act of 1996 (Public Law 104-267).

Cultural Resources/Tribal Coordination. Pursuant to its responsibilities under Section 106 of the National Historic Preservation Act (NHPA, 16 U.S.C. 470) and 36 CFR 800, BPA is required to consult with the appropriate tribes and State Historic Preservation Office for projects that have the potential to cause effects on historic properties. BPA is the primary lead Federal agency for Section 106 consultation. BPA will also consult with the appropriate tribes to ensure that no activity or its operation will impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights

National Wild and Scenic Rivers Act. Pursuant to its responsibilities under the National Wild and Scenic Rivers Act (16 USC 1271 et seq.), the BPA will ensure that the project proponent has consulted with the appropriate federal agency responsible for management of the designated Wild and Scenic River to ensure that funded projects will not adversely affect the outstanding values for which the river or component was designated or considered.

Columbia River Gorge National Scenic Act. The Columbia River Gorge National Scenic Area Act of 1986 established the Columbia River Gorge National Scenic Area and established standards by which projects and developments proposed within the scenic area are reviewed and approved. BPA is required to comply with those standards and must coordinate with the Forest Service, who is responsible for reviewing activities within the Gorge Scenic area.

ACTIVITIES AUTHORIZED BY RGP

This RGP authorizes project proponents to implement BPA funded habitat improvement projects that will be conducted within waters of the U.S. These activities are subject to review by BPA, the Northwest Power and Conservation Council, and an Independent Scientific Review Panel, and are designed to maintain, enhance, create, and/or restore watershed functions to benefit fish species, other aquatic organisms, water quality, water quantity, riparian areas, floodplains, and wetlands.

The activities proposed for inclusion in the RGP are predictable as to their effects, and consistent with large scale conservation strategies and the best available science. The proposed activities are similar in nature and will not cause more than minimal individual and cumulative effects.

The habitat improvement categories are as follows:

1. Fish Passage Restoration.

Profile Discontinuities.

- a. Dams, Water Control Structures, or Legacy Structures Removal.
- b. Consolidate, or Replace Existing Irrigation Diversions.
- c. Headcut and Grade Stabilization.
- d. Low Flow Consolidation.
- e. Provide Fish Passage at an Existing Facility.

Transportation Infrastructure.

- f. Bridge and Culvert Removal or Replacement.
- g. Bridge and Culvert Maintenance.
- h. Installation of Fords.

2. River, Stream, Floodplain, and Wetland Restoration.

- a. Improve Secondary Channel and Floodplain Interactions.
- b. Set-back or Removal of Existing, Berms, Dikes, and Levees.
- c. Protect Streambanks Using Bioengineering Methods.
- d. Install Habitat-Forming Natural Material Instream Structures.
- e. Riparian and Wetland Vegetation Planting.
- f. Channel Reconstruction.
- g. Beaver Habitat Restoration

3. Invasive Plant Control.

- a. Manage Vegetation using Physical Control.
- b. Manage Vegetation using Herbicides (River Systems).
- c. Manage Vegetation using Herbicides (Estuarine Systems).
- d. Juniper Removal.

4. Piling Removal.

5. Road and Trail Maintenance and Decommissioning.

- a. Road Maintenance.
- b. Road Decommissioning.

6. In-channel Nutrient Enhancement.

7. Irrigation and Water Delivery/Management Actions.

- a. Convert Delivery System to Drip or Sprinkler Irrigation.
- b. Convert Water Conveyance from Open Ditch to Pipeline.

- c. Convert from Instream Diversions to Groundwater Wells for Primary Water Sources.
- d. Install or Replace Return Flow Cooling Systems.
- e. Install Irrigation Water Siphon Beneath Waterway.
- f. Livestock Watering Facilities.
- g. Install, Upgrade, or Maintain Fish Exclusion Devices and Bypass.

8. Fisheries, Hydrologic, and Geomorphologic Surveys.

9. Special Actions (for Terrestrial Species).

- a. Install/Develop Wildlife Structures.
- b. Construct Fencing for Grazing Control.
- c. Plant Vegetation.
- d. Tree Removal for Large Wood Projects.

The General Aquatic Conservation Measures Applicable to All Actions, Project Descriptions, and Project-Specific Conservation Measures are found in Attachment 1.

PROCEDURES FOR USE OF THIS RGP

Projects authorized by this RGP are categorized into one of four "levels" according to potential environmental consequences and the applicability of programmatic evaluations. Notification requirements and review timelines vary between the four project levels. Level 1 requires post construction notification, while Levels 2, 3, and 4 require pre-construction notification. See Table 1 in Attachment 2 for a summary of the level requirements.

Basic Information Requirements

Regardless of which level is used, the following information must be provided (via a permit application and an accompanying Corps RGP-6 Notification Form, Attachment 2) for all projects that utilize this RGP:

- **Contact Information:** Project proponent contact name, email address, mailing address, and phone number.
- **Project Location:**
 - Detailed vicinity map
 - 6th field Hydrologic Unit Code (HUC) name and number, stream name, river mile, and county.
 - For specific project sites, provide Township/Range/Section, and latitude and longitude (decimal degrees).
 - For linear projects, - provide Township/Range/Section, and latitude and longitude (decimal degrees) for start and end points.
- **Timing:** Project start and completion dates.
- **Activity Type:** Activity categories that apply.
- **Project Description:** Brief narrative of the project and objectives, appropriate plan view and cross-section drawings, fill and/or removal volume estimates, acreage impacts, BPA project number, contract

number, and work element.

- **Extent:** Number of stream miles or acres to be treated.
- **Tribal Coordination:** Document the list of tribes contacted, review time provided or date coordination process started, whether there were issues (yes/no), and issue resolution.
- **Section 106 NHPA compliance:** Provide effects determination and all documentation showing Section 106 compliance.
- **Species Affected:** Listed fish and wildlife species, critical habitat, and/or Essential Fish Habitat (EFH), or non-listed fish species affected by the project.

Level 1 Projects

Applicability: Level 1 is intended for projects that are within the scope of the most recent version of the BPA Habitat Improvement Program (HIP) Handbook and do not require review under related laws prior to the Corps issuing an authorization. To qualify for Level 1 Notification, a project must meet the General Aquatic Conservation Measures Applicable to All Actions, Project Descriptions, and Project-Specific Conservation Measures in Attachment 1, in addition to all of the conditions listed below:

- Does not affect ESA species or designated critical habitat protected under the Endangered Species Act (ESA), Magnuson-Stevens Act (MSA), or the Marine Mammal Protection Act (MMPA); AND
- Does not affect reserved treaty rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights; AND
- Does not have the potential to cause effects to historic properties listed or eligible for listing in the National Register of Historic Places pursuant to Section 106 of the National Historic Preservation Act; AND
- Does not affect designated or nominated Wild and Scenic River corridors; AND
- Does not occur in a state's coastal zone; AND
- Meets conditions of the Water Quality Certification (WQC) issued by Oregon Department of Environmental Quality (Attachment 3); AND
- Does not cause the loss of more than 0.1 acre of wetlands nor 300 linear feet of stream; AND
- Does not cause conversion of a stream or natural wetland to another aquatic habitat type; AND
- Does not alter, occupy, or use a Corps civil works project.

Notification Requirements: Within 60 days of completion of the work performed in waters of the U.S., the project proponent must submit a post-construction report of completed activities. In addition to the basic information requirements, the post-construction report will include the following:

- Documentation of "no effect" for ESA, "no potential to affect" for NHPA Section 106, and no impairment to reserved treaty rights.

Level 2 Projects

Applicability: Level 2 is intended for projects that are within the scope of the most recent version of the BPA Habitat Improvement Program (HIP) Handbook but require review under related laws prior to the Corps issuing an authorization, as detailed below.

