

APPENDIX C

GEOTECHNICAL REPORTS



HWA GEOSCIENCES INC.

Geotechnical Engineering • Hydrogeology • Geoenvironmental Services • Inspection and Testing

TECHNICAL MEMORANDUM

TO: Jennifer Dvorak, P.E. / Parametrix

PREPARED BY: Brad Thurber, L.E.G., Bryan Hawkins, P.E. / HWA GeoSciences Inc.

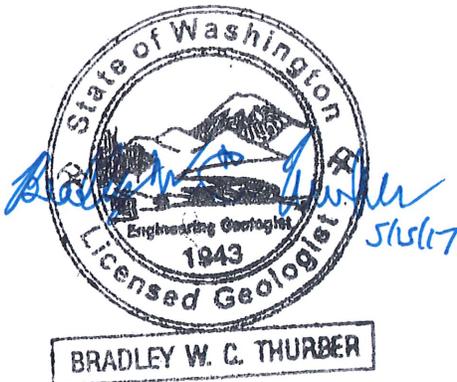
SUBJECT: **Additional Deep Mixing Columns Under Bridge Abutments
Black River Bridge
Lake to Sound Trail
Renton, Washington**

PROJECT NO.: 2010-100 T200

DATE: May 15, 2017

The purpose of this memo is to clarify the need for additional deep mixing columns beneath the proposed bridge abutment footings. The geotechnical report dated October 3, 2016 in Section 4.4.1 notes that bridge footings supported on ground treated with DMM (Deep Mixing Method) can be designed for a bearing capacity of 12,000 psf, and that all footing areas should be treated with DMM. However, it was not clear in the text that columns in addition to the overall pattern of DMM treatment would be necessary.

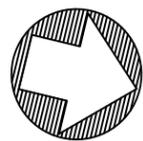
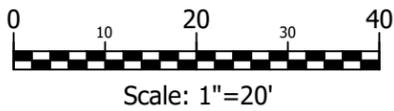
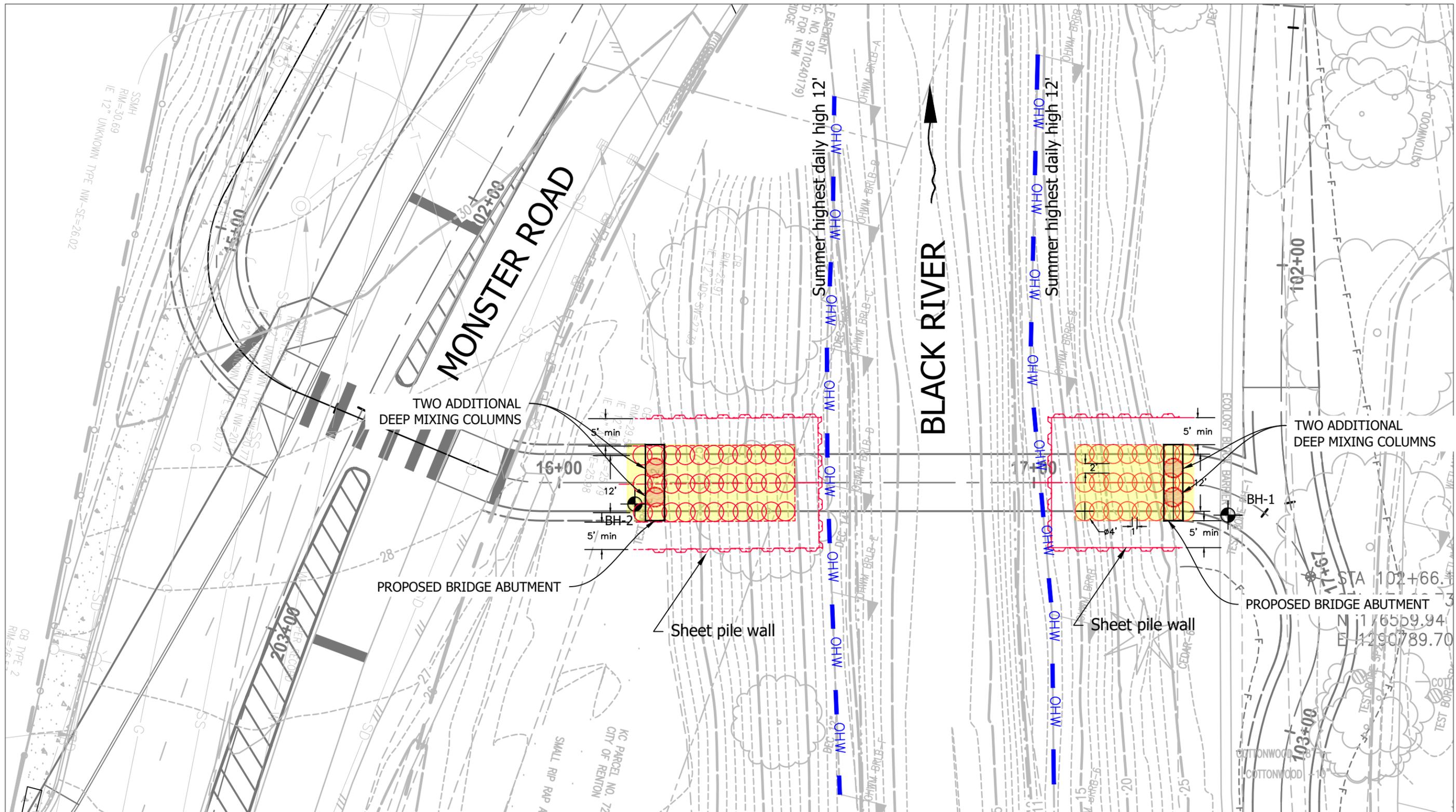
We recommend that two DMM columns be installed beneath each abutment, in addition to the stated pattern of rows of DMM columns. The additional columns should be centered under the axis of each abutment, and centered between the proposed rows of columns, such that each abutment footing will be entirely supported on DMM treated soil (see revised Figure 4, attached).



Brad W. Thurber, L.G., L.E.G.
Senior Engineering Geologist



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BH-2
BORING APPROXIMATE LOCATION AND DESIGNATION



HWA GeoSCIENCES INC.

BLACK RIVER BRIDGE
LAKE TO SOUND TRAIL
RENTON, WASHINGTON

PROPOSED GROUND
IMPROVEMENT AREAS

DRAWN BY
EFK
CHECK BY
BT
DATE:
05.15.07

FIGURE #
4
PROJECT #
2010-100
TASK 200

**FINAL GEOTECHNICAL REPORT
Lake to Sound Trail
Segment A – Black River Bridge
Renton, Washington**

HWA Project No. 2010-100-21 Task 200

**Prepared for
Parametrix, Inc.**

October 3, 2016



HWA GEOSCIENCES INC.

- *Geotechnical Engineering*
- *Hydrogeology*
- *Geoenvironmental Services*
- *Inspection & Testing*



HWA GEOSCIENCES INC.

Geotechnical & Pavement Engineering • Hydrogeology • Geoenvironmental • Inspection & Testing

October 3, 2016
HWA Project No. 2010-100-21 Task 200

Parametrix, Inc.
719 2nd Avenue, Suite 200
Seattle, Washington 98104

Attention: Ms. Jenny Bailey

Subject: **FINAL GEOTECHNICAL REPORT
LAKE TO SOUND TRAIL
SEGMENT A - BLACK RIVER BRIDGE
RENTON, WASHINGTON**

Dear Jenny:

Enclosed is the final geotechnical report for the proposed Black River Bridge on Segment A of the Lake to Sound Trail in Renton, Washington. To stabilize the river banks during a design earthquake event per AASHTO LRFD bridge design specifications, ground improvement treatment is recommended. In particular, we recommend the Deep Mixing Method for ground improvement. The bridge could then be supported on shallow foundations.

We appreciate the opportunity of providing geotechnical services on this project. Should you have any questions please do not hesitate to call.

Sincerely,

HWA GEOSCIENCES INC.

Sa H. Hong, P.E.
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**FINAL GEOTECHNICAL REPORT
LAKE TO SOUND TRAIL
SEGMENT A - BLACK RIVER BRIDGE
RENTON, WASHINGTON**

1. INTRODUCTION

1.1. PROJECT DESCRIPTION

HWA GeoSciences Inc. (HWA) performed a geotechnical study for the proposed Lake to Sound Trail Segment A, Black River Bridge in Renton, Washington. The location of the site and the general project layout are shown on the Vicinity Map (Figure 1) and the Site and Exploration Plan (Figure 2), respectively. The purpose of this geotechnical study was to explore and evaluate surface and subsurface conditions at the site and provide recommendations for the geotechnical aspects of the project.

The new trail pedestrian bridge will consist of a single-span steel or concrete girder structure over the Black River with a minimum span of approximately 114 feet. The new bridge is being designed in accordance with AASHTO Load and Resistance Factor Design (LRFD) methodology.

We understand construction impacts will need to be mitigated to protect the wetland located north of the trail alignment, as well as the Black River channel.

1.2. SCOPE OF SERVICES AND AUTHORIZATION

Geotechnical engineering services were authorized in a subconsultant agreement dated November 7, 2014 and two subsequent amendments. Our scope of work included collecting and reviewing available geotechnical and geologic information in the vicinity of the project site, and performing subsurface explorations at the proposed ends of the bridge span to determine soil and ground water conditions. Our work also included coordinating the field activities with the project team; performing laboratory testing and engineering analyses to develop geotechnical recommendations for the proposed improvements; and preparing draft and final geotechnical reports. The need for additional work was identified during the investigation, in which seismically liquefiable soils were encountered in the borings (unlike the prior borings for the adjacent Monster Road Bridge) and therefore the need for additional analyses to address lateral spreading of the river banks, which would adversely affect the proposed bridge.

2. FIELD AND LABORATORY INVESTIGATIONS

2.1. FIELD EXPLORATIONS

Two exploratory borings were drilled on November 10, 2014 and January 6, 2015. Borehole BH-1 was drilled on the north side of the river to a depth of 61 feet, and BH-2 was drilled on the south side to a depth of 86.5 feet. Both borings were drilled utilizing hollow-stem auger methods. The explorations were supervised and logged by a geologist from HWA, who observed the exploratory work on a full time basis. A detailed discussion of the field exploration methodologies and the equipment used is presented in Appendix A, along with the borehole logs and a legend of terms and symbols used on the logs. The exploration locations are shown on Figures 2 and 3.

2.2. LABORATORY TESTING

Laboratory tests were performed on selected samples obtained from the borings to characterize relevant engineering and index properties of the site soils. Laboratory tests included determination of in-situ moisture content, and grain size characteristics. The tests were conducted in general accordance with appropriate American Society of Testing and Materials (ASTM) standards. The test results and a discussion of laboratory test methodologies are presented in Appendix B, and/or displayed on the exploration logs in Appendix A, as appropriate.

3. SITE CONDITIONS

3.1. SURFACE CONDITIONS

The proposed bridge alignment is located approximately 80 feet (south end) to 230 feet (north end) east of Monster Road Bridge in the City of Renton. The river banks in this area are inclined at approximately 2H:1V. We understand the bridge approaches will be slightly above the original ground surface on the embankments. Both banks are armored with rip-rap rock having maximum diameters ranging from approximately 12 to 24 inches.

3.2. GENERAL GEOLOGIC CONDITIONS

The geology of the Puget Sound region includes a thick sequence of glacial and non-glacial soils overlying bedrock. Glacial deposits were formed by ice originating in the mountains of British Columbia (Cordilleran Ice Sheet) and from alpine glaciers which descended from the Olympic and Cascade Mountains. These ice sheets invaded the Puget Lowland at least four times during the early to late Pleistocene Epoch (approximately 150,000 to 10,000 years before present). The southern extent of these glacial advances was near Olympia, Washington. During periods between these glacial advances and after the last glaciation, portions of the Puget Lowland filled

with alluvial sediments deposited by rivers draining the western slopes of the Cascades and the eastern slopes of the Olympics. The most recent glacial advance, the Fraser Glaciation, included the Vashon Stade, during which the Puget Lobe of the Cordilleran Ice Sheet advanced and retreated through the Puget Sound Basin. Existing topography, surficial geology and hydrogeology in the project area were heavily influenced by the advance and retreat of the ice sheet.

Surficial geological information for the site area was obtained partly from the published maps, “*Geologic Map of the Renton Quadrangle, King County, Washington*” (Mullineaux, 1965) and “*Geologic Map of the Des Moines Quadrangle, King County, Washington*” (Booth and Waldron, 2004). The maps indicate that the uplands to the southwest and immediate north consist of Tertiary igneous bedrock predominantly mantled by Pleistocene Vashon till, while the valley floor is covered by alluvial deposits.

The bedrock consists of highly jointed and faulted andesite. The till was deposited as a discontinuous mantle of ground moraine beneath glacial ice on the eroded surface of older deposits. Soils defined as Vashon till consist of an unsorted, non-stratified mass of silt, gravel, and sand in varied proportions. The till is of high density/strength due to glacial over-consolidation, and typically has low permeability.

The 1965 map, which includes the subject site, indicates the valley floor is covered by alluvium deposited by the White River and Green River, prior to historical diversion of the White River south into the Puyallup in 1906. According to the map this alluvium consists of silt and fine sand at the surface, becoming medium to coarse sand with depth. Black volcanic sand is typical of White River deposits in the valley. The Black River formerly was the outlet for Lake Washington, prior to completion of the Lake Washington Ship Canal in 1917. Very little sediment would be expected to exit the lake; therefore, Black River deposits would consist primarily of reworked sediment of the Cedar River and White River.

3.3. SUBSURFACE CONDITIONS

3.3.1. Soil Stratigraphy

Our interpretations of subsurface conditions were based on the results of field explorations, our review of available geologic and geotechnical data, and our general experience in similar geologic settings. It should be noted that in-situ tests performed during drilling, e.g. Standard Penetration Tests represented by N values, identified liquefiable fine sandy silt layers within both borings. For reference, the blow count values recorded during tests are included on the boring logs and are plotted on the penetration resistance chart on each log. Soil density descriptions on the boring logs are based on our observations of soil granularity vs. cohesiveness in addition to the recorded penetration values.

In general, the area of the proposed bridge site is underlain by a sequence of layers of recent silty and sandy alluvium deposited by the historical White River and Black River. This alluvium is underlain by glacial till. Bedrock was encountered below the till in BH-1. Suitable bearing material for bridge foundations was encountered at a depth of approximately 45 feet on the north bank (glacial till, over bedrock in BH-1) and at 67 feet at the south bank (glacial till in BH-2). The soil units encountered in the borings are described separately and in more detail below. The conditions are also summarized in Figure 3. Appendix A contains detailed summary logs of subsurface conditions encountered at the individual exploration locations.

- **Fill** - Both borings encountered fill at the ground surface to depths of 7.5 feet in BH-1 and approximately 25 feet in BH-2. The fill consisted of medium dense to dense, gravelly silty sand in the upper 4 to 7 feet, then medium dense to loose sandy silt to silty sand with variable gravel content. In BH-2 this latter material had the appearance of alluvium with fine bedding below 17.5 feet; however, a chunk of rubber in the sampler obtained from the sample taken at 20 feet indicated the material was fill to approximately 25 feet. Based on this depth of fill, we speculate that it originated as dredge tailings fill from channel modifications to the Black River. The protective surficial layer of fill on both banks of the river consisted of loosely placed riprap rocks.
- **Loose Alluvium** - Recent alluvial deposits were encountered beneath the existing fill in both borings. The upper portion of alluvium in BH-1 consisted of fine sandy silt and silty sand. It was typically very loose with N values ranging from 0 to 10 and extended from approximately 7.5 to 30 feet deep. In BH-2, loose alluvium consisting of slightly silty sand and sandy gravel was encountered from 25 to 40 feet deep.
- **Medium Dense to Dense Alluvium** - Gravelly, silty sand was encountered below the loose alluvium in BH-1 from approximately 30 to 40 feet. In BH-2, medium dense, clean to slightly silty sand was encountered from approximately 40 to 67 feet, with the upper 5 feet consisting of dense sandy gravel.
- **Glacial Till** - Glacial Till was encountered below the alluvium in both borings, and consisted of unsorted, non-stratified dense to very dense, sandy, gravelly silt to silty, gravelly sand.
- **Bedrock** - Bedrock was encountered at a depth of approximately 55 feet in borehole BH-1 at the north bank, but was not encountered within BH-2 at the south bank. This is also a pile foundation bearing strata at the site. The bedrock consisted of fractured basalt, becoming less weathered and stronger with depth.