To qualify for Level 2 Notification, a project must meet the General Aquatic Conservation Measures Applicable to All Actions, Project Descriptions, and Project-Specific Conservation Measures in Attachment 1 (or have a variance approved, as appropriate) and meet **all** of the conditions listed below:

- Impacts to ESA species and EFH are addressed through use of the most recent BPA HIP Handbook; AND
- BPA has completed NHPA Section 106 review and consultation with the State Historic Preservation Office (SHPO) and interested tribes; AND
- If applicable, has coverage under an existing Section 7(a) written determination for effects to designated or nominated Wild and Scenic River corridors; AND
- Has local land use approval; AND
- Meets the standard Coastal Zone Management (CZM) conditions required by this RGP (if project occurs in state's coastal zone)(Attachment 4); AND
- Meets conditions of the WQC issued by Oregon Department of Environmental Quality (Attachment 3); AND
- Does not alter, occupy, or use a Corps civil works project, or has received Section 408 permission for such activity.

Notification Requirements: Project proponents must notify the Corps at least 45 days prior to the planned start of the project.

In addition to the basic information requirements, for Level 2 projects the project notification will include the following (attached to the Corps RGP-6 Notification Form):

- Documentation of ESA consultation and NHPA Section 106 compliance.
- Documentation of no impairment to reserved treaty rights.
- The BPA Project Notification Form from the current HIP.
- If applicable, documentation of an approved variance from BPA.
- If applicable, documentation of Section 408 permission.
- If there are proposed impacts to wetlands, a wetland delineation may be required by the Corps.

Corps Review Process: In addition to evaluating the project for consistency with this RGP, the Corps will review Level 2 projects to ensure adequate documentation of compliance with related laws, including, but not limited to:

- Documentation from BPA archaeologist regarding lack of response from SHPO in 30-day consultation timeframe (36 CFR 800.4(c)(1)), or concurrence on determination of effects made in compliance with Section 106 of the National Historic Preservation Act (36 CFR 800), or a memorandum of agreement pursuant to 36 CFR 800.6(b), or a programmatic agreement (36 CFR 800.14(b)(2)). If applicable, documentation of coordination/consultation with Treaty Tribes to ensure project will not impair reserved treaty rights.
- The current HIP Handbook, incorporation of HIP Conservation Measures, and completion of RRT Review Process for Med-High Risk Projects.
- If applicable, a project-specific non-conditioned Section 7(a) written determination for effects to a designated or nominated Wild and Scenic River corridor; or coverage under a prior submitted programmatic MOA/Section 7(a) written determination for effects to designated or nominated Wild and Scenic River corridors.
- The WQC conditions required by this RGP (Attachment 3).
- If applicable, the standard CZM conditions required by this RGP (Attachment 4).

Work in waters of the U.S. may proceed according to the terms of the RGP provided the Corps does not object to the proposed project within 45 days from the date the Corps receives the Level 2 Notification. The Corps may require Level 2 Projects to be evaluated as Level 4 Projects, if determined by the Corps Project Manager.

Level 3 Projects

Applicability: Level 3 is intended for projects that are within the scope of a current programmatic consultation or are the subject of a completed or ongoing individual consultation, and need no further review under related laws prior to the Corps issuing an authorization.

To qualify for Level 3 Notification, a project must meet conservation measures from the programmatic consultation, in addition to **all** of the conditions listed below:

- Impacts to ESA species and EFH are addressed through a current non-BPA/non-Corps programmatic consultation or are the subject of a completed individual consultation; AND
- BPA has completed NHPA Section 106 review and consultation with SHPO and interested tribes; AND
- If applicable, has coverage under an existing Section 7(a) written determination for effects to designated or nominated Wild and Scenic River corridors; AND
- Has local land use approval; AND

- Meets the standard CZM conditions required by this RGP (if project occurs in state's coastal zone) (Attachment 4); AND
- Meets conditions of WQC issued by Oregon Department of Environmental Quality (Attachment 3); AND
- Does not alter, occupy, or use a Corps civil works project, or has received Section 408 permission for such activity.

Notification Requirements: Project proponents must notify the Corps at least 45 days prior to the planned start of the project. In addition to the basic information requirements, for Level 3 projects the project notification will include the following (attached to the Corps RGP-6 Notification Form):

- Documentation showing the applicability of an individual or programmatic Biological Opinion.
- Documentation of ESA consultation and NHPA Section 106 compliance.
- Documentation of no impairment to reserved treaty rights.
- The BPA Project Notification Form.
- Documentation that project meets all conservation measures.
- If applicable, documentation of an approved variance from BPA.
- If applicable, documentation of Section 408 permission.
- If there are proposed impacts to wetlands, a wetland delineation may be required by the Corps.

Corps Review Process: In addition to evaluating the project for consistency with this RGP, the Corps will review a Level 3 project to ensure adequate documentation of compliance with related laws, including, but not limited to:

- Programmatic coverage established in existing Biological Opinions, including, but not limited to, the following Biological Opinions:
 - Programmatic Restoration Opinion for Joint Ecosystem Conservation by the Services (PROJECTS) by the U.S. Fish and Wildlife Service Using the Partners for Fish and Wildlife, Fisheries, Coastal, and Recovery Programs and NOAA Restoration Center Using the Damage Assessment, Remediation and Restoration Program (DARRP), and Community-Based Restoration Program (CRP) in the States of Oregon, Washington, and Idaho, December 3, 2013.
 - Reinitiation of the Endangered Species Act Section 7 Formal Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Aquatic Restoration Activities in the States of Oregon and Washington (ARBO II), April 25, 2013.
- Other review requirements will be the same as for Level 2 projects.

Work in waters of the U.S. may proceed according to the terms of the RGP and other

relevant approvals provided the Corps does not object to the proposed project within 45 days from the date the Corps receives the Level 3 Notification. Any required individual ESA consultation must be complete before a project can be authorized under this RGP. The Corps may require Level 3 Projects to be evaluated as Level 4 Projects, if determined by the Corps Project Manager.

Level 4 Projects

Applicability: Level 4 is intended for projects that require a project-specific determination that environmental impacts are no more than minimal individually and cumulatively or that have outstanding issues regarding related laws that must be addressed prior to the Corps issuing a permit.

Level 4 review is triggered if ANY one of the following apply:

- Affects a designated or nominated Wild and Scenic River corridors and does not have coverage under an existing Section 7(a) written determination; OR
- Does not have local land use approval(s); OR
- The project occurs in a state's coastal zone and does not meet the standard CZM conditions required by this RGP (Attachment 4); OR
- The project is inconsistent with the applicable Section 401 Water Quality Certification associated with this RGP (Attachment 3), or the project is not covered by an existing Section 401 Water Quality Certification; OR
- Alters, occupies, or uses a Corps civil works project, and Section 408 permission has not been granted prior to submittal of an application to the Corps.

Notification Requirements: Project proponents will notify the Corps prior to commencing work in waters of the U.S. Work in waters of the U.S. and **shall not proceed until a Notice-to-Proceed written verification is obtained from the Corps.** The project applicant must provide pre-construction notification to the Corps under a Level 4 Notification. In addition to the basic information requirements, for Level 4 projects the project notification will include the following (attached to the Corps RGP-6 Notification Form):

- The BPA Project Notification Form.
- Documentation of no impairment to reserved treaty rights.
- Documentation that project meets all conservation measures (checklist).
- If there are proposed impacts to wetlands, a wetland delineation may be required by the Corps.

Additional information may be required. The Corps will request this information from the project proponent after completing an initial review of the Corps RGP-6 notification form.

POST-SUBMITTAL VARIANCES

The Corps will receive notification of any variances that occur after Corps approval of a project. Documentation that the variance has been reviewed and approved by the appropriate entities shall be submitted to the Corps in a timely manner and prior to start of work.

ANNUAL MONITORING REPORT

By May 1st of each year, the BPA shall provide an annual program report to the Corps describing projects implemented under the RGP during the previous construction season.

ANNUAL REVIEW

Upon request and as needed, the BPA shall implement an annual coordination meeting with the Corps to discuss the annual program report and any actions that will improve conservation under RGP-6 or make the program more efficient and/or accountable. Representatives from other federal and state agencies and representatives of Native American Tribes may also be invited to attend this meeting.

GENERAL PERMIT CONDITIONS

A. MAINTENANCE. The project proponent must maintain individual projects authorized by this RGP in good condition and in conformance with the terms and conditions of this RGP. A project proponent is not relieved of this requirement if they abandon the individual projects, although they may make a good faith transfer to a third party in compliance with Condition (B), below.

B. PROPERTY TRANSFER. If the permittee sells properties associated with this RGP, the permittee may transfer the verification(s) to the new owner(s) by submitting a letter to the Corps to validate the transfer of the authorization(s). Documentation of the specific authorization must be attached to the letter, and the letter must contain the following statement and signature:

When the structures or work authorized by this regional general permit are still in existence at the time the property is transferred, the terms and conditions of this regional general permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this regional general permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(Transferee)

(Date)

C. CONSERVATION MEASURES AND PROJECT DESCRIPTION. Project proponents shall ensure individual projects implemented under this RGP meet the

requirements of the General Aquatic Conservation Measures Applicable to All Actions, Project Descriptions, and Project-Specific Conservation Measures, in Attachment 1. If terms and conditions identified in the programmatic biological opinions or from an individual biological opinion are more restrictive, then the terms and conditions from the biological opinion shall take precedence.

D. WATER QUALITY CERTIFICATION. The project proponent must comply with the applicable programmatic or individual Water Quality Certification conditions issued by Oregon Department of Environmental Quality (Attachment 3).

E. COASTAL ZONE CONSISTENCY. The project proponent must comply with the conditions of the applicable programmatic or individual concurrence letter issued by Oregon Department of Land Conservation and Development, as appropriate (Attachment 4).

F. ENDANGERED SPECIES ACT COMPLIANCE. No activity is authorized under this permit which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed. Project proponents shall comply with the terms and conditions of the appropriate programmatic or individual biological opinion utilized for the specific project.

G. CULTURAL RESOURCES AND HISTORIC PROPERTIES. BPA is the lead Federal agency for complying with federal cultural resources and historic preservation laws and regulations for the projects within the scope of this RGP, including the National Historic Preservation Act (NHPA). BPA will individually review projects to determine if activities may be located on property registered or eligible for registration in the latest published version of the National Register of Historic Places (NRHP). No individual project shall proceed under the RGP until requirements under federal cultural resources and historic preservation laws and regulations are met. BPA shall take all required actions (including notifying the appropriate tribes) should human burials, cultural resources, or historic properties be discovered during project construction. Project proponents must provide documentation to the Corps, as part of a complete pre or post construction notification, demonstrating BPA's compliance with NHPA Section 106.

H. TRIBAL RIGHTS. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

I. WILD AND SCENIC RIVERS. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

J. NAVIGATION.

a. No activity may cause more than a minimal adverse effect on navigation.

b. The permittee understands and agrees that if future operations by the United States require the removal, relocation, or other alteration of the structure of work herein authorized, or if in the opinion of the Secretary of the Army or their authorized representative said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required upon due notice from the Corps of Engineers to remove, relocate, or alter the structural work or obstructions caused thereby without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

K. COMPLIANCE INSPECTIONS. Compliance inspections may be conducted to ensure that work performed under this general permit is in compliance with its terms and conditions. The District Engineer or their authorized representative will request permission from the property owner for access to the work site. A request for access will be specific as to the date and time of access, and opportunity will be provided for the property owner or his representative to be onsite during the inspection.

L. DISCRETIONARY AUTHORITY. The District Engineer reserves the right to assert discretionary authority on a case-by-case basis when it is determined that individual projects may result in more than minimal impacts, individually or cumulatively, or are otherwise not in the public interest.

M. SUITABLE MATERIAL. No activity may use unsuitable material (e.g. trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

LIMITS OF THIS AUTHORIZATION

- a. This general permit does not obviate the need to obtain other Federal, state or local authorizations required by law.
- b. This general permit does not grant any property rights or exclusive privileges.
- c. This general permit does not authorize any injury to the property or rights of others.
- d. This general permit does not authorize interference with any existing or proposed Federal project.

LIMITS OF FEDERAL LIABILITY

In issuing this permit, the Federal Government does not assume any liability for the following:

- a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
- c. Damages to any persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
- d. Design or construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.

REEVALUATION OF PERMIT DECISION

This general permit will be reviewed by the Corps within one year of its effective date to determine whether the projects authorized by this general permit result in no more than minimal effects, both individually and cumulatively, and to ensure that the terms and conditions of this permit are being met. The District Engineer will invite other interested Federal and state agencies and representatives of Native American Tribes to participate in this review. If this review concludes that changes in permit term or conditions are warranted, modification of the permit will be proposed as provided in 33 CFR 325.7, including public notice and opportunity for comment.

The District Engineer may reevaluate this general permit at any time, and, if appropriate, suspend, modify, or revoke this permit as provided 33 CFR 325.7. The District Engineer may also suspend, modify, or revoke authorization under this general permit for any specific geographic area, class of activities, or class of waters within the state of Oregon. Circumstances that could require a reevaluation include, but are not limited to, the following:

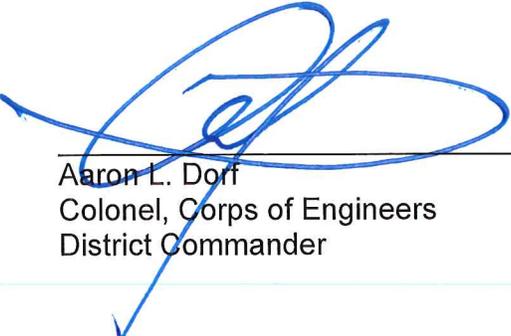
- a. Project proponent fails to comply with the terms and conditions of this RGP.
- b. The information provided by BPA and/or project proponent in support of the RGP application proves to have been false, incomplete, or inaccurate.
- c. Significant new circumstances or information becomes available relevant to environmental concerns and bearing on the proposed action which the Corps did not consider in reaching the original public interest decision.

Such reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.5. These procedures also apply to a third party.

EXPIRATION, MODIFICATION OR REVOCATION OF THIS PERMIT

Activities authorized under this general permit that are under construction or under contract for construction in reliance upon this authorization will remain authorized provide the activity is completed within 12 months of the date of this general permit's expiration, modification, or revocation, unless the District Engineer has exercised his discretionary authority to modify, suspend, or revoke the authorization of a specific project in accordance with Corps regulations.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:



Aaron L. Dorf
Colonel, Corps of Engineers
District Commander

2018-07-31
(Date)

List of Attachments to RGP-6:

ATTACHMENT 1 - GENERAL CONSERVATION MEASURES, PROJECT DESCRIPTIONS, AND DESIGN CRITERIA

ATTACHMENT 2 – CORPS RGP-6 PROJECT NOTIFICATION FORM

(Includes **TABLE 1 – FACTORS FOR DETERMINING THE LEVEL OF NOTIFICATION AND EVALUATION REQUIRED FOR INDIVIDUAL PROJECTS**)

ATTACHMENT 3 - RGP 6 AREA MAP

ATTACHMENT 4 – DLCD LETTER – COASTAL ZONE MANAGEMENT CONSISTENCY

ATTACHMENT 5 – DEQ LETTER – 401 CERTIFICATION

ATTACHMENT 1

RGP-6

GENERAL CONSERVATION MEASURES, PROJECT DESCRIPTIONS, AND PROJECT-SPECIFIC CONSERVATION MEASURES

Please use the following link to find the current version of the Bonneville Power Administration's Habitat Improvement Program Programmatic Biological Opinions (HIP) and Handbook to access the general conservation measures, project descriptions, and project-specific conservation measures.

www.bpa.gov/goto/ESA

Corps RGP-6 Notification Form

Regional General Permit 6 for BPA-Funded Habitat Improvement Projects within the Columbia River Basin

To be filled out by project proponent:

To be filled out by Corps:

Project Proponent:	Corps #: NWP - -
Project Name:	Date Received:

Note: This form provides supplemental information necessary for the Corps to quickly review projects. This form must be accompanied by one of the following permit applications:

- U.S. Army Engineering Form 4345 (<http://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Obtain-a-Permit/>)
- Joint Permit Application (JPA) (<http://www.oregon.gov/dsl/WW/Documents/JPA121217Final.docx>)

Required Information

Items noted by ● required information or documentation in addition to that provided on the permit application

Contact Information

- Proponent's Contact Info (*provide on accompanying permit application*)
- Name of BPA Environmental Compliance Lead:
Phone Number:

Project Location

- Location Description (*provide on accompanying permit application*)
- Location Map

Project Summary

- Project Description (*provide on accompanying permit application*)
- Legible and accurate plan and profile drawings

Regional General Permit Requirements

- Does the project meet the general and project-specific conservation measures described in Attachment 1 of the RGP (*or is an approved variance attached*)?
 - Yes
 - No → **RGP Level 4 ***
- Do you propose to alter, occupy, or use a Corps civil works project?
 - No
 - Yes → **RGP Level 4 ***

Endangered Species Act (ESA)

- Select from the following options:
 - No Effect** (*provide "No Effect" determination memo or email from BPA Environmental Compliance Lead*)
 - Within scope of **Habitat Improvement Project (HIP) BiOp** → **RGP Level 2**
Date of BPA Review:
 - Other ESA coverage → **RGP Level 3**
 - Programmatic Consultation(s)
Title(s):
 - Individual Consultation(s) (*BiOp(s) attached*) → **RGP Level 3**

Cultural Resources & Coordination

- Provide documentation of completed Section 106 from BPA (*provide concurrence or other letters from SHPO and/or effects determination letter/memo from BPA*)
- Provide documentation of completed coordination with interested Tribes, including documentation of no impairment to reserved treaty rights

Corps RGP-6 Notification Form

Regional General Permit 6 for BPA-Funded Habitat Improvement Projects within the Columbia River Basin

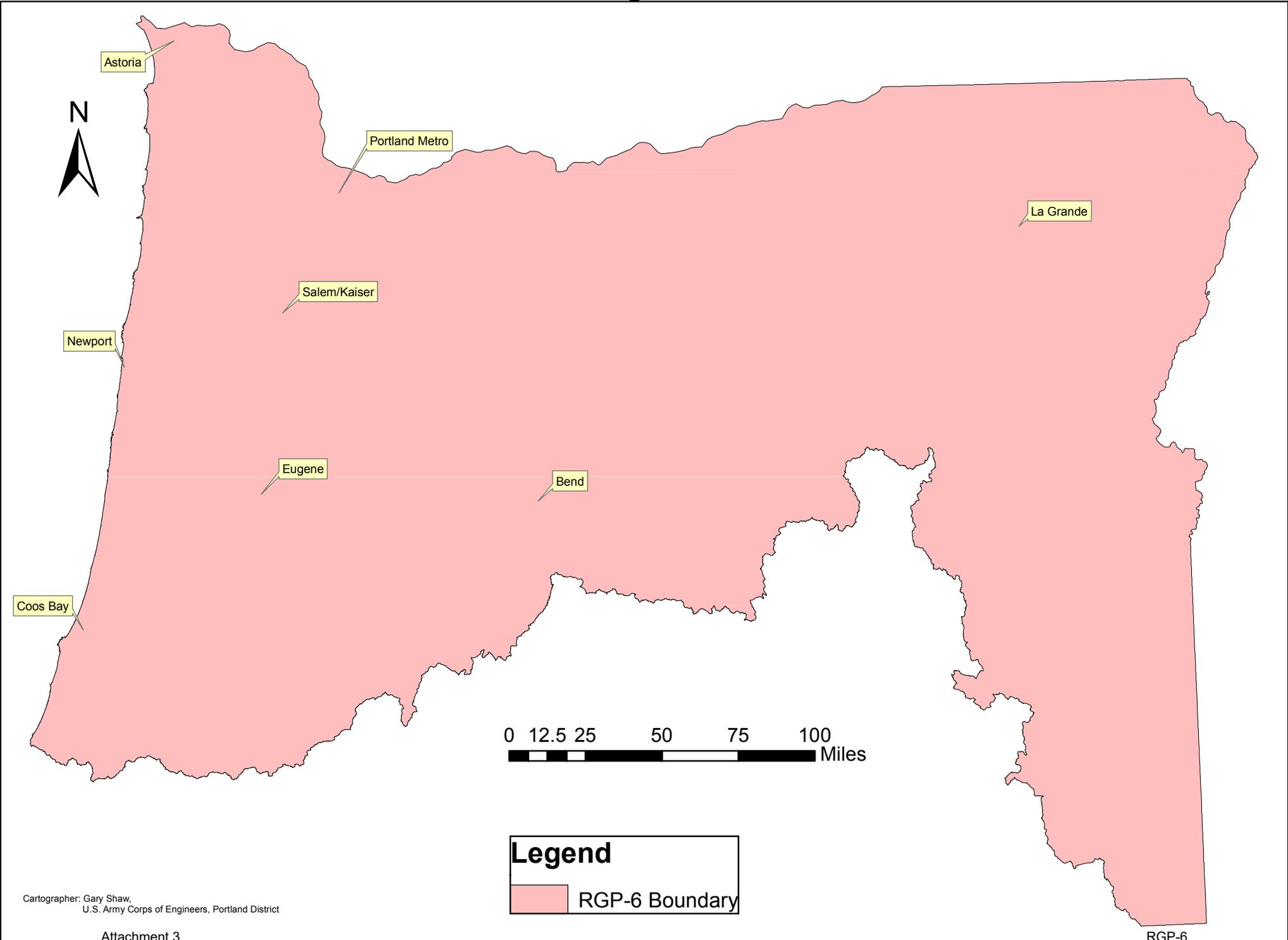
Wild and Scenic Rivers Act	<ul style="list-style-type: none">• Select <u>one</u> of the following options:<ul style="list-style-type: none"><input type="checkbox"/> The project is <u>not</u> in a Wild and Scenic River corridor<input type="checkbox"/> BPA completed consultation with the managing agency (<i>documentation attached</i>)
Land Use Compatibility <input type="checkbox"/> Check this box if the project is within the Columbia River Gorge National Scenic Area	<ul style="list-style-type: none">• For projects within the State of Oregon only, select <u>one</u> of the following options: (<i>provide appropriate documentation with signatures from local land use authority</i>)<ul style="list-style-type: none"><input type="checkbox"/> Land use compatibility is documented in the Joint Permit Application (Block 11)<input type="checkbox"/> Land use compatibility has not yet been determined → RGP Level 4 *

* Note: Projects for which ESA or § 106 documentation is not provided will be treated as Level 4 reviews. Projects subject to Level 4 review shall not proceed until the Corps has issued a project-specific authorization.

Table 1. Factors for determining the level of notification and evaluation required for individual projects.