3.3.2. Ground Water

Ground water was observed during drilling in both borings, at depths of approximately 13.5 and 19 feet below the existing ground surface at BH-1 and BH-2, respectively. Because of relatively high permeability of the fill soils and silty sand, it is expected that ground water levels will be reflective of river level. The observed ground water levels during drilling are indicated on the boring logs and on Figure 3. The ground water conditions reported on the exploration logs are for the specific dates and locations indicated and, therefore, may not necessarily be indicative of other times and/or locations. Furthermore, it is anticipated that ground water conditions will vary in response to other factors such as rainfall, time of year, local subsurface conditions, and other factors.

4. CONCLUSIONS AND RECOMMENDATIONS

The possibility of lateral spreading of the riverbanks due to soil liquefaction during a design seismic event became evident after completion of the subsurface exploration program. This was in contradiction to conditions observed by others in borings conducted for the adjacent Monster Road Bridge (Golder, 1995). The alluvium encountered in our borings was very loose to medium dense, as opposed to medium dense to dense as encountered in the Monster Road Bridge borings. Our analyses indicate the looser soils will liquefy during a design-level earthquake, resulting in lateral spreading of the riverbanks. Therefore, we recommend the bridge abutment areas be stabilized through Ground Improvement Techniques (GIT).

Geotechnical recommendations are provided below for bridge seismic design, ground improvement to minimize potential liquefaction and lateral spreading damage, slope stability, bridge foundations, bridge abutments and earthwork, and site drainage.

4.1. SEISMIC DESIGN

4.1.1. General

Based on the LRFD Bridge Design Specifications, 7th Edition (AASHTO, 2014), potential secondary effects of earthquakes on the proposed bridge include soil liquefaction, lateral spreading, seismically-induced settlement, and ground faulting. The following sections provide additional discussions and recommendations pertaining to these seismic issues for use in design of the bridge.

4.1.2. Regional Seismicity

The seismicity of northwest Washington is not as well understood as other areas of western North America. Reasons for this include: (1) incomplete historical earthquake records; (2) deep and relatively young glacial deposits and dense vegetation which obscure surface expression of

faults (Hall and Othberg, 1974); and (3) the distribution of recorded seismic epicenters is scattered and does not define map-able fault zones (Gower, et al., 1985). Historical records exist, however, of strong earthquakes with local Modified Mercalli Intensities up to VIII (indicative of structural damage such as cracked walls and fallen chimneys).

Since the 1850's, 28 earthquakes of Magnitude 5 (Richter Scale) and greater have reportedly occurred in the eastern Puget Sound and north-central Cascades region. Five events may have exceeded Magnitude 6.0. Researchers consider the North Cascades earthquake of 1872, centered near Lake Chelan, the strongest (Magnitude 7.4) historical earthquake in the region. Earthquakes of Magnitude 7.2 occurred in central Vancouver Island in 1918 and 1946. The most significant recent event, the Nisqually Earthquake, occurred on February 28, 2001, near Olympia and had a magnitude of 6.8. Other significant historical earthquakes in the region include a 1949 event near Olympia (Magnitude 7.2), and a 1965 event centered between Seattle and Tacoma (Magnitude 6.5). These latter three were intraplate Benioff Zone earthquakes, occurring at a depth of about 30 miles within the descending subducted oceanic plate.

Potential sources of earthquakes that may be significant to the site include: (1) the Cascadia subduction zone, along which the Juan de Fuca oceanic plate is being thrust under the North American plate; and (2) shallow crustal faults that may generate earthquakes in the site vicinity (McCrumb et al., 1989). The latest subduction zone earthquake in the Pacific Northwest had been determined from Japanese tsunami records to have occurred in 1700, and recent offshore sedimentological research has indicated that the entire length of the subduction zone slipped at once, which would result in an earthquake of around Magnitude 9.0.

4.1.3. Seismic Considerations

Earthquake loading for the proposed Black River bridge structure was developed in accordance with Section 3.4 of the *AASHTO Guide Specifications for LRFD Bridge Design, 2014*. For seismic analysis, the Site Class is required to be established and is determined based on the average soil properties in the upper 100 feet below the ground surface. Based on our explorations and understanding of site geology, it is our opinion that the proposed alignment is underlain by soils classifying as Site Class D. Table 1 presents recommended seismic coefficients for use with the general procedure described in the guide (AASHTO, 2014), which is based upon a design event with a 7 percent probability of exceedance in 75 years (equal to a return period of 1,033 years). Ground motions for the site are based on probabilistic earthquake hazard mapping efforts including those conducted by the United States Geological Survey. Accordingly, a Seismic Design Category D, as given by the guide (AASHTO, 2014) should be used.

Table 1. Seismic Coefficients for Evaluation Using AASHTO Specifications

Site Class	Peak Ground Acceleration PGA, (g)	Spectral Bedrock Acceleration at 0.2 sec S_s , (g)	Spectral Bedrock Acceleration at 1.0 sec S_1 , (g)	Site Amplification Coefficients			Design Acceleration Coefficient A_s , (g)
				F_{pga}	F_a	F_v	
D	0.446	0.993	0.331	1.05	1.1	1.74	0.470

4.1.4. Soil Liquefaction

Liquefaction occurs when saturated and relatively cohesionless soil deposits such as silts, sands, and fine gravels temporarily lose strength as a result of earthquake shaking. Primary factors controlling the development of liquefaction include intensity and duration of strong ground motion, characteristics of subsurface soils, in-situ stress conditions and the depth to ground water. Potential effects of soil liquefaction include temporary loss of bearing capacity and lateral soil resistance, and liquefaction-induced settlement and deformations, with concomitant potential impacts on the proposed bridge and embankment fills.

Based on the saturated, loose nature of the alluvium noted below fill in BH-1 and BH-2, liquefaction will be a design consideration for this project.

Based on the methods by Seed and Idriss (1971) and Ishihara and Yoshimine (1992), liquefaction of the loose alluvium/fill layer, 20 feet thick, below the upper medium dense fill will liquefy during an earthquake with $PGA=0.446g$ and $Mw=7.5$.

4.1.5. Ground Fault Hazard

The Seattle and Tacoma Faults are probably the most serious earthquake threat to the populous Seattle–Tacoma area. The Black River Bridge site is located between these faults. A study in 2005 (EERI and Washington Military Dept.) of bridge vulnerability estimated that a magnitude 6.7 earthquake on the Seattle Fault would damage approximately 80 bridges in the Seattle–Tacoma area, whereas a magnitude 9.0 subduction event would damage only around 87 bridges in all of western Washington. The same study also found that with failure of just six bridges (the minimum damage from a Benioff M 6.5 event) there could be at least \$3 billion lost in business revenue alone. Seismic retrofitting would likely reduce damage to key bridges.

4.2. SLOPE STABILITY EVALUATIONS

The proposed pedestrian bridge abutments are to be constructed above the top of the river bank slopes. The stability of these slopes was evaluated using limit-equilibrium methods utilizing the computer program SLIDE 5.0 (Rocscience, 2013). Limit equilibrium methods consider force (or moment) equilibrium along potential failure surfaces. Results are provided in terms of a factor of

safety, which is computed as the ratio of the summation of the resisting forces to the summation of the driving forces. Where the factor of safety is less than 1.0, instability is predicted. With limit equilibrium, the shear strength available is assumed to mobilize at the same rate at all points along the failure surface. As a result, the factor of safety is constant over the entire failure surface.

4.2.1. Static Slope Stability Analyses

The static factors of safety calculated along Cross Section A-A', Figure 3, was evaluated with Spencer's method, Janbu's Simplified method, and Bishop's Simplified method with the observed site conditions.

The factor of safety of the slope at the southern abutment, under static loading, is approximately 1.26 and for the northern abutment is approximately 1.1, as shown on Figures C-1 and C-4 of Appendix C, respectively. These analyses indicate that the factor of safety is slightly greater than 1, which means that the slopes are marginally stable under the static condition with the current condition of the slopes.

4.2.2. Pseudo-Static Slope Stability Analyses

Cross Section A-A' was evaluated using pseudo-static methods to evaluate the response of the slope under earthquake loading prior to the onset of liquefaction. Spencer's, Janbu's Simplified, and Bishop's Simplified methods were used in this evaluation. Pseudo-static slope stability analyses model the anticipated earthquake loading as a constant horizontal force applied to the soil mass. For our analyses, we used a horizontal seismic coefficient of 0.235g, which is one-half of the design acceleration coefficient (A_s , in Table 1). Pre-liquefaction strengths were used for all materials in this analysis.

The results of these analyses indicate a factor of safety of approximately 0.65 and 0.62, for the southern and northern abutments, respectively, as shown in Figures C-2 and C-5 of Appendix C. These analyses indicate that slope instability is likely to occur during the design seismic event, prior to the onset of liquefaction. As a factor of safety less than 1.0 was calculated, we expect the existing slopes to undergo lateral spreading upon the onset of liquefaction.

4.2.3. Post-Liquefaction Slope Stability Analyses

Additional stability analyses were completed for the slopes depicted in Cross Section A-A' to determine the response of the slopes after the onset of liquefaction. The post-liquefaction residual shear strengths for the liquefiable soils were used to model the anticipated loss of shear strength during a seismic event. The results of these analyses indicate a factor of safety of approximately 0.31 and 0.19, for the southern and northern abutments, respectively, as shown in Figures C-3 and C-6 of Appendix C, respectively. As a factor of safety less than 1.0 was

calculated, we expect the existing slopes to undergo large lateral spreading upon the onset of liquefaction.

A summary of the anticipated factor of safety for global stability at the abutments are provided below in Table 2.

Table 2. Global Stability Analyses Results Without GIT

	Factor of Safety	
	South Side	North Side
Static	1.26	1.10
Pseudo-Static	0.65	0.62
Post Liquefaction	0.31	0.19

4.2.4. Lateral Spreading and Sliding

Lateral spreading occurs cyclically when the horizontal ground accelerations combine with gravity to create driving forces which temporarily exceed the available strength of the soil mass. This is a type of failure known as cyclic mobility. The result of a lateral spreading failure is horizontal movement of the partially liquefied soils and any overlying crust of non-liquefied soils. We would expect displacements associated with lateral spreading to be very large at this site.

Bartlett and Youd (1992) used a large data base of lateral spreading case histories and developed an empirical formula. According to the research, we calculated a yield acceleration ($a_y=0.2g$) by means of a trial and error method for the existing bank slope (2H:1V) and Newmark's sliding block slope stability analyses. When an earthquake magnitude $M_w=7$ occurs, the estimated lateral spreading ranges from about 24 to 134 inches depending upon assumed epicenter distances, 60 km (Tacoma Fault) and 6 km (Seattle Fault) away, respectively. Although the results vary widely, the analyses demonstrate that large lateral spreading is likely during a significant seismic event.

To mitigate these liquefiable soil conditions and lateral spreading, we recommend that the strength of the slopes be increased by in-situ ground improvement techniques (GIT). See Section 4.3 for a discussion of GIT methods: Deep soil mixing method (DMM) and Stone column treatment (SC).

4.2.5. Global Stability after Ground Improvement

4.2.5.1. Static Slope Stability Analyses

The static factors of safety calculated along Cross Section A-A' were evaluated with Spencer's method, Janbu's Simplified method, and Bishop's Simplified method assuming ground improvement was performed per Section 4.3.

The factor of safety of the slope at the southern abutment, under static loading assuming stone columns as GIT, is approximately 1.30 and for the northern abutment is approximately 1.24, as shown on Figures C-7 and C-8 of Appendix C. These analyses indicate that the factor of safety increases slightly after the application of stone columns as GIT. These factor of safety magnitudes confirm that the composite shear strength properties achieved from the utilization of stone columns as GIT are not adequate for the stabilization of the slope.

The factor of safety of the slope at the southern abutment, under static loading assuming deep soil mixing (DMM) as GIT, is approximately 3.5 and for the northern abutment is approximately 2.5, as shown on Figures C-9 and C-10 of Appendix C. These analyses indicate that the factor of safety increases significantly after the application of deep soil mixing (DMM) and that global slope instability is not likely to occur under static loading conditions.

4.2.5.2. Pseudo-Static Slope Stability Analyses

Cross Section A-A' was evaluated using pseudo-static methods to evaluate the response of the slope under earthquake loading prior to the onset of liquefaction, after the application of GIT. Spencer's, Janbu's Simplified, and Bishop's Simplified methods were used in this evaluation. Pseudo-static slope stability analysis model the anticipated earthquake loading as a constant horizontal force applied to the soil mass. For our analyses, we used a horizontal seismic coefficient of 0.235g, which is one-half of the design acceleration coefficient (A_s). Pre-liquefaction strengths were used for all materials in this analysis.

The results of these analyses assuming stone columns as GIT indicate a factor of safety of approximately 0.77 for the southern abutment and 0.68 for the northern abutment, as shown in Figures C-11 and C-12 of Appendix C. This indicates that slope instability is likely during a seismic event, prior to the onset of liquefaction. As a factor of safety less than 1.0 was calculated, we expect the SC-treated slopes to undergo minor lateral spreading (non-catastrophic) upon the onset of liquefaction. These factor of safety magnitudes confirm that the composite shear strength properties achieved from the utilization of stone columns as GIT are not adequate for the stabilization of the slope.

The results of these analyses assuming deep soil mixing (DMM) as GIT indicate a factor of safety of approximately 1.6 for the southern abutment and 1.2 for the northern abutment, as shown in Figures C-13 and C-14 of Appendix C. The results shown in Figures C-13 and C-14 are for a sliding surface passing beneath the deep soil mixing depth. Additional to these analyses, we evaluated potential sliding surfaces that pass through the deep mixed zone and shallow sliding surfaces as is recommended by FHWA design manual for deep soil mixing (FHWA, 2013). These analyses indicate that global slope instability is not likely during the design seismic event.

The summary of the stability analyses is summarized in Table 3, below.

Table 3. Global Stability Analyses Results after GIT

	Factor of Safety			
	South Side		North Side	
	SC	DMM	SC	DMM
Static After GIT	1.3	3.5	1.2	2.5
Pseudo-Static After GIT	0.77	1.6	0.68	1.2

4.3. GROUND IMPROVEMENT TECHNIQUES (GIT)

The bridge foundations should be designed to withstand liquefaction-induced lateral and down-drag loading as well as liquefaction-induced lateral spreading. To mitigate liquefaction conditions and densify the loose sand/silt layer noted below the fill, we recommend ground improvement techniques (GIT) be applied. Based on our analyses, we recommend the deep mixing method (DMM). Slope stability analyses of modeled conditions post-application of DMM present factors of safety greater than 1.0 for static and pseudo-static conditions for both abutments. Additionally, the deep mixing method reduces the potential of adverse construction impacts to the river, in comparison to stone columns. The particular methods are described in Sections 4.3.1 and 4.3.2 below. The section on stone columns is included for comparison, but we recommend against using stone columns due to inadequate factors of safety against static slope instability and lateral spreading, and greater (and partly unmitigatable) construction impacts to the river and adjacent wetland.

4.3.1. Deep Mixing Method

The deep mixing method (DMM) is an in-situ method in which the physical properties of weak soils are improved by mechanically mixing in wet or dry cement. Specialized augers and mixing paddles are used to mix the soil in a column. DMM is achieved by a rotating motion with no vibration applied, such that accidental slope failure during DMM construction will not be likely. We recommend 4-foot diameter columns. Rows of overlapping soil mixed columns oriented in the direction of the possible soil movement (perpendicular to river) would resist sliding and lateral spreading. As a result of DMM, the treated rows will behave like shear walls at the bridge abutments to resist lateral movement. The rows of overlapping columns should be spaced with a 2-foot gap in between rows (6 feet center to center). The DMM treatment area should begin above the Ordinary High Water Mark (OHWM) and extend to 4 feet behind (opposite the river from) each abutment. The width of treatment area should be 16 feet, making 3 rows of overlapping columns (see Figure 4). The columns should overlap at least 1 foot along each row.

The ground improvements should be conducted in the dry summer months to take advantage of lower water levels. The treatment depths should extend to EL -2 and EL -14 at the north and south banks, respectively. The loose alluvium to be treated is about 15 to 23 feet thick, extending to depths of approximately 32 feet below ground surface on the north side and 42 feet

below ground surface on the south side. These depths include a 2-foot penetration into the medium dense sand layer.

Installation of the first columns should begin just above OHWM and progress away from the river. A temporary three-sided sheet pile containment wall would be necessary for each abutment area, along OHWM and perpendicular to the bank along the sides of the GIT areas as shown on Figure 4. The sole purpose of the containment wall is to prevent any wet spoils generated from the GIT operations from entering the river. This wall should be designed by the contractor who will be performing the GIT. We anticipate the sheet pile wall would be embedded approximately 10 feet with a stickup of about 7 feet. We recommend a 5-foot setback distance from the sheet pile wall to the DMM columns.

We recommend that DMM replacement ratio per volume be on the order of 40 percent. The cemented soil columns provide high shear strength to resist lateral movements. Typical DMM unconfined compressive strength ($q_{dm, spec}$) within columns ranges from 100 to 300 psi depending upon the sand/silt contents. We recommend a 28-day unconfined compressive strength (UCS) of $q_u=150$ psi be achieved by the contractor for 90% of all cores obtained and tested after DMM completion and wet samples taken during DMM. The specialty contractor should obtain wet samples at every 5 feet in selected columns (at least one per day) and the samples should be tested at 7, 14, 28 and 56 days. The specialty contractor should provide drilled core samples at two DMM columns each at the south and north abutment per the owner's designation. The specialty contractor should submit laboratory cement slurry mix-design with the unconfined compressive strength.

Medium dense to dense fill soils were encountered from the surface to depths of 7.5 feet to 17 feet, at the north and south bank, respectively. We recommend that this surface crust (Fill) be predrilled for each DMM column in order to facilitate the deep mixing method. The existing river banks are armored with riprap stones which should be removed prior to pre-drilling. The cost associated with predrilling, removal and restoration of riprap on the slopes should be included for estimating the cost of the project. Riprap restoration is still needed after DMM because untreated areas between DMM will be vulnerable to erosion.

DMM will bring up wet, silty and cementitious spoils to the surface from the mixing process. This will tend to flow towards the river and will need to be contained by means of a short sheet pile wall and lined with erosion mats and geotextile fencing. For the extent of ground improvement proposed, a local specialty contractor estimated about 1,500 cubic yards of soil-cement spoils would need to be hauled off for disposal. However, this amount shall be re-evaluated by each contractor based on their equipment and experience for their actual bidding.

We recommend that shallow spread footings resting on the deep soil mixed columns be used to support the bridge (see Section 4.4).

DMM Construction Considerations

The existing rip-rap will be an impediment to driving sheet piles for the temporary containment wall, as well as to drilling for deep soil mixing. The uncertainty of rip-rap size and thickness, and therefore the relative difficulty of driving / drilling vs. excavating out the rip rap, poses a significant cost risk to the project. The risk can be greatly reduced by evaluating the rip-rap size and thickness in advance, so that the cost of removing the rip-rap can be estimated for budgeting, and contractors can bid for rip-rap removal on an even basis. All rip-rap within the proposed treatment areas would need to be removed, as selective removal for each DMM shaft would remove most of the rip-rap anyway but at greater effort than removing all. The rip-rap size and thickness should be investigated during design with a trackhoe having at least a 30-foot reach. The contract should state that rip-rap should be removed prior to driving sheets and drilling for deep soil mixing. It will need to be done in such a way as to avoid increasing the turbidity of the river. Assuming removal of rip-rap will be from OHWM and up, the work should not be done during high tides, e.g. a buffer between the excavation work and river level should be maintained.

The depth limitation of DMM is about 130 feet. The intended ground improvement depths, in the range of 30 to 40 feet, are well within the range of maximum depth.

The abutment work space needs to be large enough to accommodate a large crane, other auxiliary equipment, concrete truck, and pump truck. Adjacent property ownership and land use (wetland, river and narrow foot print of embankment) constrain the available work areas. The north side work area is particularly constrained to a narrow width at the proposed bridge site, but in our opinion and based on conversations with a ground improvement contractor, there is adequate room for construction. The crane would operate from the level area above the bank crest. Based on the presence of medium dense granular fill at the surface to a depth of 7 feet, it does not appear that the north side would require ground mitigation for crane support. However, timber crane mats may be desirable. The contractor should provide a submittal regarding equipment type and size, support, and slope stability evaluations, as well as general staging procedures.

Potential turbidity impacts to the river include siltation from removing rip-rap close to the water line, and runoff from spoils with cement from wet-mixing. These can be mitigated by installing a sheet pile wall on each river bank just above OHW, lined with visquene, to catch loosened soils and cement and allow for removal with heavy equipment for disposal off site. The walls would need to be embedded 10 feet and stickup approximately 7 feet. The purpose of the sheet pile walls is to contain drilling spoils and stormwater runoff only; it would not stabilize the slope. Even with predrilling of the columns through the medium dense upper soils, spoils consisting of excess soil and cement slurry will come to the ground surface and need to be contained and disposed of continuously as DMM progresses. The volume of material could potentially be up to, or greater than, the cement replacement volume, e.g. 40 percent of shaft volume.

Assuming a 4-foot diameter for DMM columns, the lowermost columns would need to be at least 5 feet from the sheet pile wall to prevent destabilization of the wall. By standard procedure, adjacent column rows would not be installed on the same day, to allow for curing of the cement before installation of adjacent rows. Constraints to installation sequencing should be provided to bidders, who will need to provide submittals regarding means and methods including sequencing. After all DMM columns are installed and rip-rap reestablished on the banks, the sheet pile walls would be removed. Installation and removal of the sheet pile walls would be conducted with a crane-suspended vibratory hammer, such that the piles can be installed on a slope distant from where equipment actually sits.

We recommend that the wet rotary method be specified, and the wet jet method prohibited. With the wet jet method, which utilizes high-pressure water during drilling and injection of cement slurry, there is a higher risk of turbid water eruption at the ground surface or within the river. Also, slope stability could be compromised during installation of the lower columns.

We do not anticipate impacts to ground water flow from DMM. Alkalinity increases will be temporary during cement treatment and curing of soil columns.

4.3.2. Stone Columns

The stone column (SC) method is a method by which vertical columns are made of compacted aggregate extending through a deposit of loose soil, and result in increased shear resistance of the slope and relief of pore-water pressure during the design earthquake event. Using the dry method, SCs are installed with a vibratory probe and a deep stone feed tube, forcing the aggregate radially into the loose soil zones, compacting the stone as well as any granular zones formed in the surrounding soil. Typical diameters of stone columns are 2 to 4 feet. Stone columns provide dissipation of excess pore pressure during strong shaking and the treated soil layer will not liquefy.

As indicated in the previous sections of slope stability analyses, SC would not completely eliminate the slope instability problem during the design earthquake event, but it would prevent liquefaction of the loose alluvium layer, and thereby reduce lateral spreading (Bohn and Lambert, 2013).

The wet, top-feed method can create “geysers” of silty water coming up from the ground in random, unwanted locations. If constructed in an improper order, e.g. progressing toward the river instead of away, then vibrations may cause local liquefaction and accidental embankment failure.

Based on the higher risks of slope instability as well as turbidity impacts to the river and adjacent wetlands, we recommend against using the SC method.

4.3.3. Ground Improvement Verification Tests

DMM Verification Tests

After DMM treatment, two borings should be made at each abutment site with core samples retrieved for unconfined compressive strength tests. The average strength should be approximately 150 psi and the minimum strength 75 psi. The geotechnical engineer of record should evaluate the DMM strength improvement. The boreholes should be backfilled with grout after coring.

4.4. SHALLOW FOUNDATIONS

Shallow strip and square footings, as recommended below, can be used to support the bridge structure after DMM treatment is implemented.

4.4.1. Spread Footing Bearing Capacity for Bridge Support

Shallow strip and square footings supporting the bridge abutment and bridge approach retaining walls on level ground that has been treated with DMM per the strength improvement recommendations specified above can be designed with a net bearing capacity (q_n) of 12,000 psf and on sloping ground (2H:1V) 5,000 psf with a 2-foot minimum width. A resistance factor, $\phi_b = 0.5$, should be applied for the design. All footing areas should be treated with DMM. Total settlement under the load will be one inch or less. The depths of the footings should not be less than 18 inches below ground surface for frost protection. Footings located on slopes should have a minimum embedment depth of 36 inches. The resistance factor for the extreme and service cases should be 1.0. While earthwork and concrete work for the footings can begin as soon as the next day after completion of ground improvement, we recommend that 14 days be allowed for curing of the DMM columns before installation of the bridge superstructure.

4.4.2. Sliding Resistance on Existing Fill for Cast-In-Place Concrete Footings

The friction coefficient at the base of footings should be 0.4. Resistance Factor $\phi_\tau = 0.8$ should be used. The resistance factor for the extreme and service cases is 1.0.

4.4.3. Passive Earth Pressure Component of Sliding Resistance for CIP Concrete Footings

The passive earth pressures for static and dynamic cases shall be estimated per Sections 4.5.1 and 4.5.2, respectively.

4.5. BRIDGE ABUTMENTS, FOOTINGS AND WING WALLS

4.5.1. Static Lateral Earth Pressures

Lateral at-rest earth pressures used for design of bridge abutments under static loading conditions should be equivalent to that generated by a fluid weighing 55 pcf, assuming the tops of the abutments are restrained from lateral movement. An equivalent fluid unit weight of 35 pcf should be utilized if the tops are free to rotate (i.e. active case). The above recommendations assume a level backslope behind the wall, and that properly compacted, well-drained granular fill is placed as backfill behind the abutment walls. Traffic surcharge loads should also be included in the abutment design. The traffic surcharge should be multiplied by the active earth pressure coefficient (k_a) of 0.27 for a wall free to rotate, or the at-rest earth pressure coefficient (k_0) equal to 0.43 for a wall restrained from movement at its top.

Lateral loads at bridge abutments can be resisted by passive resistance of buried structural elements. Passive resistance may be evaluated using an equivalent fluid density of 300 pcf for structural elements cast neat against the wall on the levelled ground surface. The upper two feet should be ignored for passive resistance. The soil in front of the wall must also be level for a distance of at least twice the depth of embedment below the ground surface. If the slope geometry does not meet these requirements, we recommend the passive resistance be ignored when evaluating lateral restraint.

In addition, structural elements will need to be able to move sufficiently to generate the full passive resistance. The lateral movement required to generate 100 percent of the passive pressure is a function of the type of soil bearing against the footing and the thickness of the footing. We estimate structural elements founded against undisturbed structural fill would need to move laterally a distance of 0.02H, to generate 100 percent of the passive pressure, where H represents the height of the structural element. The AASHTO LRFD Bridge Design Specifications state that surveys of the performance of bridges indicate that horizontal abutment movement less than 1.5 inches can usually be tolerated by bridge superstructures without significant damage. It appears therefore that, for abutments with heights not exceeding 6.25 feet, full passive resistance can be mobilized by allowing the abutment to move laterally a distance equal to 0.02H.

4.5.2. Seismic Lateral Earth Pressures

During a seismic event, seismic earth pressures acting on bridge abutments should be equivalent to that generated by a fluid weighing 55 pcf, assuming the tops of the abutments are able to deflect at least 1 to 2 inches during seismic loading. To determine the lateral earth pressure under seismic loading, the Mononobe-Okabe analysis was utilized, as formulated by Richards and Elms (1992). For computation of the lateral seismic earth pressure a seismic horizontal coefficient (k_h) of 0.235 was used. This fluid pressure should be used in place of the earth

pressure recommended for use under static loading. Note that the current AASHTO code recommends the resultant of the seismic earth pressures to be applied at $1/3 \cdot h$.

4.6. GRAVITY BLOCK WALLS DESIGN

We understand that portions of the trail will be supported by either gravity block walls or structural earth walls (SEWs). We assume that the gravity block and SEW walls will conform to one of the current WSDOT pre-approved systems, and that the wall suppliers will design the walls for internal stability. The retaining walls should be designed in accordance with AASHTO Standard Specifications for Highway Bridges. We recommend that each of the walls be designed using the parameters presented in Table 4.

Table 4.
Recommended Design Parameters for Gravity Block Walls and Structural Earth Walls

Soil Properties	Wall Backfill	Retained Soil	Foundation Soil
Unit Weight (pcf)	140	140	140
Friction Angle (deg)	36	36	36
Cohesion (psf)	0	0	0
		AASHTO Load Group I (EP+LL)	AASHTO Load Group VII (EP+EQ)
Ultimate Bearing Capacity (psf)		5,000	5,000
Acceleration Coefficient (g)		N/A	0.47

4.7. RESISTANCE FACTORS FOR WALL DESIGN

The resistance factors for the Strength Limit State should be obtained from Table 11.5.7-1 of the *AASHTO LRFD Bridge Design Specifications* (AASHTO, 2014) for the appropriate wall type. Resistance factors for the Extreme Event Limit State are provided in Section 11.5.8 also in the *LRFD Bridge Design Specifications*.

4.8. WALL BACKFILL

Abutment wall design and construction should be in accordance with applicable WSDOT Standards. Wall backfill materials should consist of *Gravel Backfill for Walls* (WSDOT 9-03.12(2)), or *Gravel Borrow* (WSDOT 9-03.14), as described in the *WSDOT Standard Specifications* (WSDOT, 2014). Placement and compaction of fill behind walls shall be in accordance with WSDOT 2-09.3(1) E, with the exception that the compaction standard referenced in Section 2-03.3(14) D should be Modified Proctor, per ASTM D 1557.

Wall drainage systems should also be designed and constructed in accordance with the WSDOT *Standard Specifications*. Provisions for permanent control of subsurface water should at a minimum consist of a perforated drain pipe behind and at the base of the wall, embedded in clean, free-draining sand and gravel. The base of the drain pipe should be a minimum of 12 inches below the base of the adjacent ground surface at the toe of the wall. The drain pipe should be graded to direct water away from backfill and subgrade soils and to a suitable outlet.

4.9. EMBANKMENT SLOPES

We recommend that the planned compacted fill slopes or bank slopes be constructed/restored no steeper than 2H:1V (Horizontal:Vertical). For fill slopes constructed at 2H:1V or flatter, and comprised of fill soils placed and compacted as structural fill as described above, we anticipate that adequate factors of safety against global failure will be maintained. Measures should be taken to prevent surficial instability and/or erosion of embankment material. This can be accomplished by conscientious compaction of the embankment fills all the way out to the slope face, by maintaining adequate drainage, and planting the disturbed slope face with vegetation as soon as possible after construction. To achieve the specified relative compaction at the slope face, it may be necessary to overbuild the slopes several feet, and then trim back to finish grade. In our experience, compaction of slope faces by “track-walking” is generally ineffective and is, therefore, not recommended.

Even after ground improvement treatment, riprap rocks should be installed on the banks from the toe level of the slopes to the design flood level of the river. The riprap rocks removed from the slopes can be re-used. Riprap rocks (18” minus in diameter) meeting WSDOT 9-13 and 9-13.4(2) should be underlain by a 12-inch layer of 4-inch minus Quarry Spalls, per WSDOT 9-03.6. If rip-rap is not allowed by the agencies, bioengineered erosion protection should be incorporated into the slope restoration, the design of which is beyond our current scope of work.

4.10. STRUCTURAL FILL MATERIALS AND COMPACTION

In our opinion, the existing fill on site will not be suitable for use as structural fill. Imported structural fill should consist of relatively clean, free draining, sand and gravel conforming to the Gravel Borrow specification, Section 9-03.14 (Gravel Borrow) of the 2014 WSDOT *Standard Specifications*. If earthwork is performed during extended periods of wet weather or in wet conditions, the structural fill should conform to the recommendations provided below in Section 4.9, Wet Weather Earthwork.