	Level 1	Level 2	Level 3	Level 4
Activity Types	<p>Only applies to projects that:</p> <ul style="list-style-type: none"> • Do <u>not</u> impact > 0.1 ac of wetland nor > 300 linear ft of stream • Do <u>not</u> convert a stream or natural wetland to another aquatic habitat type 	No specific limits other than those prescribed by conditions of the RGP		Required for projects that cannot implement applicable conservation measures and practices
Endangered Species Act / Essential Fish Habitat	No effect	Effects addressed via use of the current BPA HIP Biological Opinion	Effects addressed via a current non-BPA/non-Corps programmatic consultation or an individual consultation	Effects addressed via a programmatic consultation or individual consultation
Cultural Resources	No effect	Documentation of completed § 106 consultation provided with RGP Notification Form		§ 106 consultation has <u>not</u> been completed
Wild and Scenic Rivers (WSR) Act	No effect	Documentation of completed § 7(a) determination is provided with RGP Notification Form (if applicable)		Affects a WSR corridor, and § 7(a) determination has not been completed
Coastal Zone Management Act	Not within coastal zone	Meets standard CZM conditions (if applicable)		Occurs in a state's coastal zone and does <u>not</u> meet the standard CZM conditions; or advance concurrence is not available
Land Use Compatibility	Not applicable	Has local land use approval		Does not have local land use approval
Section 401 Water Quality Certification	Meets conditions of applicable Water Quality Certification (WQC; issued by Oregon Dept. of Environmental Quality)			No applicable WQC, or does not meet conditions of applicable WQC

USACE, Portland District Regional General Permit 6 Area



Cartographer: Gary Shaw,
U.S. Army Corps of Engineers, Portland District

Standard Oregon Coastal Management Program (OCMP) Coastal Zone Conditions

The federal Coastal Zone Management Act provides that federal actions affecting any use or resource of the coastal zone,* including projects permitted by the U.S. Army Corps of Engineers (USACE), must be consistent with the enforceable policies of a State's federally approved coastal management program. Oregon's approved program, the Oregon Coastal Management Program (OCMP), is a "networked" program that integrates authorities of local governments and other state agencies. The coastal zone conditions contained in this document reflect the networked nature of the OCMP, and reference the specific applicable enforceable policies.

In addition to all USACE national and regional permit conditions, permitted projects in Oregon's coastal zone must comply with the following coastal zone conditions.

If an applicant chooses not to follow one or more of the coastal zone conditions, DLCDC will object to the permit issuance pursuant to 15 CFR § 930.63(e). In that instance, the permittee may appeal the state's objection by requesting that the Secretary of Commerce override the objection pursuant to 15 CFR 930, subpart H, within 30 days of receipt of the letter informing the applicant of the OCMP's objection. In order to grant an override request, the Secretary must find that the activity is consistent with the objectives or purposes of the Coastal Zone Management Act, or is necessary in the interest of national security. A copy of the request and supporting information must be sent to the OCMP and the USACE. The Secretary may collect fees from the permittee for administering and processing the override request.

*Oregon's coastal zone generally includes the area lying between the Oregon/Washington border on the north, to the Oregon/California border on the south, seaward to the extent of the state's jurisdiction as recognized by federal law, and inland to the crest of the Coast Range Mountains, excepting:

- (a) The Umpqua River basin, where the coastal zone extends to Scottsburg;
- (b) The Rogue River basin, where the coastal zone extends to Agness; and
- (c) The Columbia River basin, where the coastal zone extends to the downstream end of Puget Island.

CZ Condition 1. Consistency with Local Comprehensive Plans

(1) Permitted projects must be consistent with or not subject to the applicable local comprehensive plan and implementing land use regulations, including the applicable estuary management plan, or the statewide land use planning goals where applicable. Permittee must obtain required permits or other authorizations from the applicable local government before initiating work under any USACE permit. Permittee must provide USACE and the OCMP with verification of the local jurisdiction's approval in the form of a completed block seven (7) of the Joint Permit Application. All appeals of the local jurisdiction's decision(s) must be resolved before any regulated work may begin.

(2) All conditions placed on an authorization or permit by the local government are incorporated by reference into the OCMP coastal zone conditions.

[Enforceable Policy: ORS chapter 197, Comprehensive Land Use Planning Coordination]

CZ Condition 2. Consistency with Removal-Fill Law

(1) Permitted projects must be consistent with or not subject to the state requirements governing removal-fill in waters of the state. Permittee must obtain required permits or other authorizations from the Oregon Department of State Lands (DSL) before any regulated work may begin.

(2) Projects requiring a DSL removal-fill permit must compensate for reasonably expected adverse impacts by complying to the full extent with DSL's compensatory mitigation requirements.

(3) Where DSL finds a project not subject to the Removal/Fill Law, permittee must submit to DSL any changes in project design or implementation that may reasonably be expected to require application of the Removal/Fill Law.

(4) All conditions placed on a Removal-Fill permit by DSL are incorporated by reference into the OCMP coastal zone conditions.

[Enforceable Policy: ORS chapter 196, Removal of Material; Filling]

CZ Condition 3. Leases of State Lands

(1) Permitted projects must be consistent with or not subject to state requirements governing use of state lands. Permittee must obtain any required lease, license, or other authorization for the use of state lands or waters from the Oregon Department of State Lands (DSL) before any regulated work may begin.

(2) All conditions placed on a lease, license, or authorization by DSL are incorporated by reference into the OCMP coastal zone conditions.

[Enforceable Policy: ORS chapter 274, Submersible and Submerged Lands]

CZ Condition 4. Department of Environmental Quality

(1) Permitted projects must be consistent with or not subject to the state requirements governing water quality. Permittee must obtain certification, if required, from the Oregon Department of Environmental Quality (DEQ) through its 401 Water Quality Certification process before any regulated work may begin.

(2) All conditions placed on a license, permit, or authorization by DEQ are incorporated by reference into the OCMP coastal zone conditions.

[Enforceable Policy: ORS chapter 468B, Water Quality]

CZ Condition 5. Fish and Aquatic Life Passage

(1) Where applicable, all authorized projects shall be in conformance with ODFW standards for fish passage (<http://www.dfw.state.or.us/fish/passage/>). Decisions to abrogate ODFW fish passage standards shall be accompanied by written approval from ODFW.

(2) No work shall be authorized that does not provide for adequate passage of "aquatic life." Aquatic life shall be interpreted to include amphibians, reptiles, and mammals whose natural habitat includes waters of this state and which are generally present in or around, or pass through the project site.

(3) This condition is effective only where ODFW regulations apply.

[Enforceable Policy: ORS chapter 509, Additional Fishery Requirements]

CZ Condition 6. Ocean Shore

(1) Permitted projects must be consistent with or not subject to state requirements governing use of the ocean shore. Permittee must obtain, if required, an ocean shore permit from the Oregon Parks and Recreation Department (OPRD) before any regulated work may begin.

(2) All conditions placed on an Ocean Shore permit by OPRD are incorporated by reference into the OCMP coastal zone conditions.

[Enforceable Policy: ORS chapter 390, Ocean Shores]

CZ Condition 7. Aquaculture

(1) Permitted projects must be consistent with or not subject to state requirements governing commercial aquaculture or mariculture cultivation of oysters, clams, and mussels. Permittee must obtain, if required, authorization from the Oregon Department of Agriculture (ODA) for use of state submerged and submersible lands for aquaculture purposes.

(2) All conditions placed on an aquaculture or mariculture operation by the ODA are incorporated by reference into the OCMP coastal zone conditions.

[Enforceable Policy: ORS chapter 622, Shellfish]



April 6, 2018

Daniel Gambetta –ECF4
Bonneville Power Administration
905 NE 11th Avenue
Portland, OR 97232

RE: 401 Water Quality Certification for Reissuance of Regional General Permit #6 with Modifications for Bonneville Power Administration Funded Habitat Improvement Projects - USACE #2011-00127-1

Dear Mr. Gambetta:

The Department of Environmental Quality (DEQ) has reviewed the US Army Corps of Engineers (USACE) public notice materials on the above noted proposal, submitted for evaluation for 401 Water Quality Certification (WQC), and received on January 18, 2017. Project proponents will be funded by Bonneville Power Administration (BPA) to undertake recurring actions, with minor individual and cumulative impacts to waters of the state, that are designed to maintain, enhance, create, and/or restore watershed functions to benefit fish, aquatic organisms, water quality, riparian areas, floodplains, and wetlands in the Columbia River Basin of Oregon.

Project Location: The project activity is limited to the Columbia River Basin within the State of Oregon.

Project Background: The Regional General Permit (RGP) 6 was first issued a water quality certification on June 2, 2011. Originally, the RGP included the following categories:

- Surveying, Construction, Operation, and Maintenance Activities:
- Planning and Habitat Protection Actions
- Instream Habitat Actions
- Livestock Impact Reduction
- Irrigation and Water Delivery/Management Actions

The original RGP is being modified to expand and clarify the habitat restoration activities to follow the categories from the BPA Habitat Improvement Program biological opinions issued from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service.