In general, the backfill should be placed in horizontal lifts and compacted to a dense and unyielding condition, and at least 95 percent of its maximum dry density, per test method ASTM D 1557. The thickness of loose lifts should not exceed 8 inches for heavy equipment compactors and 4 inches for hand operated compactors.

The procedure to achieve the specified minimum relative compaction depends on the size and type of compaction equipment, the number of passes, thickness of the layer being compacted, and on soil moisture-density properties. We recommend that the appropriate lift thickness, and the adequacy of the subgrade preparation and materials compaction, be evaluated by a representative of the geotechnical consultant during construction. A sufficient number of in-place density tests should be performed as the fill is being placed to determine if the required compaction is being achieved.

4.11. SITE DRAINAGE AND EROSION

4.11.1. Surface Water Control

Surface runoff can be controlled during construction by careful grading practices. Typically, these include the construction of shallow, upgrade, perimeter ditches or low earthen berms and the use of temporary sumps to collect runoff and prevent water from damaging exposed subgrades. Also, measures should be taken to avoid ponding of surface water during construction. The use of Ground Improvement Techniques will require the use of a sheetpile containment wall for each treatment area during GIT construction.

Permanent control of surface water should be incorporated in the final grading design. Adequate surface gradients and drainage systems should be incorporated into the design such that surface runoff is directed away from structures and pavements and into swales or other controlled drainage devices.

4.11.2. Erosion Control

In our opinion, erosion at the site during construction can be minimized by implementing the recommendations presented in *Wet Weather Earthwork*, Section 4.12, and by judicious use of straw bales, silt fences and plastic sheets. The erosion control devices should be in place and remain in place throughout site preparation and construction. Potential problems associated with erosion may also be minimized by establishing vegetation within disturbed areas immediately following grading operations. Vegetation with deep penetrating roots is the preferred choice, since the roots tend to maintain the surficial stability of slopes by mechanical effects and contribute to the drying of slopes by evapotranspiration.

4.12. WET WEATHER EARTHWORK

The on-site fill is considered moderately moisture sensitive and may be difficult to traverse with construction equipment during periods of wet weather or wet conditions. Furthermore, the near-surface soils may be difficult to compact if their moisture content significantly exceeds the optimum. General recommendations relative to earthwork performed in wet weather or in wet conditions are presented below.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soil should be followed promptly by the placement and compaction of clean structural fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance that may be caused by equipment traffic.
- Material used as structural fill should consist of clean granular soil with less than 5 percent passing the U.S. Standard No. 200 sieve, based on wet sieving the fraction passing the ¾-inch sieve. The fine-grained portion of the structural fill soils should be non-plastic.
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water.
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should soil be left uncompacted and exposed to moisture.
- Excavation and placement of structural fill material should be performed under the full-time observation of a representative of the geotechnical engineer, to determine that the work is being accomplished in accordance with the project specifications and the recommendations contained herein.
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion and the movement of soil.

5. CONDITIONS AND LIMITATIONS

We have prepared this report for use by Parametrix, Inc. and King County in design of a portion of this project. The report and any other applicable geotechnical data should be provided in its entirety to prospective contractors for their bidding or estimating purposes, but our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions. Experience has shown that subsurface soil and ground water conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations and may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HWA should be notified for review of the recommendations of this report, and revision of such if necessary. If there is a substantial lapse of time between the submission of this report and the start of construction, or if conditions have changed due to construction operations at or near the site, it is

October 3, 2016

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recommended that this report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

This report is issued with the understanding that the information and recommendations contained herein will be brought to the attention of the appropriate design team personnel and incorporated into the project plans and specifications, and the necessary steps will be taken to verify that the contractor and subcontractors carry out such recommendations in the field.

Within the limitations of scope, schedule and budget, HWA attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology in the area at the time the report was prepared. No warranty, express or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands, hazardous substances in the soil, or surface water at this site.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and cannot be responsible for the safety of personnel other than our own on the site. As such, the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any of the recommended actions presented herein unsafe.

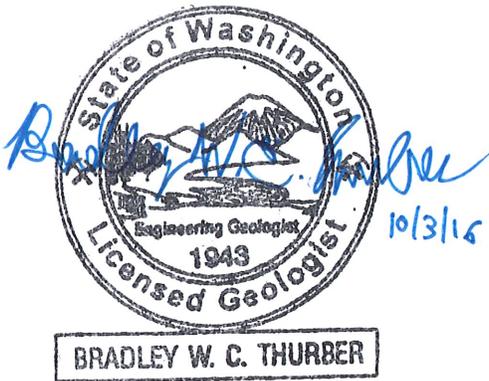


October 3, 2016
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We appreciate the opportunity to provide geotechnical services on this project. Should you have any questions or comments, please do not hesitate to call.

Sincerely,

HWA GEOSCIENCES INC.



Brad W. Thurber, L.G, L.E.G.
Senior Engineering Geologist



Sa H. Hong, P.E.
Principal Geotechnical Engineer

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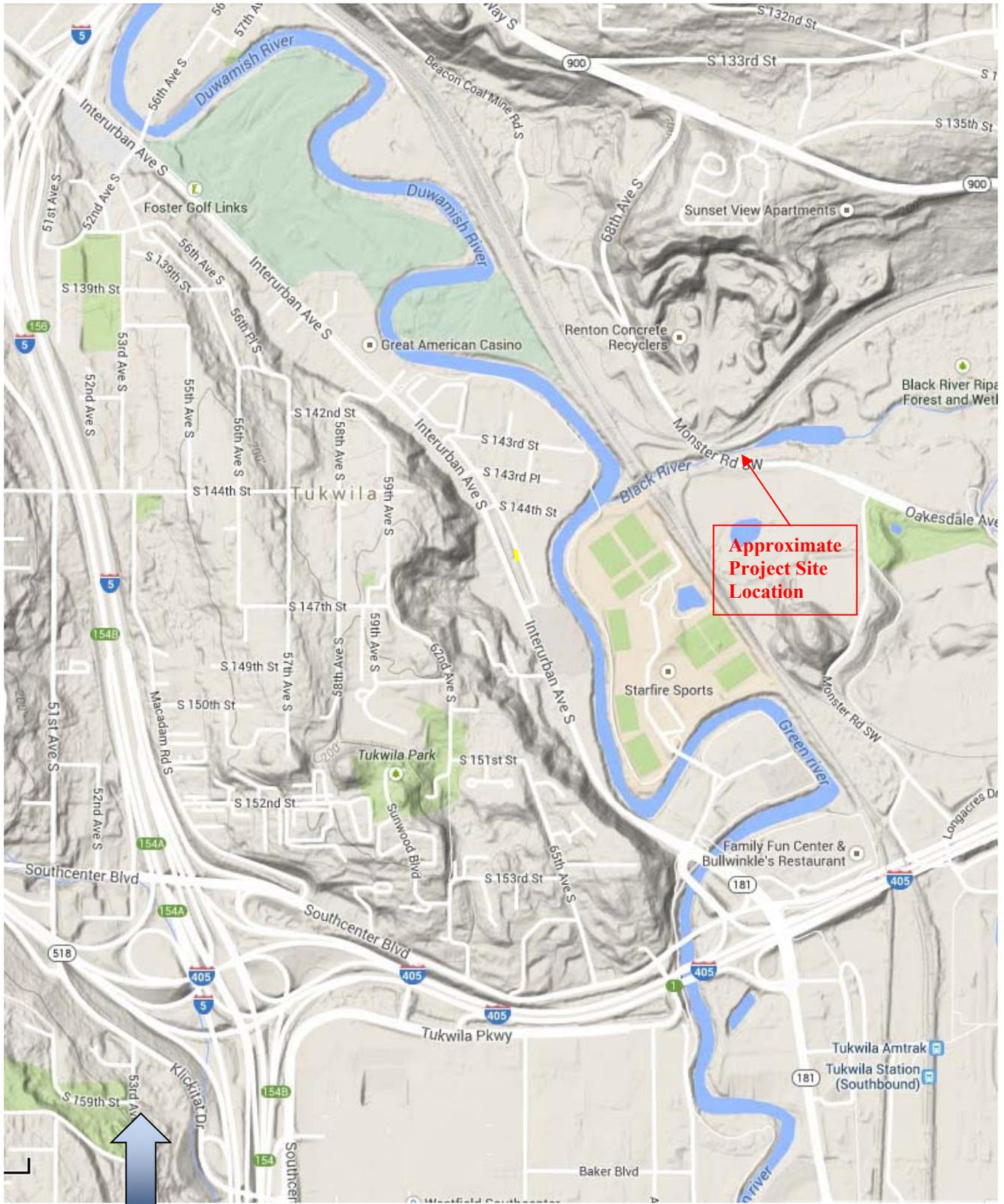
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NORTH
NOT TO SCALE

BASE MAP FROM GOOGLE MAPS- DATA MAP © 2015

VICINITY MAP

BLACK RIVER BRIDGE
LAKE TO SOUND TRAIL
RENTON, WASHINGTON

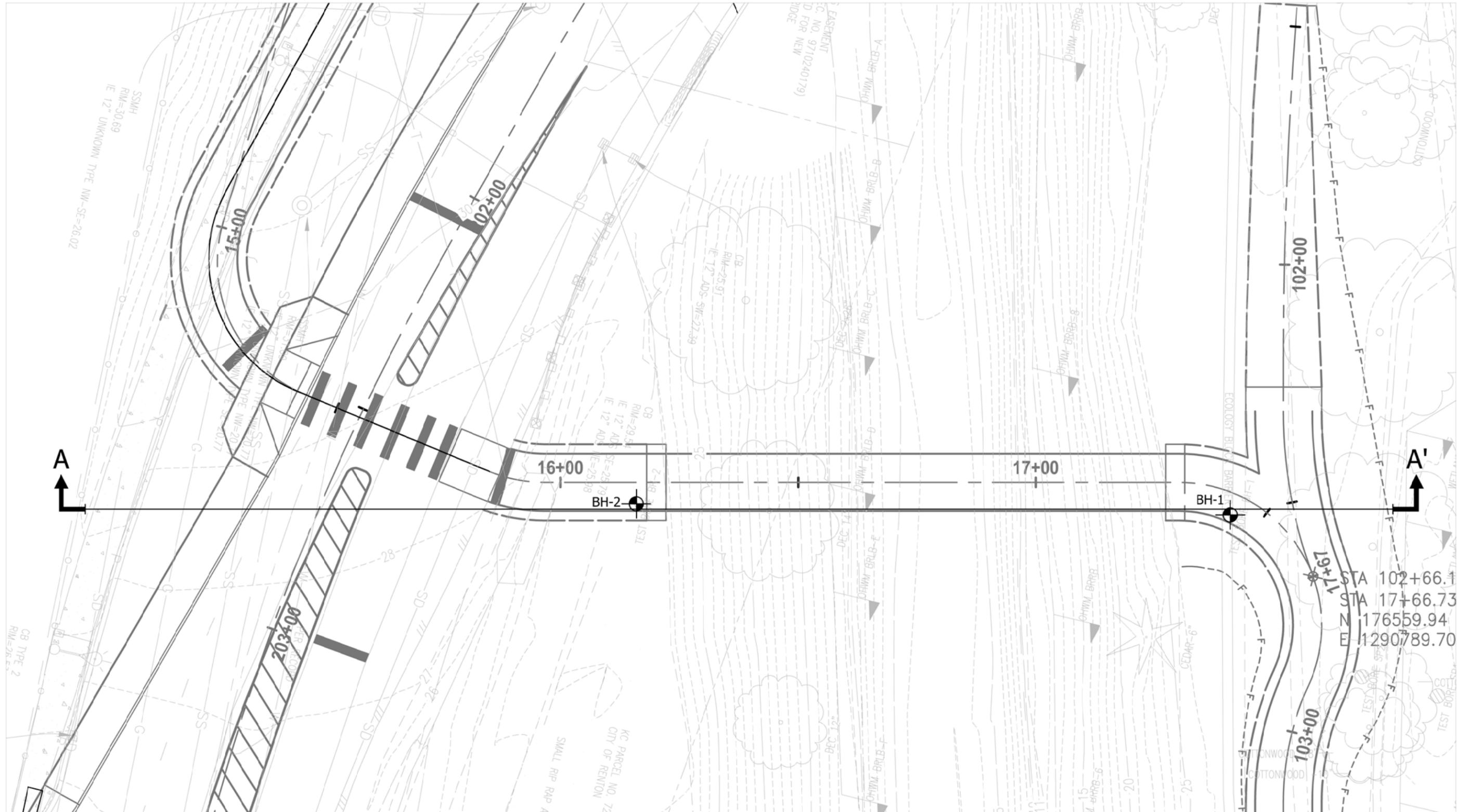
FIGURE NO.

1

PROJECT NO.
2010-100
T200



HWA GEOSCIENCES INC.



STA 102+66.1
 STA 17+66.73
 N 176559.94
 E 1290789.70



Scale: 1"=20'



BH-2
 BORING APPROXIMATE LOCATION AND DESIGNATION



HWA GEOSCIENCES INC.

BLACK RIVER BRIDGE
 LAKE TO SOUND TRAIL
 RENTON, WASHINGTON

SITE AND
 EXPLORATION
 PLAN

DRAWN BY
EFK
 CHECK BY
BT
 DATE:
04.08.15

FIGURE #
2
 PROJECT #
2010-100
 TASK 200

APPENDIX A

FIELD INVESTIGATION

APPENDIX A

FIELD INVESTIGATION

Two geotechnical borings were drilled for the proposed Black River Bridge, on November 10, 2014 and January 6, 2015. These borings were designated BH-1 and BH-2, and were drilled at the top of the river banks in the general centerline of the proposed bridge alignment. The borings were drilled to maximum depths ranging from 61 to 86.5 feet below the existing ground surface. The exploration locations were located in the field by taping distances from known site features and plotted. The locations of the borings are indicated on Figures 2 and 3.

The borings were drilled by Holocene Drilling, Inc. of Puyallup, Washington, under subcontract to HWA Geosciences Inc. The borings were advanced using a track-mounted, Diedrich D-50 drill rig equipped with hollow stem augers. Each of the explorations was completed under the full-time supervision and observation of an HWA geologist.

Soil samples were collected at 2.5- to 5-foot intervals using Standard Penetration Test (SPT) methods in general accordance with ASTM D-1586. SPT sampling consisted of using a 2-inch outside diameter, split-spoon sampler driven with a 140-pound drop hammer using a rope and cathead. During the test, a sample is obtained by driving the sampler 18 inches into the soil with the hammer free-falling 30 inches per blow. The number of blows required for each 6 inches of penetration is recorded. The Standard Penetration Resistance ("N-value") of the soil is calculated as the number of blows required for the final 12 inches of penetration. This resistance, or N-value, provides an indication of the relative density of granular soils and the relative consistency of cohesive soils.

HWA personnel recorded pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and ground water occurrence. Soils were classified in general accordance with the classification system described in Figure A-1, which also provides a key to the exploration log symbols. Representative soil samples were taken to our laboratory for further examination. The summary logs of boreholes are presented on Figures A-2 and A-3.

The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types; actual transitions may be more gradual. Moreover, the soil and ground water conditions depicted are only for the specific locations and dates reported and, therefore, are not necessarily representative of other locations and times.

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff Hard	15 to 30 over 30	2000 - 4000 >4000

TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS		
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)		GW Well-graded GRAVEL	
		Gravel with Fines (appreciable amount of fines)		GP Poorly-graded GRAVEL	
	More than 50% Retained on No. 4 Sieve	Sand and Sandy Soils	Clean Sand (little or no fines)		SW Well-graded SAND
			Sand with Fines (appreciable amount of fines)		SP Poorly-graded SAND
More than 50% Retained on No. 200 Sieve Size	50% or More of Coarse Fraction Passing No. 4 Sieve	Silty SAND		SM Silty SAND	
		Clayey SAND		SC Clayey SAND	
	Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%		ML SILT
			Liquid Limit 50% or More		CL Lean CLAY
50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit Less than 50%		MH Elastic SILT	
		Liquid Limit 50% or More		CH Fat CLAY	
		Liquid Limit 50% or More		OH Organic SILT/Organic CLAY	
Highly Organic Soils				PT PEAT	

SAMPLE TYPE SYMBOLS

	2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
	Shelby Tube
	3-1/4" OD Split Spoon with Brass Rings
	Small Bag Sample
	Large Bag (Bulk) Sample
	Core Run
	Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

	Groundwater Level (measured at time of drilling)
	Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments.
(GEOLOGIC INTERPRETATION)

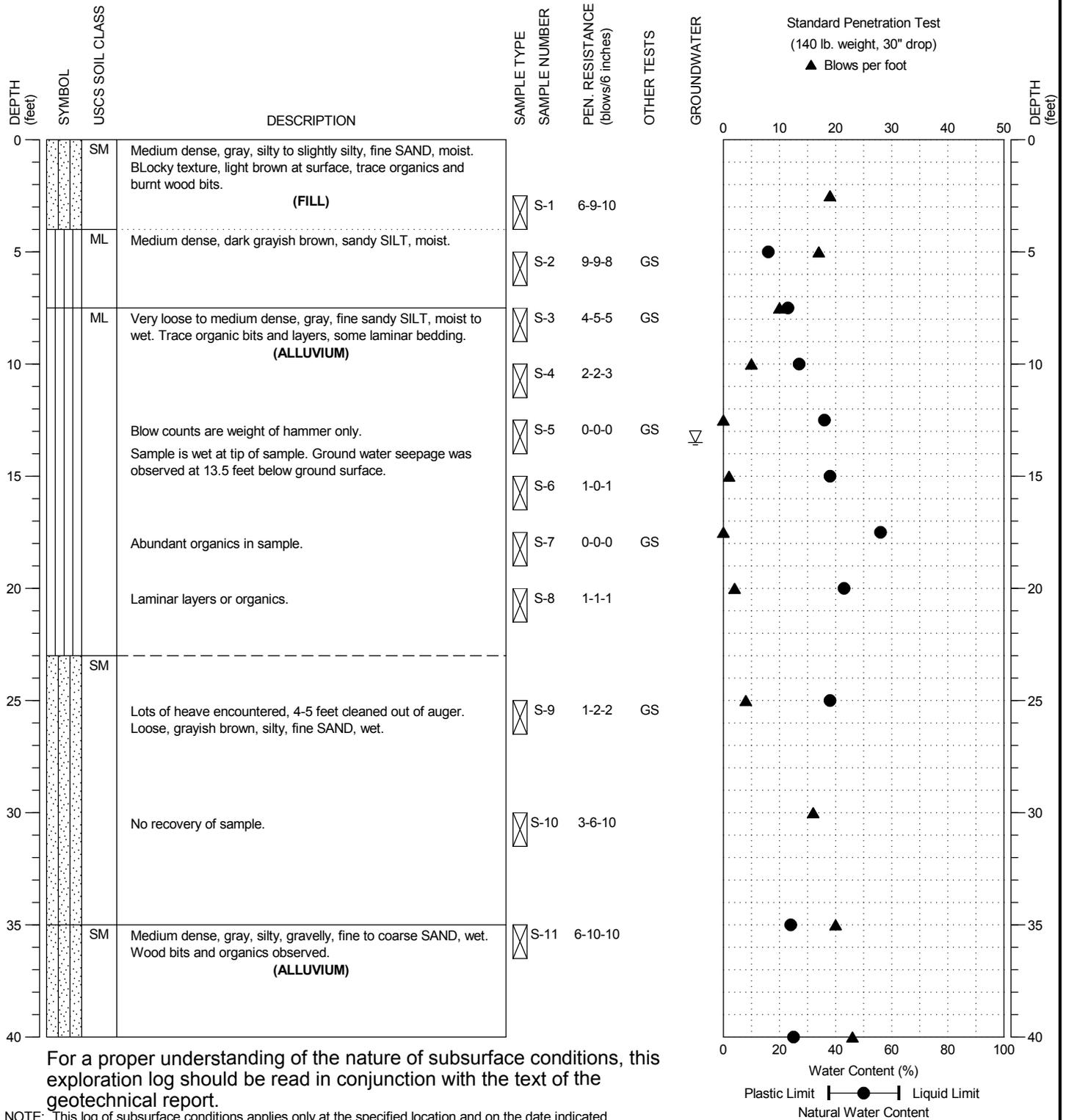
Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

DRILLING COMPANY: Holocene Drilling
 DRILLING METHOD: Diedrich D-50 track rig with HSA
 SAMPLING METHOD: SPT Autohammer
 SURFACE ELEVATION: 26.50 ± feet

LOCATION: See Figure 2
 DATE STARTED: 11/10/2014
 DATE COMPLETED: 11/10/2014
 LOGGED BY: D. Coltrane



For a proper understanding of the nature of subsurface conditions, this exploration log should be read in conjunction with the text of the geotechnical report.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



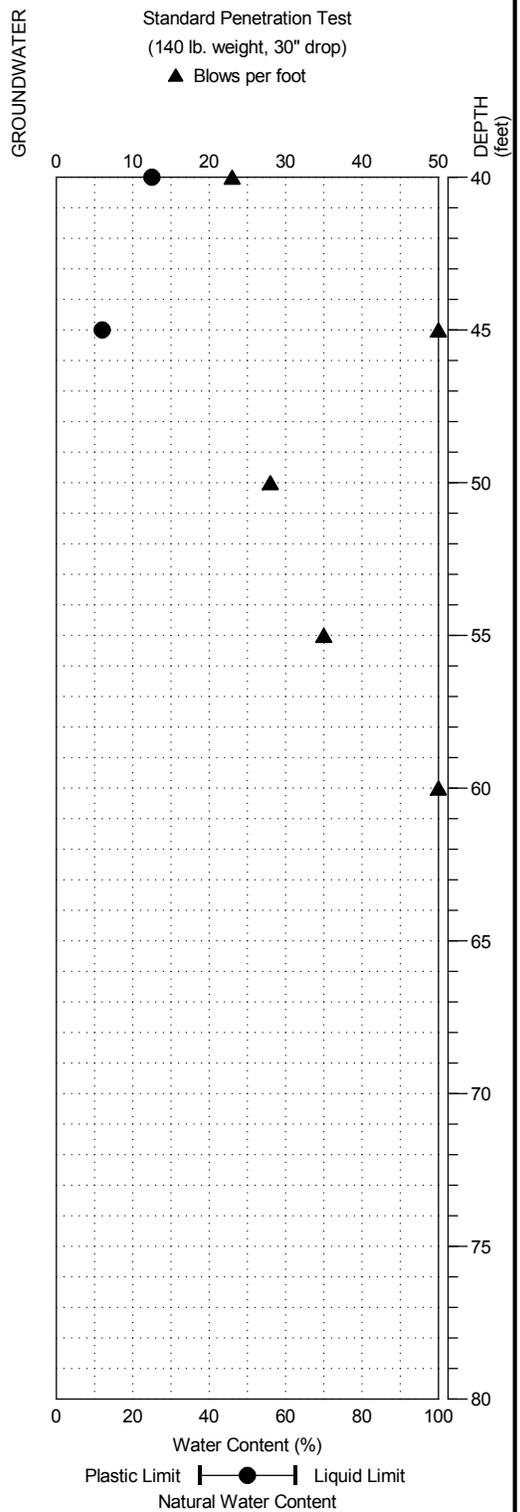
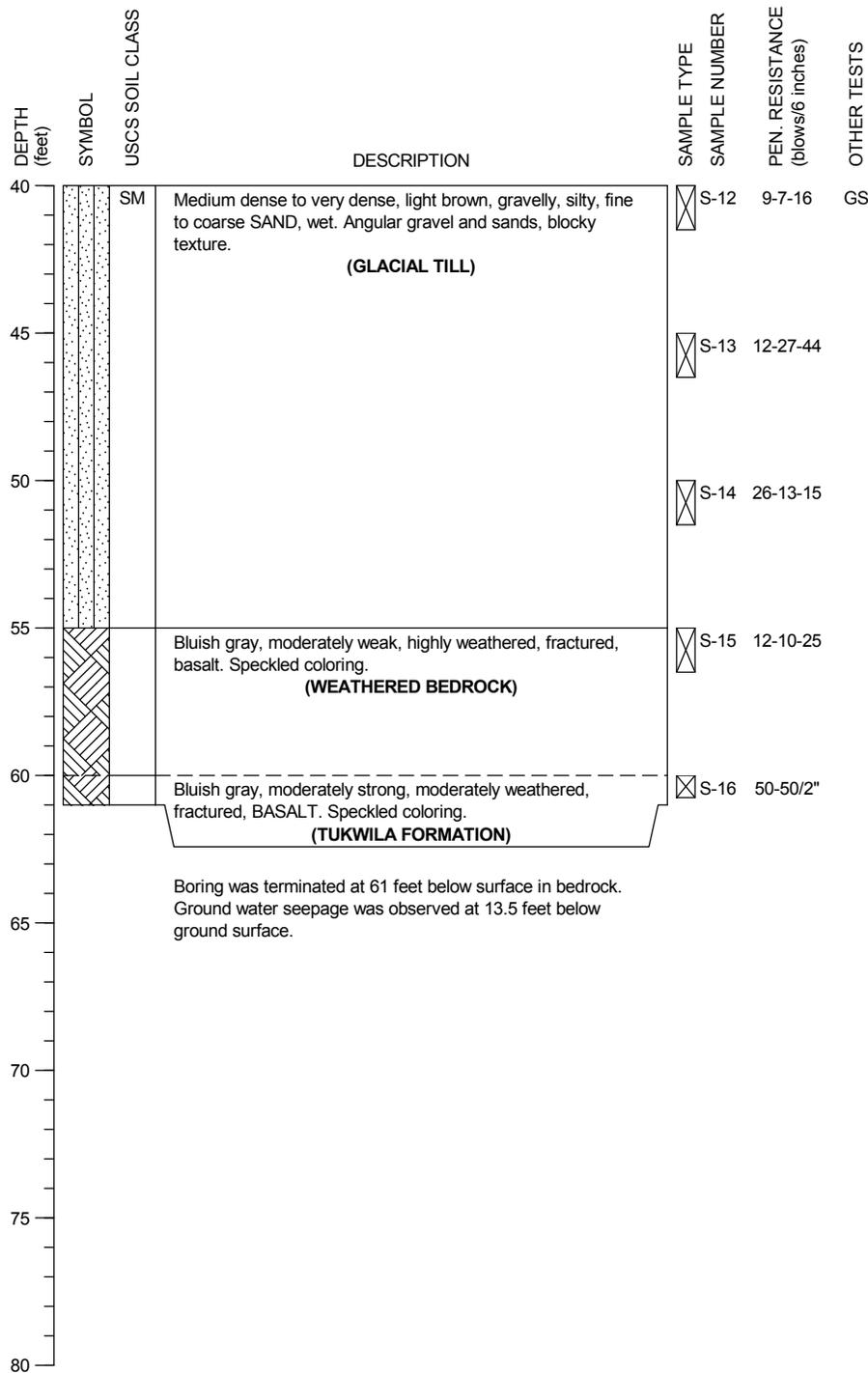
Lake to Sound Trail
 Black River Bridge
 Renton, Washington

BORING:
 BH-1

PAGE: 1 of 2

DRILLING COMPANY: Holocene Drilling
 DRILLING METHOD: Diedrich D-50 track rig with HSA
 SAMPLING METHOD: SPT Autohammer
 SURFACE ELEVATION: 26.50 ± feet

LOCATION: See Figure 2
 DATE STARTED: 11/10/2014
 DATE COMPLETED: 11/10/2014
 LOGGED BY: D. Coltrane



For a proper understanding of the nature of subsurface conditions, this exploration log should be read in conjunction with the text of the geotechnical report.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



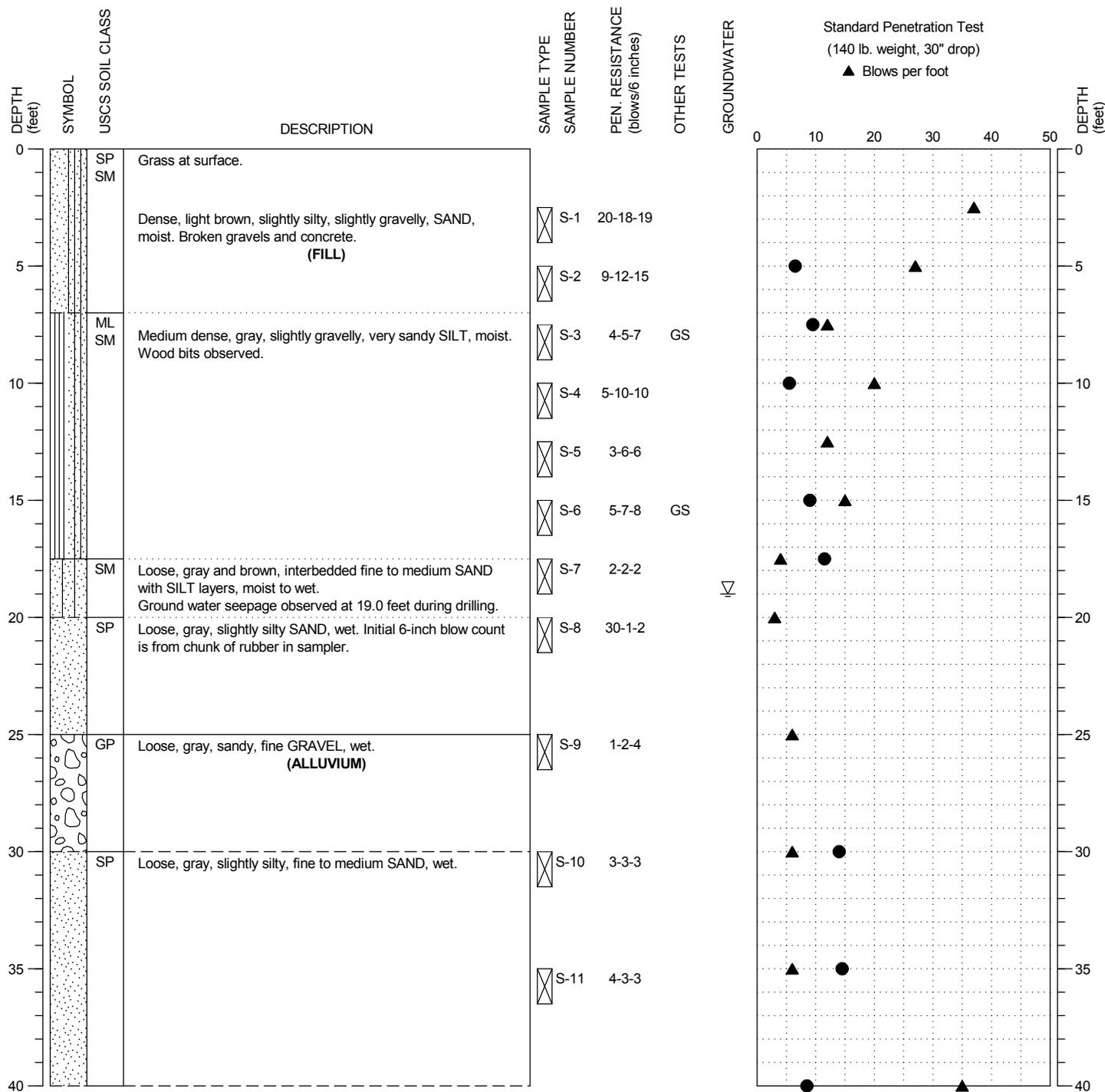
Lake to Sound Trail
 Black River Bridge
 Renton, Washington