Nine categories are being proposed:

1. Fish Passage Restoration
 - Profile Discontinuities
 - a. Dams, water control, or legacy structure removal
 - b. Consolidate or replace existing irrigation diversions

- c. Headcut and grade stabilization
- d. Low flow consolidation
- e. Providing fish passage at an existing facility

Transportation Infrastructure

- f. Bridge and culvert removal and replacement
- g. Bridge and culvert maintenance
- h. Installation of fords

2. River, Stream, and Wetland Restoration
 - a. Improve secondary channel and floodplain interactions
 - b. Set-back or removal of existing berms, dikes, and levees
 - c. Protect streambanks using bioengineering methods
 - d. Install habitat-forming natural instream structures (large wood, boulders, and spawning gravel)
 - e. Riparian vegetation planting
 - f. Channel reconstruction
 - g. Beaver habitat restoration
3. Invasive and Non-Native Plant Control
 - a. Manage vegetation using physical controls
 - b. Manage vegetation using herbicides (Riverine)
 - c. Manage vegetation using herbicides (Estuarine)
 - d. Juniper removal
4. Road and Trail Erosion Control, Maintenance, and Decommissioning
 - a. Maintain roads
 - b. Decommission roads
5. Piling Removal
6. In-Channel Nutrient Enhancement
7. Irrigation and Water Delivery/Management Actions
 - a. Convert delivery system to drip or sprinkler irrigation
 - b. Convert water conveyance from open ditch to pipeline or line leaking ditches or canals
 - c. Convert from instream diversions to groundwater well for primary water sources
 - d. Install or replace return flow cooling systems
 - e. Install irrigation water siphon beneath waterway
 - f. Livestock watering facilities
 - g. Install, upgrade, or maintain fish exclusion devices and bypass
8. Fisheries, Hydrologic, and Geomorphologic Surveys
9. Special Actions (for Terrestrial Species)
 - a. Install/develop wildlife structures
 - b. Fencing construction for livestock control
 - c. Implement erosion control practices
 - d. Plant vegetation

e. Tree removal for large woody projects

Individual project proposals will be further categorized into one of four levels based on potential environmental consequences. Each project level will have specific notification requirements to initiate USACE review and varying requirements related to endangered species protection based on the terms and conditions of a an existing programmatic or individual biological opinion. Further conditions may be placed on a project due to requirements of Section 106 of the National Historic Preservation Act.

Status of Affected Waters: Activities proposed as part of this RGP #6 could affect any water of the state in the Columbia River Basin; waters of the state are defined in ORS 468B.005 as lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters) that are located wholly or partially within or bordering the state or within its jurisdiction.

High Quality Waters include the Clackamas River, the North Santiam River, and the McKenzie River (above river mile 15), as described in DEQ's Three Basin Rule (OAR 340-041-0350). Water Quality Limited Waters include all waterbodies listed as impaired, including those for which a Total Maximum Daily Load (TMDL) has been developed to address impairments.

All other streams in the Columbia River Basin and the Willamette River Subbasin are not Outstanding or High Quality waters; rather, they are classified as Water Quality Limited under the federal Clean Water Act (CWA). US Environmental Protection Agency (EPA) approved TMDLs have been developed for several parameters and many streams remain on the CWA Section 303(d) list of impaired waterbodies. A detailed listing of water quality limiting parameters can be found at <http://www.deq.state.or.us/wq/assessment/rpt2012/search.asp#db>.

The Portland Harbor Superfund Site has been designated by EPA, initiating an assessment and remediation process to address widespread legacy contamination present in the lower reaches of the Willamette River. Areas targeted for cleanup span from approximately river mile 0 to 12, with areas of interest continuing to approximately river mile 14.

Beneficial Use Designations: In the Columbia River and the Willamette River, these include: Water Supply (Public, Private, Industrial); Livestock Watering; Irrigation; Fish and Aquatic Life (salmonid rearing; anadromous fish passage; resident fish and aquatic life); Wildlife and Hunting; Fishing; Boating; Water Contact Recreation; Aesthetic Quality; and Commercial Navigation & Transportation, and all but Commercial Navigation & Transportation also apply to the other streams within the subbasins.

The Lower Columbia River and its side channels are designated by DEQ as salmon and steelhead migration corridors from the mouth at the Pacific Ocean to river mile 309, with regard to application of the water quality standard for temperature. Areas above river mile 140 are also designated as salmon and steelhead spawning and shad and sturgeon spawning and rearing fish uses. Other streams within the subbasin are designated for salmon and trout rearing and migration.

The Lower Willamette River is designated as a salmon and steelhead migration corridor and other streams within the subbasin are designated for salmon and trout rearing and migration.

Certification Decision: Based on information provided by BPA and USACE, DEQ is reasonably assured that implementation of the proposed restoration actions will be consistent with applicable provisions of Sections 301, 302, 303, 306, and 307 of the federal CWA, state water quality standards set forth in Oregon Administrative Rules (OAR) Chapter 340 Division 41, and other appropriate requirements of state law, provided the applicant strictly adheres to the procedures, conditions and best management practices as described in the public notice and subsequent materials and the following conditions are made part of the federal permit and strictly adhered to by the project proponents.

CONDITIONS

- 1) **Duration of Certificate:** This 401 WQC is valid for five years from the date of issuance of the USACE 404 permit. A new 401 WQC must be obtained prior to any substantial modification of the USACE 404 permit.
- 2) **Work Authorized:** Work authorized by this 401 WQC is limited to the work described in the USACE Public Notice dated January 18, 2017 and additional application materials (hereafter "the permit application materials"), unless otherwise authorized by DEQ. If the project is operated in a manner not consistent with the project description contained in the permit application materials, the Applicant is not in compliance with this 401 WQC and may be subject to enforcement.
- 3) In accordance with OAR 340-048-0050, DEQ may modify or revoke this 401 WQC if project activities are having an adverse impact on state water quality or beneficial uses, or if the Applicant is otherwise in violation of the conditions of this certification.
- 4) The Applicant and its contractors must allow DEQ access to the project site, staging areas, and mitigation sites to monitor compliance with these 401 WQC conditions, including:
 - a. Access to any records, logs, and reports that must be kept under the conditions of this 401 WQC;
 - b. To inspect best management practices (BMPs), monitoring or operational equipment or methods; and
 - c. To collect samples or monitor any discharge of pollutants.
- 5) Failure of any person or entity to comply with this Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce its terms.
- 6) **Land Use Compatibility Statement:** In accordance with OAR 340-048-0020(2) (i), each Applicant must submit findings prepared by the local land use jurisdiction that demonstrates the activity's compliance with the local comprehensive plan. Such findings can be submitted using the appropriate section of the USACE & DSL Joint Permit Application, signed by the appropriate local official and indicating:
 - a. "This project is consistent with the comprehensive plan and land use regulations;" or,
 - b. "This project will be consistent with the comprehensive plan and land use regulations when the following local approvals are obtained," accompanied by the obtained local approvals.

- c. Rarely, such as for federal projects on federal land, "this project is not regulated by the comprehensive plan" will be acceptable.