BORING:
 BH-1

PAGE: 2 of 2

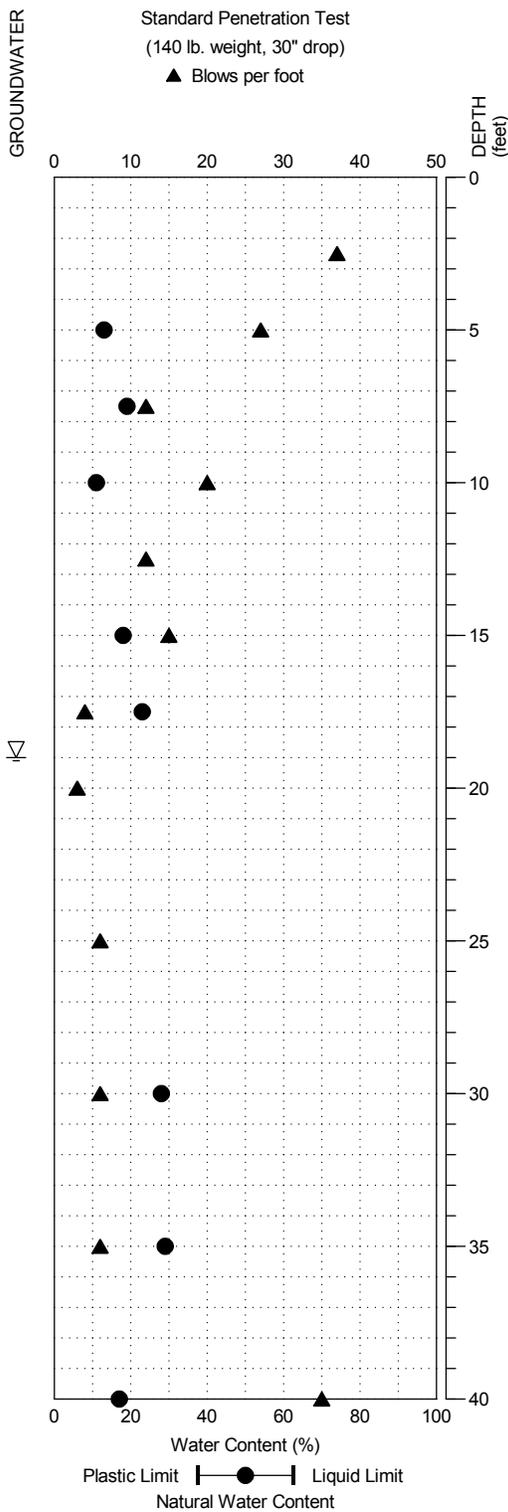
DRILLING COMPANY: Holocene Drilling
 DRILLING METHOD: Diedrich D-50 track rig with HSA
 SAMPLING METHOD: SPT Autohammer
 SURFACE ELEVATION: 29.00 ± feet

LOCATION: See Figure 2
 DATE STARTED: 1/6/2015
 DATE COMPLETED: 1/6/2015
 LOGGED BY: D. Coltrane



For a proper understanding of the nature of subsurface conditions, this exploration log should be read in conjunction with the text of the geotechnical report.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Lake to Sound Trail
 Black River Bridge
 Renton, Washington

BORING:
 BH-2

PAGE: 1 of 3

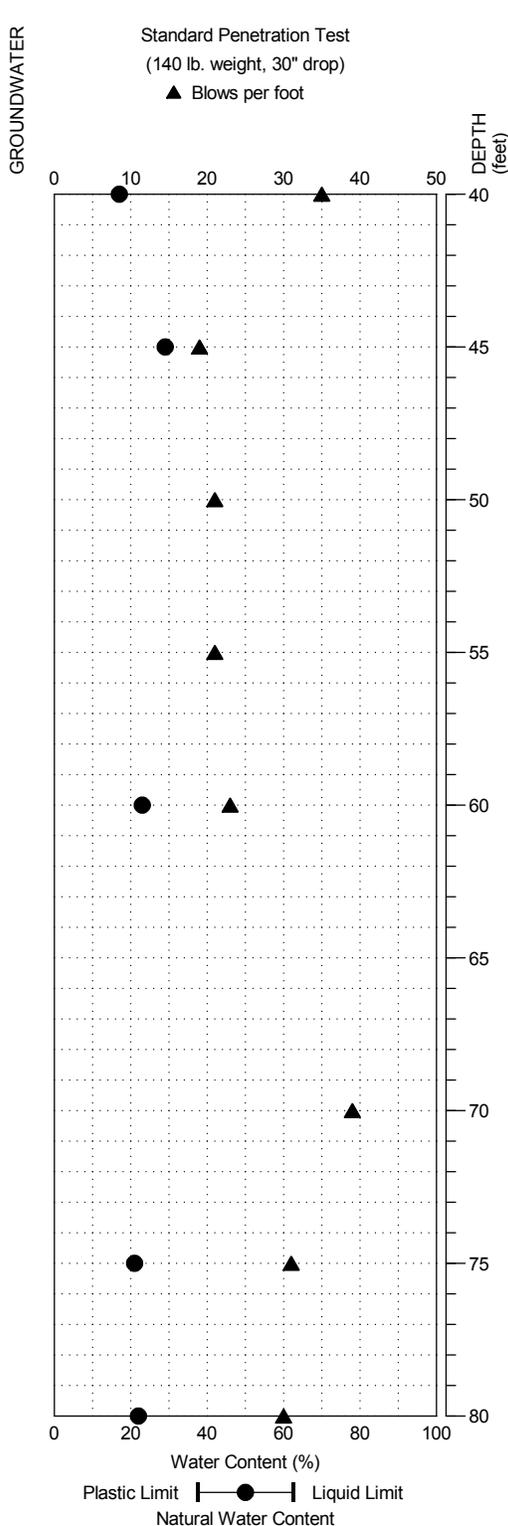
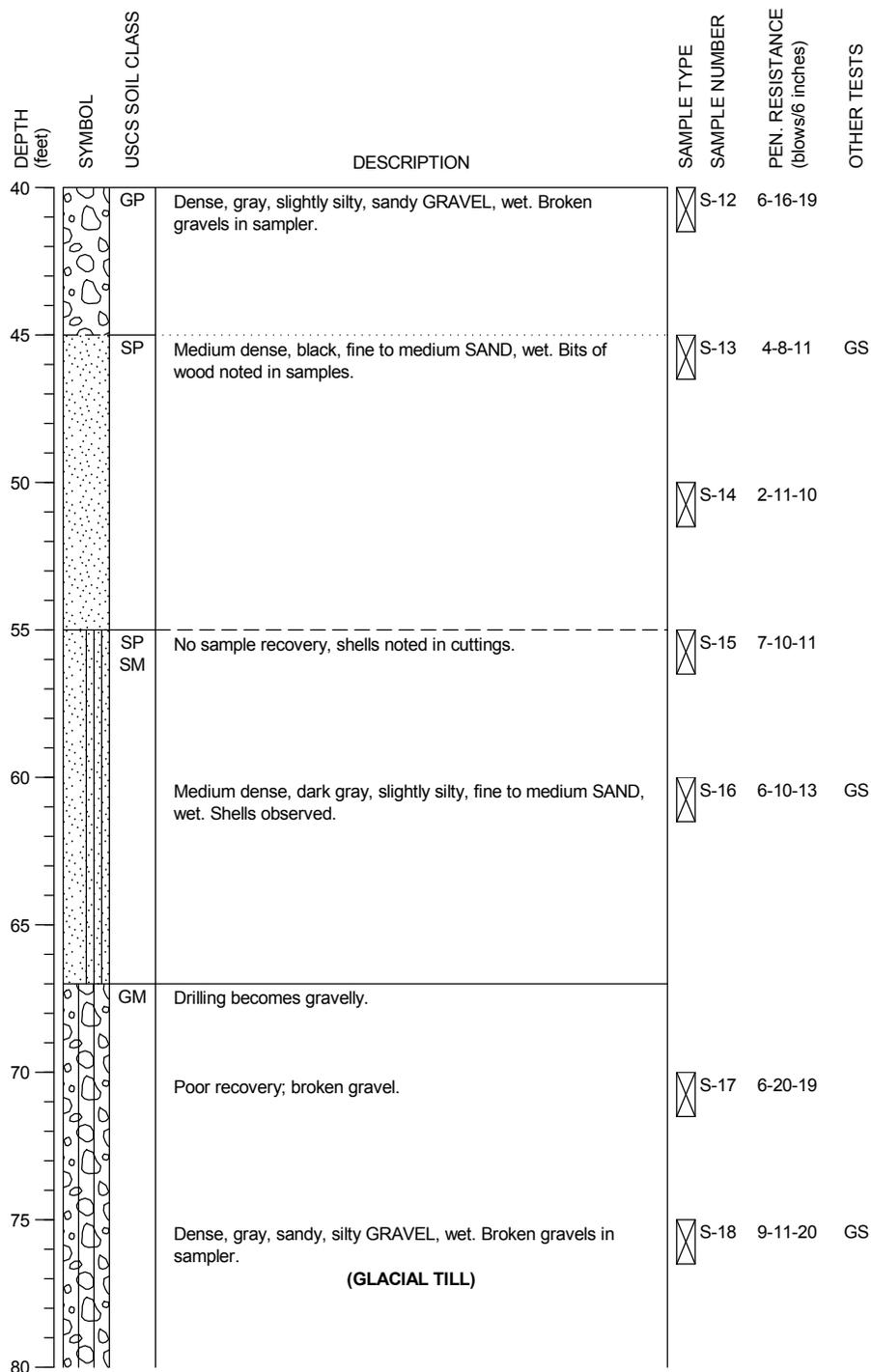
PROJECT NO.: 2010-100-200

FIGURE:

A-3

DRILLING COMPANY: Holocene Drilling
 DRILLING METHOD: Diedrich D-50 track rig with HSA
 SAMPLING METHOD: SPT Autohammer
 SURFACE ELEVATION: 29.00 ± feet

LOCATION: See Figure 2
 DATE STARTED: 1/6/2015
 DATE COMPLETED: 1/6/2015
 LOGGED BY: D. Coltrane



For a proper understanding of the nature of subsurface conditions, this exploration log should be read in conjunction with the text of the geotechnical report.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



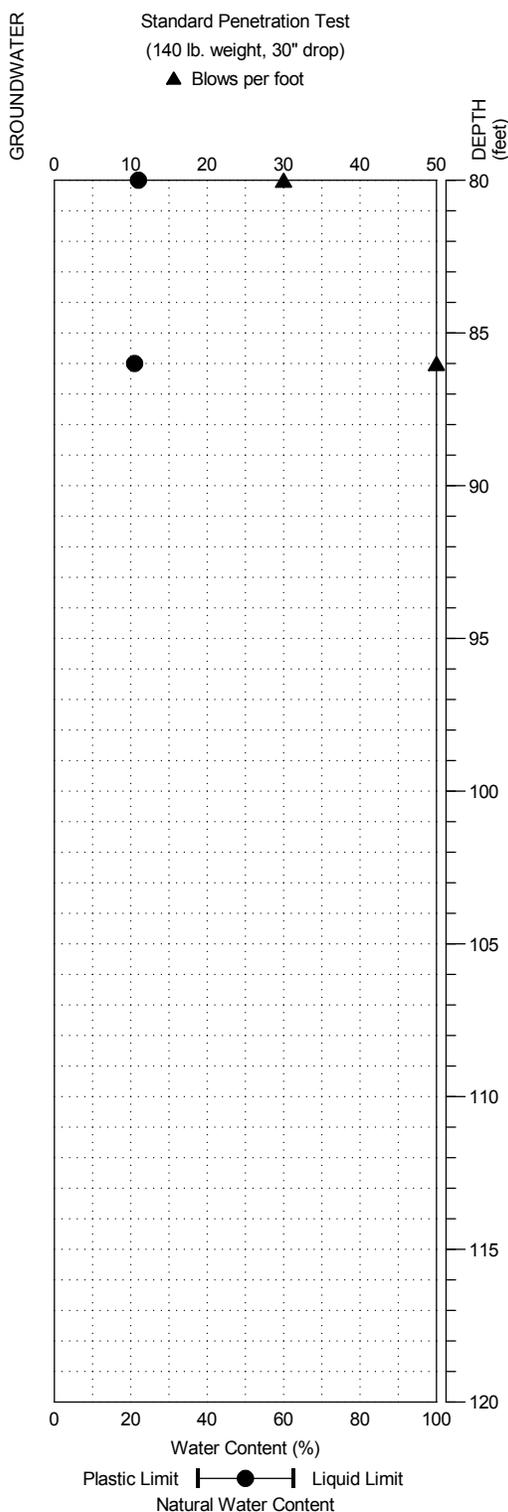
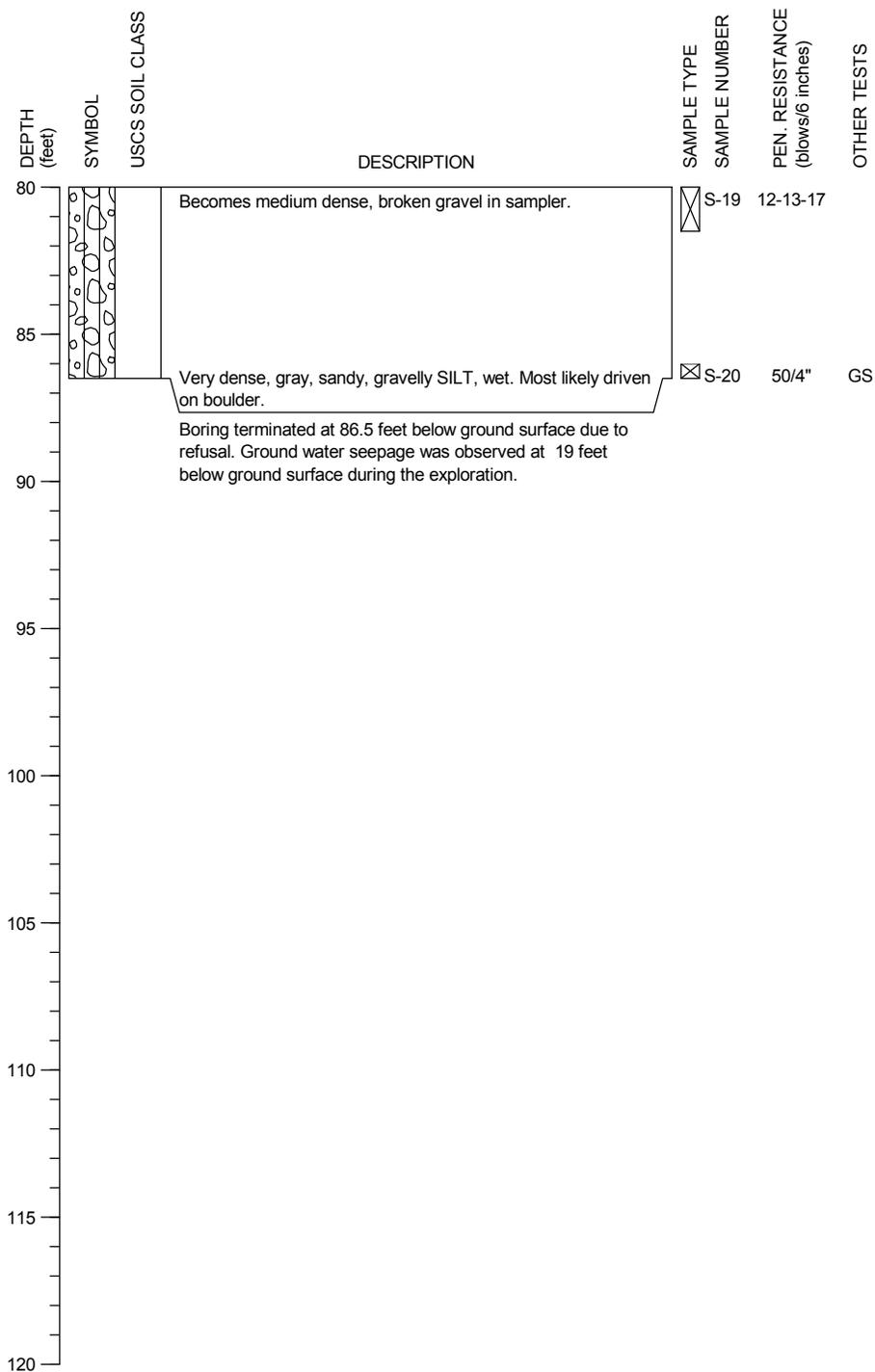
Lake to Sound Trail
 Black River Bridge
 Renton, Washington

BORING:
 BH-2

PAGE: 2 of 3

DRILLING COMPANY: Holocene Drilling
 DRILLING METHOD: Diedrich D-50 track rig with HSA
 SAMPLING METHOD: SPT Autohammer
 SURFACE ELEVATION: 29.00 ± feet

LOCATION: See Figure 2
 DATE STARTED: 1/6/2015
 DATE COMPLETED: 1/6/2015
 LOGGED BY: D. Coltrane



For a proper understanding of the nature of subsurface conditions, this exploration log should be read in conjunction with the text of the geotechnical report.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.