In lieu of submitting the appropriate section of the USACE & DSL Joint Permit Application, the Applicant may use DEQ's Land Use Compatibility Statement form found at:

<http://www.deq.state.or.us/pubs/permithandbook/lucs.pdf>

- 7) **Erosion and Sediment Control:** During construction, erosion and sediment control measures must be implemented to prevent or control movement of sediment, soil or pollutants into waters of the state. The Applicant is required to develop and implement an effective erosion and sediment control plan. **Any project that disturbs more than one acre is required to obtain an NPDES 1200-C construction stormwater permit from DEQ.** In addition, the Applicant (or responsible party) must:
 - a. Where practicable, use removable pads or mats to prevent soil compaction at all construction access points through, and staging areas in, riparian or wetland areas to prevent soil compaction.
 - b. Demarcate wetlands not specifically authorized to be impacted to protect from disturbance and/or erosion.
 - c. Place dredged or other excavated material on upland areas with stable slopes to prevent materials from eroding back into waterways or wetlands. Place BMPs as necessary to stabilize and prevent erosion.
- 8) **Spill Prevention:** Applicant must fuel, operate, maintain and store vehicles, and must store construction materials, in areas that will not impact water quality either directly or due to potential discharges.
- 9) **Spill & Incident Reporting:**
 - a. In the event that petroleum products, chemicals, or any other deleterious materials are discharged into state waters, the discharge must be promptly reported to the Oregon Emergency Response Service (OERS, 1-800-452-0311). Containment and cleanup must begin immediately and be completed as soon as practicable.
 - b. If the project operations result in distressed or dying fish, the operator must immediately: cease operations; take appropriate corrective measures to prevent further environmental damage; and immediately notify DEQ and ODFW.
- 10) **Vegetation Protection and Site Restoration:**
 - a. Applicant must protect riparian, wetland, and shoreline vegetation in the authorized project area from disturbance through one or more of the following:
 - i. Minimization of project and impact footprint;
 - ii. Designation of staging areas and access points in open, upland areas;
 - iii. Fencing and other barriers demarking construction areas; and
 - iv. Use of alternative equipment (e.g., spider hoe or crane).
 - b. If authorized work results in any vegetative disturbance and the disturbance has not been accounted for in planned mitigation actions, the Applicant must successfully reestablish vegetation to a degree of function equivalent or better than before the disturbance.

- 11) The Applicant shall avoid and protect from harm, all wetlands and riparian areas located within 50 feet of USACE jurisdictional waters, unless proposed, necessary, and approved as part of the project. If a local jurisdiction has a more stringent buffer requirement, that requirement will override this certification requirement.

FOR PROJECTS THAT PROPOSE IN-STREAM WORK IN JURISDICTIONAL WATERS

- 12) **Fish protection/Oregon Department of Fish and Wildlife timing:** The Applicant must perform in-water work only within the Oregon Department of Fish and Wildlife preferred time window as specified in the *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, or as authorized otherwise under a USACE permit and/or Department of State Lands removal/fill permit. Exceptions to the timing window must be recommended by Oregon Department of Fish and Wildlife, the National Marine Fisheries Services and/or the US Fish and Wildlife as appropriate.
- 13) **Aquatic life movements:** Any activity that may disrupt the movement of aquatic life living in the water body, including those species that normally migrate through the area, is prohibited. The Applicant must provide unobstructed fish passage at all times during any authorized activity, unless otherwise approved in the approved application.
- 14) **Turbidity:** The Applicant must implement appropriate Best Management Practices (BMPs) to minimize turbidity during in-water work. Any activity that causes turbidity to exceed 10% above natural stream turbidity is prohibited except as specifically provided below:
- a. **Monitoring:** Turbidity monitoring must be conducted and recorded as described below. Monitoring must occur at four hour intervals each day during daylight hours when in-water work is being conducted. A properly calibrated turbidimeter is required **unless another monitoring method is proposed and authorized by DEQ.**
 - i. **Representative Background Point:** Applicant must take and record a turbidity measurement every four hours during in-water work at an undisturbed area. A background location shall be established at a representative location approximately 100 feet upcurrent of the in water activity unless otherwise authorized by DEQ. The background turbidity, location, date, tidal stage (if applicable) and time must be recorded immediately prior to monitoring downcurrent at the compliance point described below.
 - ii. **Compliance Point:** The Applicant must monitor every four hours. A compliance location shall be established at a representative location:
 - a) 50 feet downstream for streams that are less than 30 feet wide;
 - b) 100 feet downstream for streams between 30 and 100 feet wide;
 - c) 200 feet downstream for streams greater than 100 feet wide; and
 - d) 300 feet from the discharge point or nonpoint source for locations subject to tidal or coastal scour.
 - iii. The turbidity, location, date, tidal stage (if applicable) and time must be recorded for each measurement.
 - b. **Compliance:** The Applicant must compare turbidity monitoring results from the compliance points to the representative background levels taken during each four –

hour monitoring interval. Pursuant to OAR 340-041-0036, short term exceedances of the turbidity water quality standard are allowed as follows:

MONITORING WITH A TURBIDIMETER EVERY 4 HOURS	
TURBIDITY LEVEL	Restrictions to Duration of Activity
0 to 4 NTU above background	No Restrictions
5 to 29 NTU above background	Work may continue maximum of 4 hours. If turbidity remains 5-29 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-5 above background.
30 to 49 NTU above background	Work may continue maximum of 2 hours. If turbidity remains 30-49 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-5 above background.
50 NTU or more above background	Stop work immediately and inform DEQ

- c. **Reporting:** Applicant must record all turbidity monitoring required by subsections (a) and (b) above in daily logs. The daily logs must include calibration documentation; background NTUs; compliance point NTUs; comparison of the points in NTUs; location; date; time; and tidal stage (if applicable) for each reading. Additionally, a narrative must be prepared discussing all exceedances with subsequent monitoring, actions taken, and the effectiveness of the actions. Applicant must make available copies of daily logs for turbidity monitoring to BPA, DEQ, USACE, NMFS, USFWS, and ODFW upon request.
- d. **BMPs to Minimize In-stream Turbidity:** The Applicants must implement the following BMPs, unless otherwise accepted by DEQ:
 - i. Sequence/Phasing of Work – The Applicant must schedule work activities so as to minimize in-water disturbance and duration of in-water disturbances;
 - ii. Bucket control - All in-stream digging passes by excavation machinery and placement of fill in-stream using a bucket must be completed so as to minimize turbidity. All practicable techniques such as employing an experienced equipment operator, not dumping partial or full buckets of material back into the wetted stream, adjusting the volume, speed, or both of the load, or using a closed-lipped environmental bucket must be implemented;
 - iii. The Applicant must limit the number and location of stream-crossing events. Establish temporary crossing sites as necessary in the least sensitive areas and amend these crossing sites with clean gravel or other temporary methods as appropriate;
 - iv. Machinery may not be driven into the flowing channel, unless authorized by DEQ; and

- v. Excavated material must be placed so that it is isolated from the water edge or wetlands, and not placed where it could re-enter waters of the state uncontrolled.

FOR PROJECTS THAT INCLUDE NEW IMPERVIOUS SURFACES OR REDEVELOPMENT OF EXISTING SURFACES, THE FOLLOWING CONDITIONS APPLY

- 15) **Post-Construction Stormwater Management:** For projects which propose new impervious surfaces or the redevelopment of existing surfaces, the Applicant must submit a post-construction stormwater management plan to DEQ for review and approval prior to construction, in order to ensure compliance with water quality standards. The Applicant must implement BMPs as proposed in the stormwater management plan, including operation and maintenance. If proposed stormwater facilities change due to site conditions, the Applicant must notify DEQ.

In lieu of a complete stormwater management plan, the Applicant may submit documentation of acceptance of the stormwater into a DEQ permitted National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Separate Storm Sewer System (MS4).

- 16) **Stormwater Management & System Maintenance:** The Applicant is required to implement effective operation and maintenance practices for the lifetime of the proposed facility.

If USACE or BPA is dissatisfied with the conditions contained in this certification, a hearing may be requested. Such request must be made in writing to DEQ's Office of Compliance and Enforcement at 811SW 6th Avenue, Portland Oregon 97204, within 20 days of the mailing of this certification.

If you have any questions, please contact Sara Christensen at (541) 633-2007, or by email at: christensen.sara@deq.state.or.us.

Sincerely,



Steve Mrazik
Water Quality Manager
Northwest Region

ec: Carrie Bond, USACE
Jamie Davis, USACE
Liz Ruther, DLCD



FIELD DATA REPORT **Date:** 08/27/2021

Project Name; US30 MP 212 Project# ST_1

General Location: About 17 feet from coordinates given: N729105.20, E7604326.16. Discrepancy was due to pothole target mark on road.