Lake to Sound Trail
 Black River Bridge
 Renton, Washington

BORING:
 BH-2

PAGE: 3 of 3

APPENDIX B

LABORATORY INVESTIGATION

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed on selected samples obtained from the borings to characterize relevant engineering and index properties of the site soils. Because of the predominantly coarse-grained nature of the encountered soils, the collected and tested samples should not be considered representative of the existing soils. For the same reason, only a limited number of laboratory tests could be performed on the obtained soil samples.

HWA personnel performed laboratory tests in general accordance with appropriate ASTM test methods. We tested selected soil samples to determine moisture content and grain-size distribution. The test procedures and results are briefly discussed below.

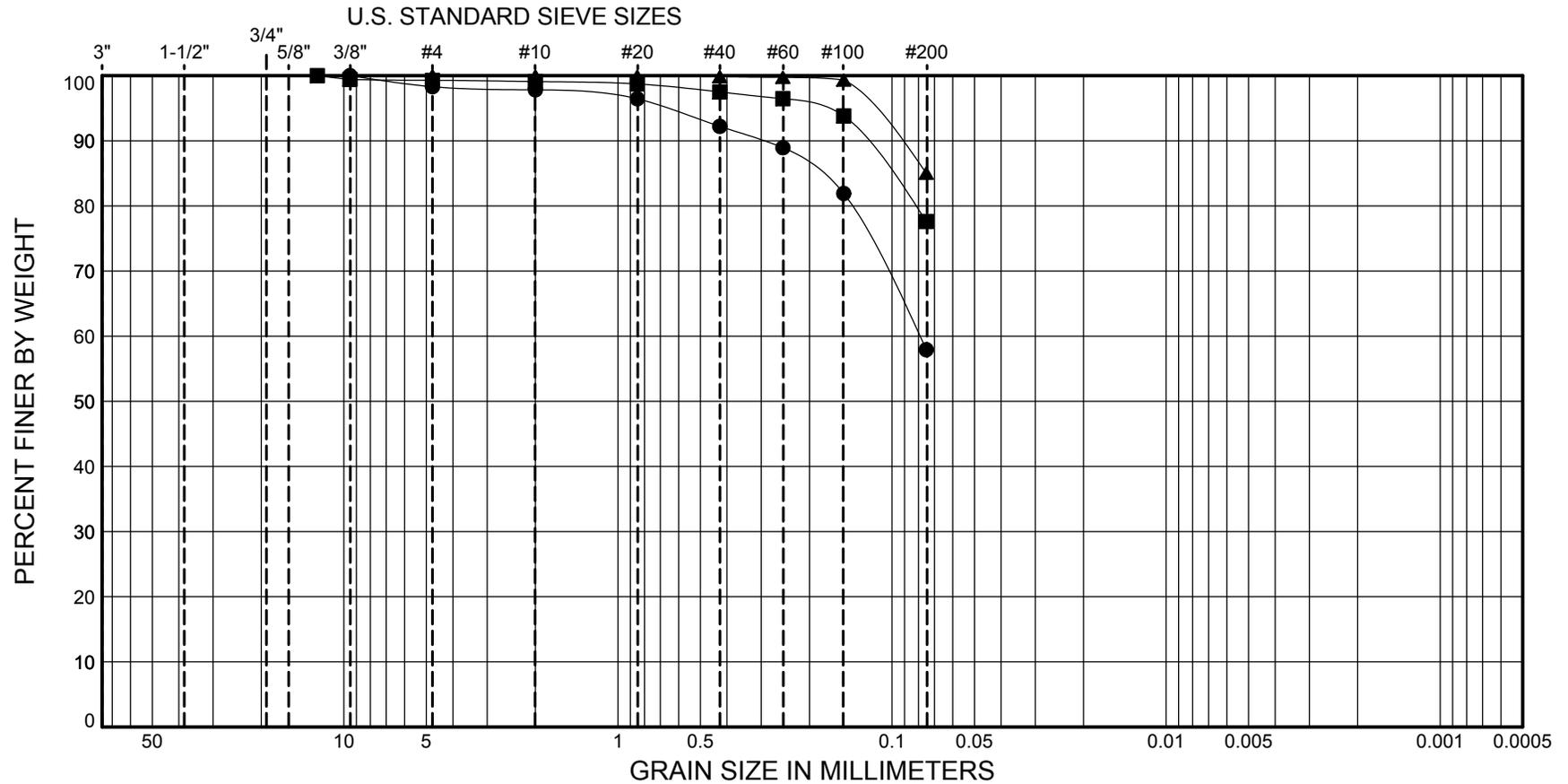
Moisture Content

Laboratory tests were conducted to determine the moisture content of selected soil samples, in general accordance with ASTM D-2216. Test results are indicated at the sampled intervals on the appropriate boring logs in Appendix A.

Grain Size Analysis

The grain size distributions of selected soil samples were determined in general accordance with ASTM D 422. Grain size distribution curves for the tested samples are presented on Figures B-1 through B-4.

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



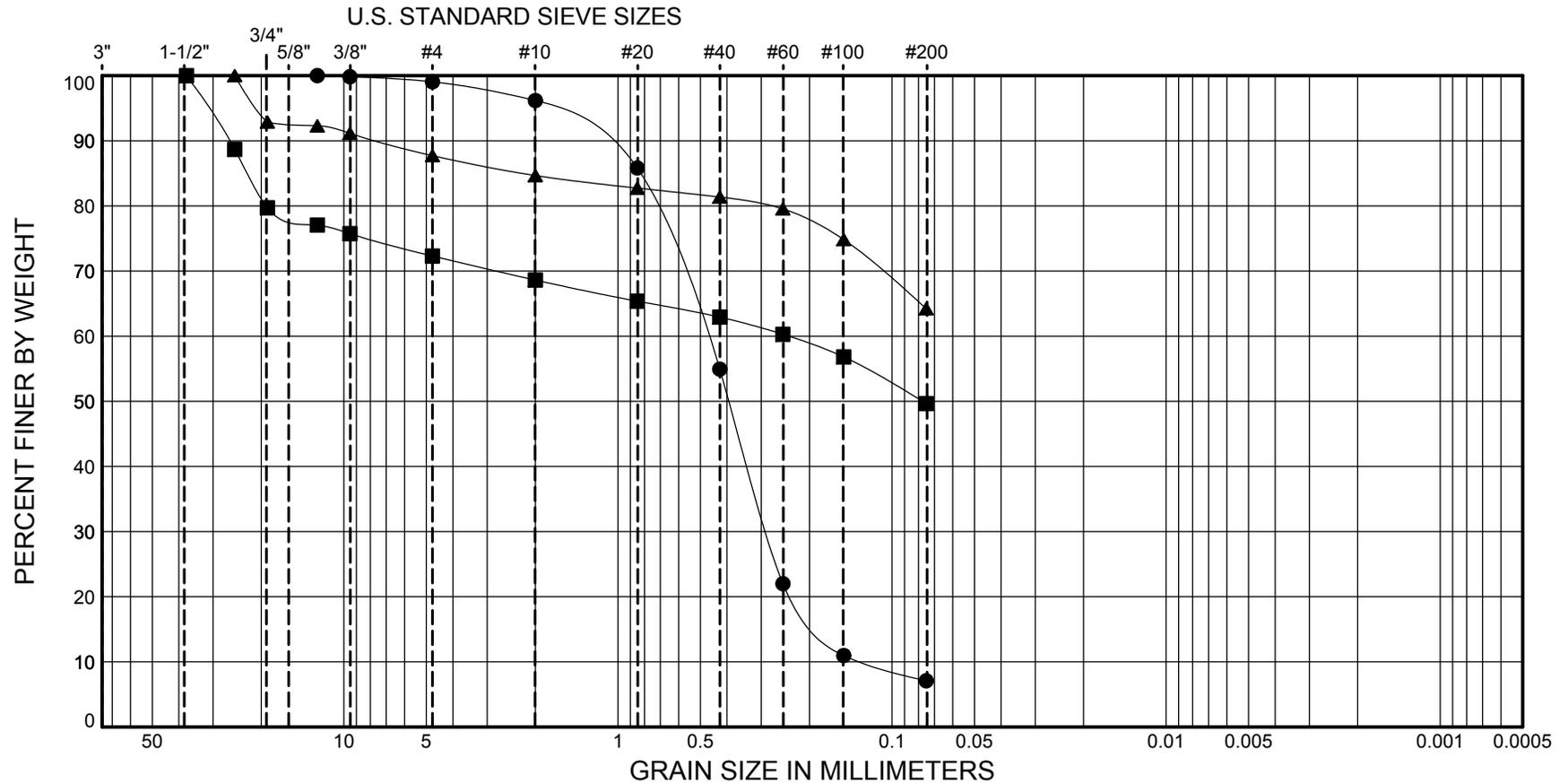
SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-1 S-2	5.0 - 6.5	(ML) Dark grayish brown, Sandy SILT	16				1.7	40.4	57.9
■	BH-1 S-3	7.5 - 9.0	(ML) Dark grayish brown, SILT with sand	23				0.7	21.7	77.6
▲	BH-1 S-5	12.5 - 14.0	(ML) Gray, SILT with sand	36					15.0	85.0



Lake to Sound Trail
 Black River Bridge
 Renton, Washington

PARTICLE-SIZE ANALYSIS
 OF SOILS
 METHOD ASTM D422

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-2 S-16	60.0 - 61.5	(SP-SM) Dark gray, Poorly graded SAND with silt	23				0.9	92.0	7.1
■	BH-2 S-18	75.0 - 76.5	(GM) Gray, Silty GRAVEL with sand	21				27.7	22.7	49.6
▲	BH-2 S-20	86.0 - 86.5	(ML) Gray, SILT with sand	21				12.3	23.5	64.2

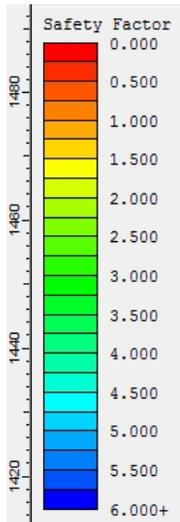


Lake to Sound Trail
Black River Bridge
Renton, Washington

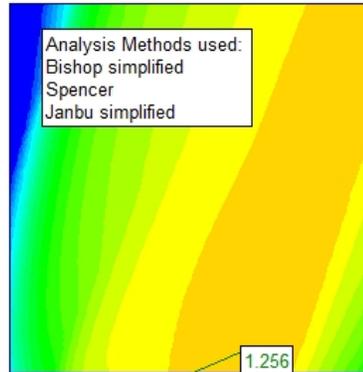
PARTICLE-SIZE ANALYSIS
OF SOILS
METHOD ASTM D422

APPENDIX C

SLOPE STABILITY ANALYSES, COMPUTER CALCULATION RESULTS



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington
 South Side: Static Analysis

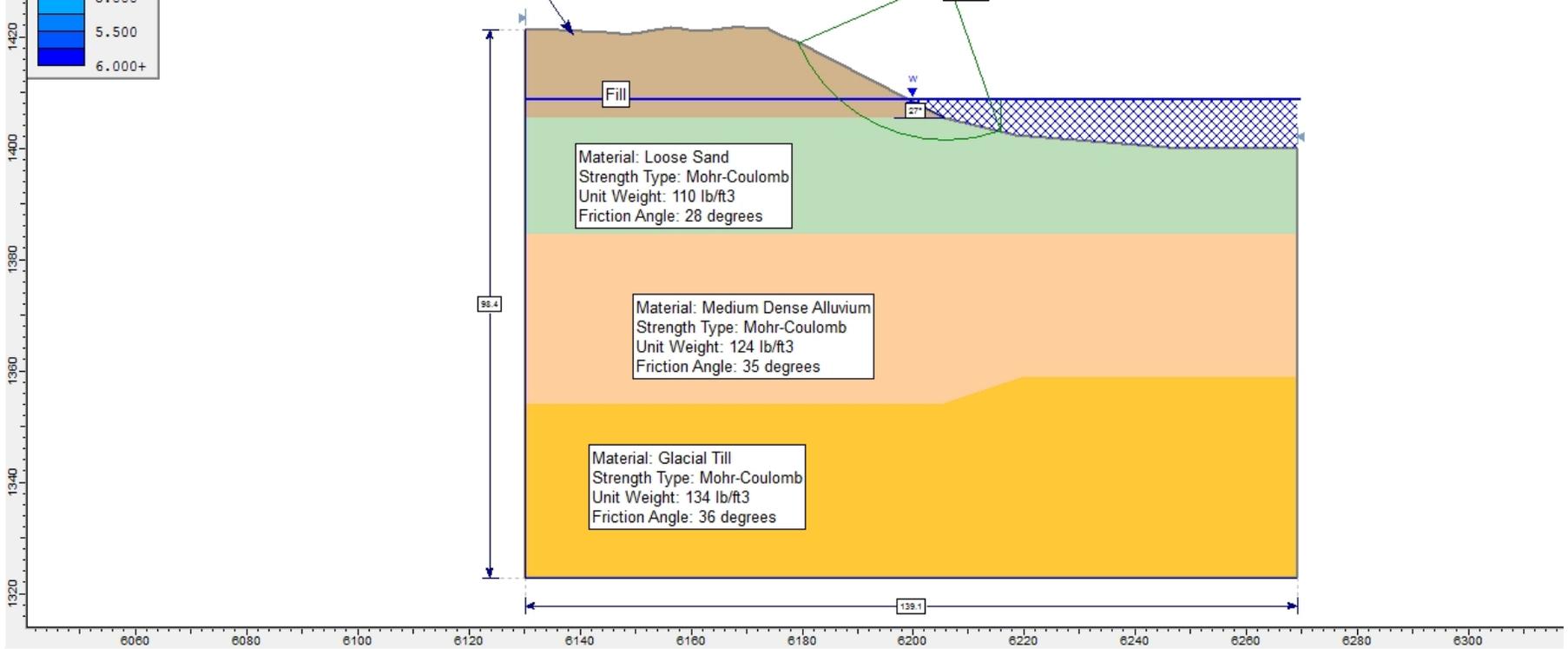


Material: Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Friction Angle: 36 degrees

Material: Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Friction Angle: 28 degrees

Material: Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Friction Angle: 35 degrees

Material: Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Friction Angle: 36 degrees



STATIC STABILITY: SOUTH ABUTMENT

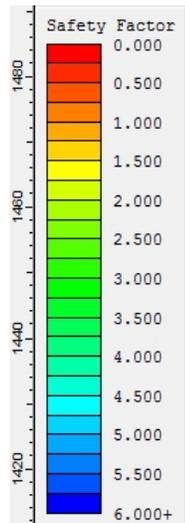
BLACK RIVER BRIDGE
 LAKE TO SOUND TRAIL
 RENTON, WA

FIGURE NO.

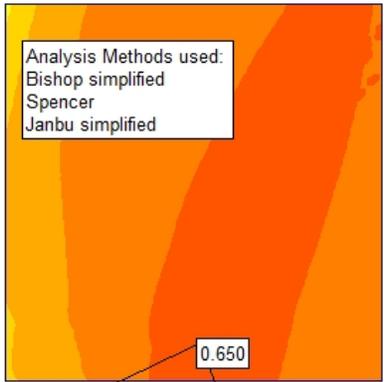
C-1

PROJECT NO.