Crew/Truck: Trey, Jamison, Peter, Jesse/4687, 1461

FIELD USE ONLY

Pictures:

Target Utility: Storm Before: Yes

Utility Found: Storm Board: N/A

Material of Utility: Concrete Utility: Yes

General Condition of Utility: Good After: Yes

Width or diameter of Utility: 12 inches

Surface Description: Hard

Thickness of Pavement: 7 inches

Thickness of Base Course: NA

Top of Utility 53 inches

Bottom of Utility 65 inches

Description of Soil: Rocky. With large rocks

Completed By: Peter Checked By: Jesse King

Remarks: 12" ID of pipe taken from manhole opening.

Pothole Pictures

Before Dig





Pothole Excavated

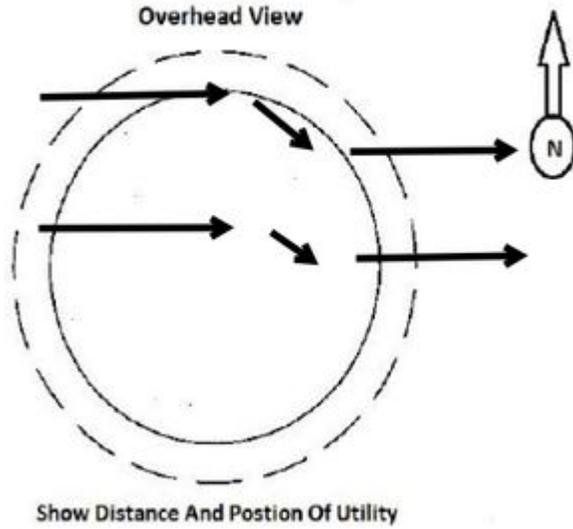
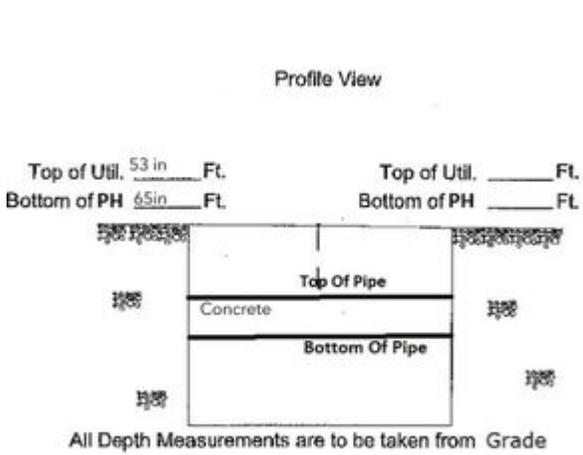




Pothole Patched



Field Annotations:



Supplemental Photos



Project Name: US30 MP 212 Project# C_1(C_2)

General Location: 17 feet down road from coordinates; N729101.85, E7604321.99. To Be aligned with Pothole target mark made on road.

Crew/Truck: Trey, Jamison, Peter, Jesse/4687, 1461

FIELD USE ONLY

Pictures:

Target Utility: Communications Before: Yes

Utility Found: Communications Board: N/A

Material of Utility: PVC Utility: Yes

General Condition of Utility: Good After: Yes

Width or diameter of Utility: 2 inches

Surface Description: Soft

Thickness of Pavement: NA inches

Thickness of Base Course: NA

Top of Utility 21 inches

Bottom of Utility 29 inches

Description of Soil: Large rocks with clay type soil

Completed By: Jesse Checked By: Jesse King

Remarks: 6 inch concrete slab on top of com line per com oversight knowledge.

Pothole Pictures

Before Dig



Pothole Excavated

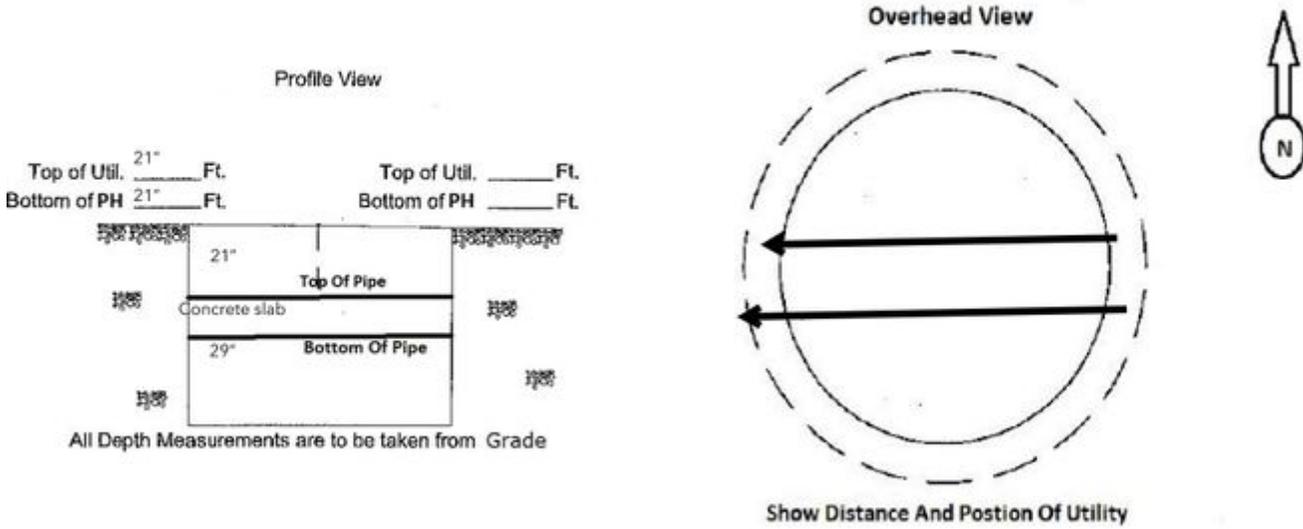




Pothole Patched



Field Annotations:



Supplemental Photos





FIELD DATA REPORT **Date:** 09/01/2021

Project Name; US30 MP 212 Project# W_1

General Location: About 14 feet down road from coordinates: N729147.65, E7604379.00 Wanted to be inline with potholes made on Eastbound side of US 30.

Crew/Truck: Trey, Jamison, Josue, Peter, Jesse/4687, 1461

FIELD USE ONLY

Pictures:

Target Utility: Water Before: Yes

Utility Found: Water Board: N/A

Material of Utility: PVC Utility: Yes

General Condition of Utility: Good After: Yes

Width or diameter of Utility: 12 inches

Surface Description: Soft

Thickness of Pavement: 8 inches

Thickness of Base Course: NA

Top of Utility 34 inches

Bottom of Utility 46 inches

Description of Soil: Hard

Completed By: Peter Checked By: Jesse King

Remarks: _____

Pothole Pictures

Before Dig



Pothole Excavated

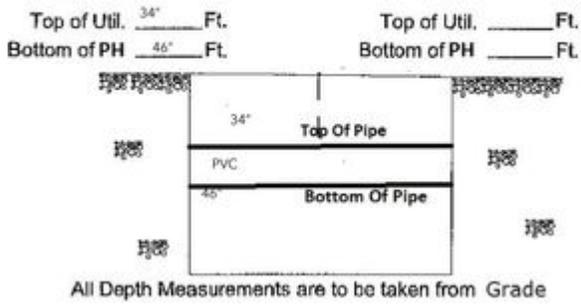


Pothole Patched

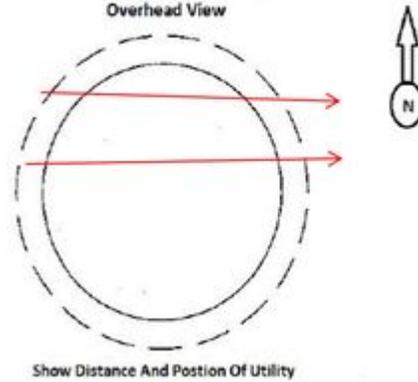


Field Annotations:

Profile View



Overhead View



Supplemental Photos