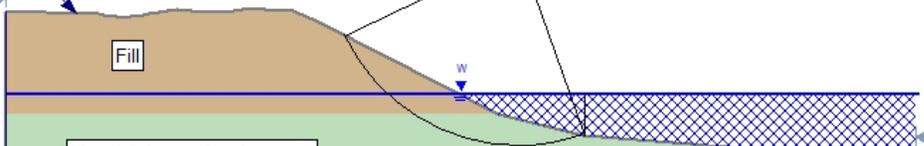
2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington
 South Side: Pseudo-Static Analysis



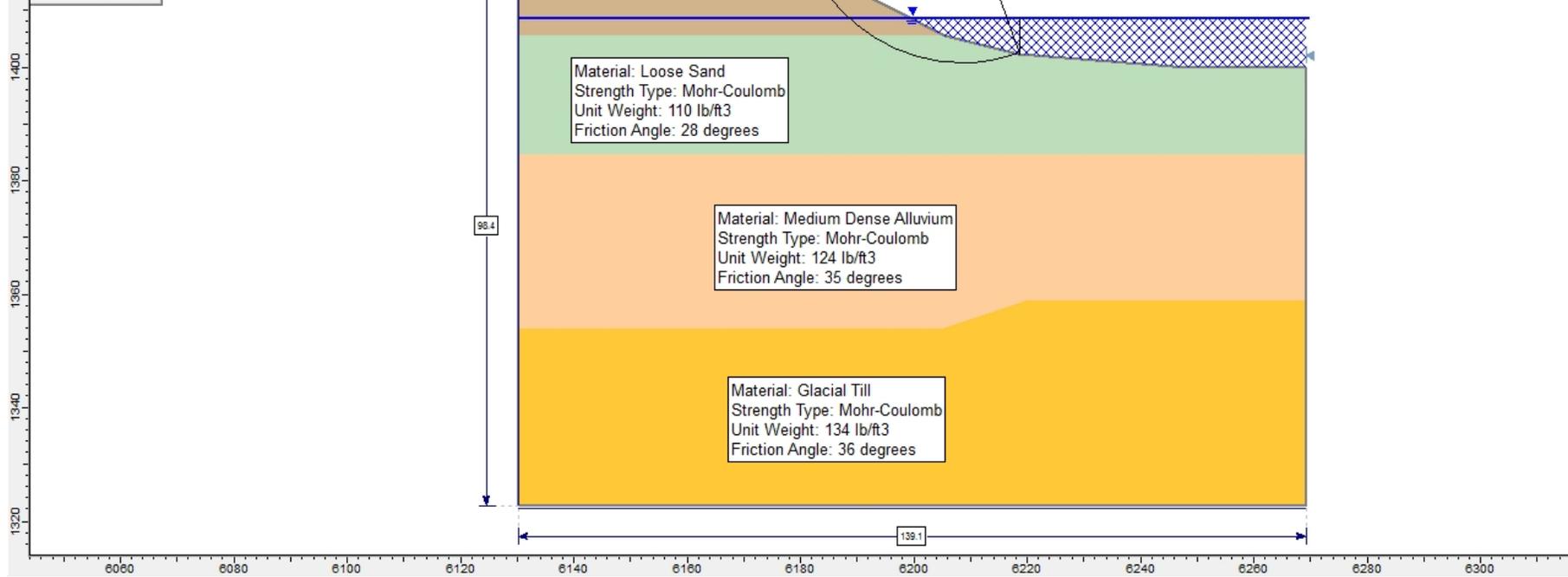
Material: Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Friction Angle: 36 degrees



Material: Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Friction Angle: 28 degrees

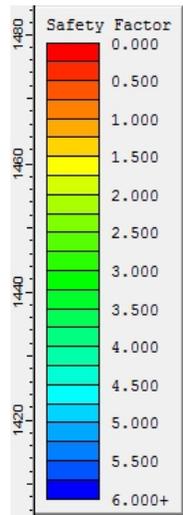
Material: Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Friction Angle: 35 degrees

Material: Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Friction Angle: 36 degrees

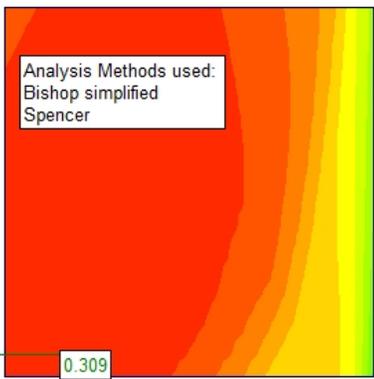


SEISMIC STABILITY: SOUTH ABUTMENT (DESIGN EVENT)

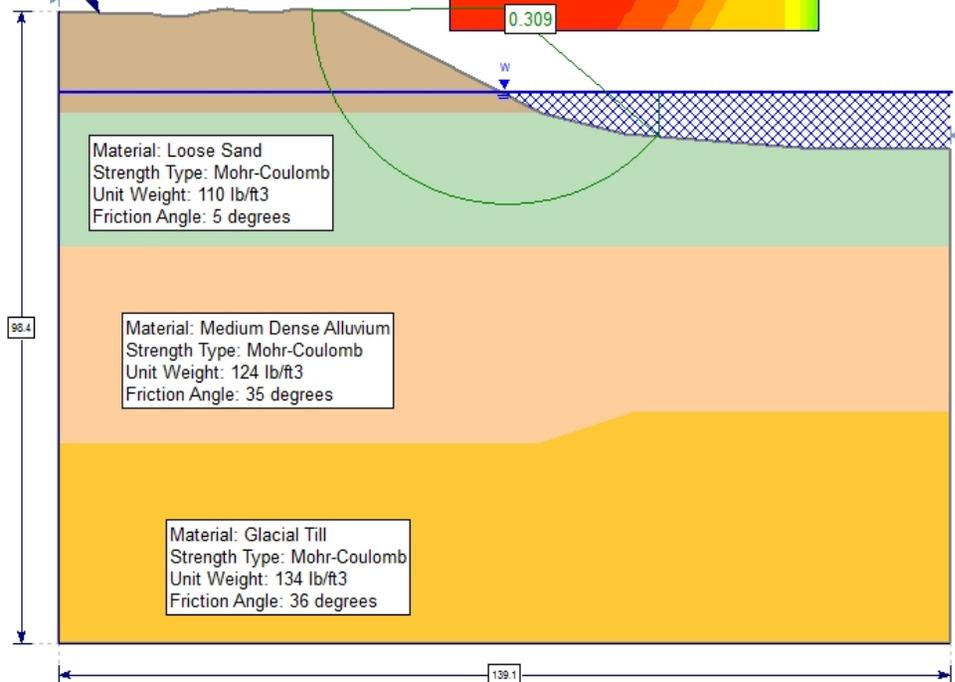
FIGURE NO.
C-2
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington
 South Side: Post Liquefaction Analysis

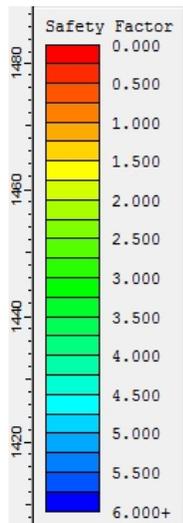


Material: Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Friction Angle: 36 degrees

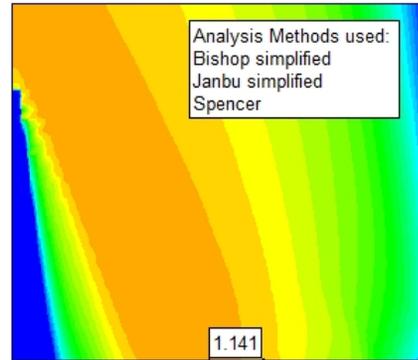


POST LIQUEFACTION STABILITY: SOUTH ABUTMENT (DESIGN EVENT)

FIGURE NO.
C-3
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington
 North Side: Static Analysis



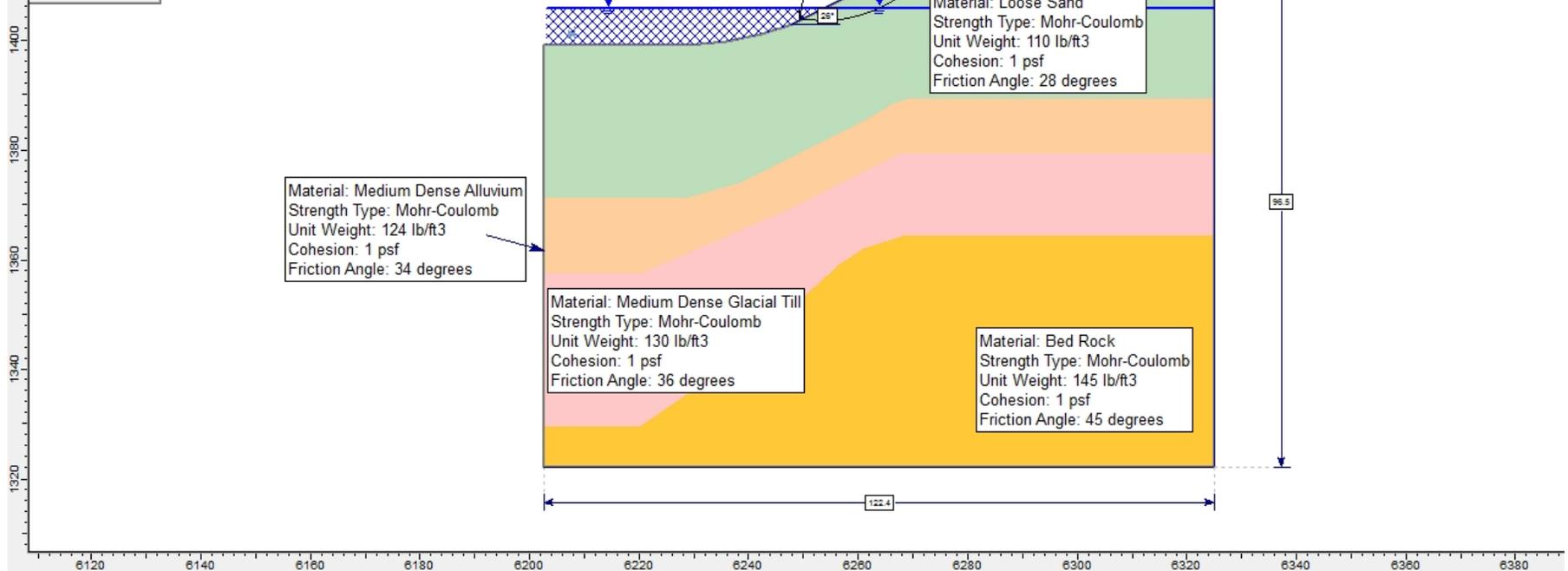
Material: Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees

Material: Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees

Material: Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 34 degrees

Material: Medium Dense Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees

Material: Bed Rock
 Strength Type: Mohr-Coulomb
 Unit Weight: 145 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 45 degrees



STATIC STABILITY: NORTH ABUTMENT

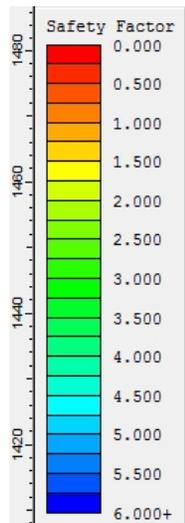
BLACK RIVER BRIDGE
 LAKE TO SOUND TRAIL
 RENTON, WA

FIGURE NO.

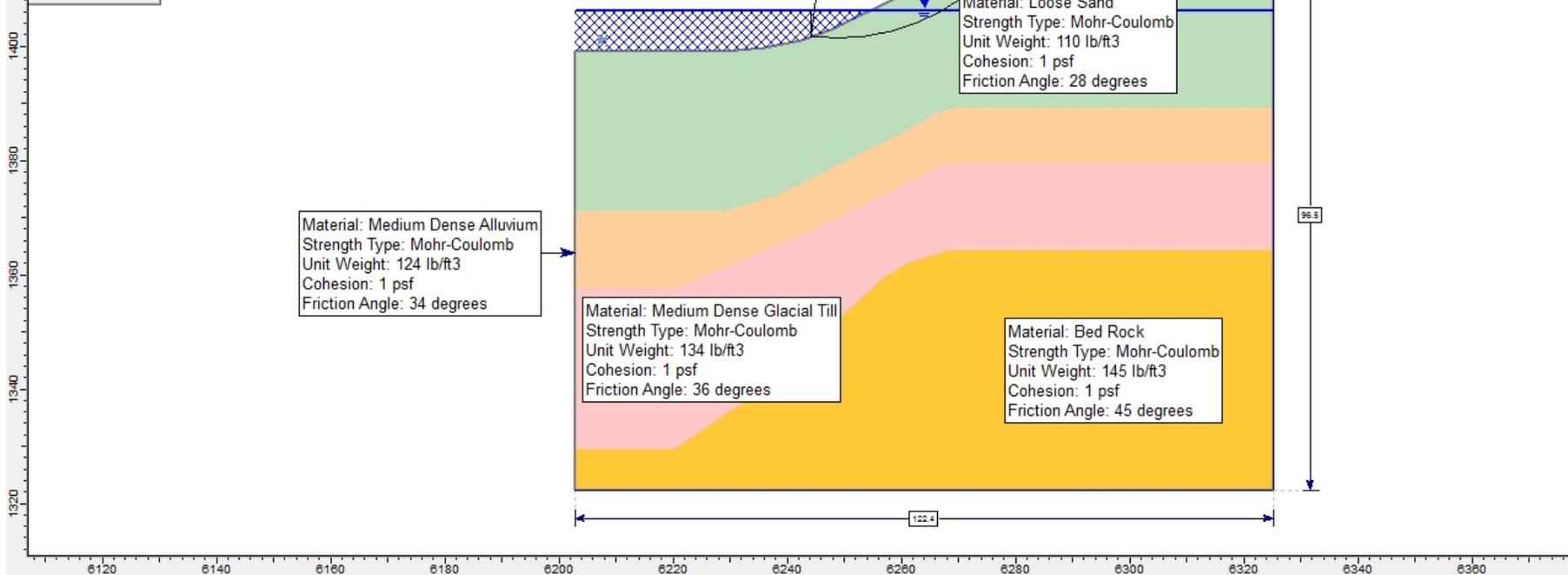
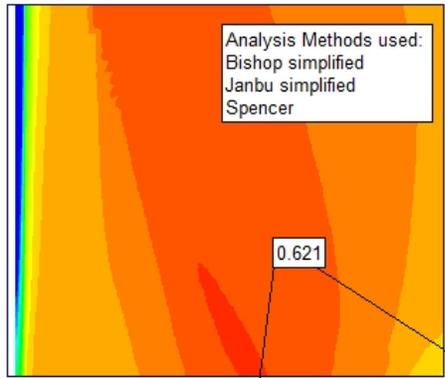
C-4

PROJECT NO.

2010-100-21

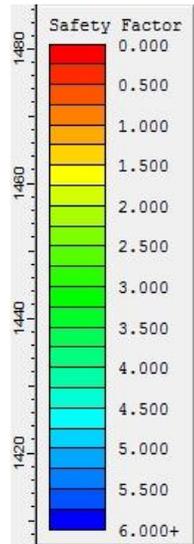


Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington
 North Side: Pseudo - Static Analysis

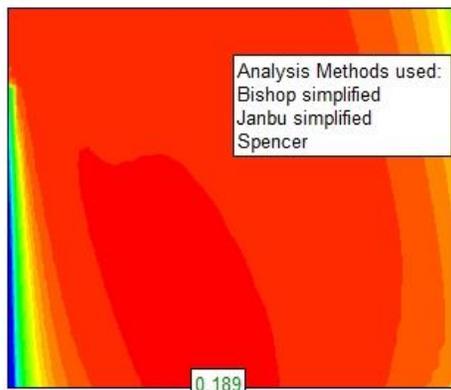


SEISMIC STABILITY: NORTH ABUTMENT (DESIGN EVENT)

FIGURE NO.
C-5
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington
 North Side: Post Liquefaction Analysis



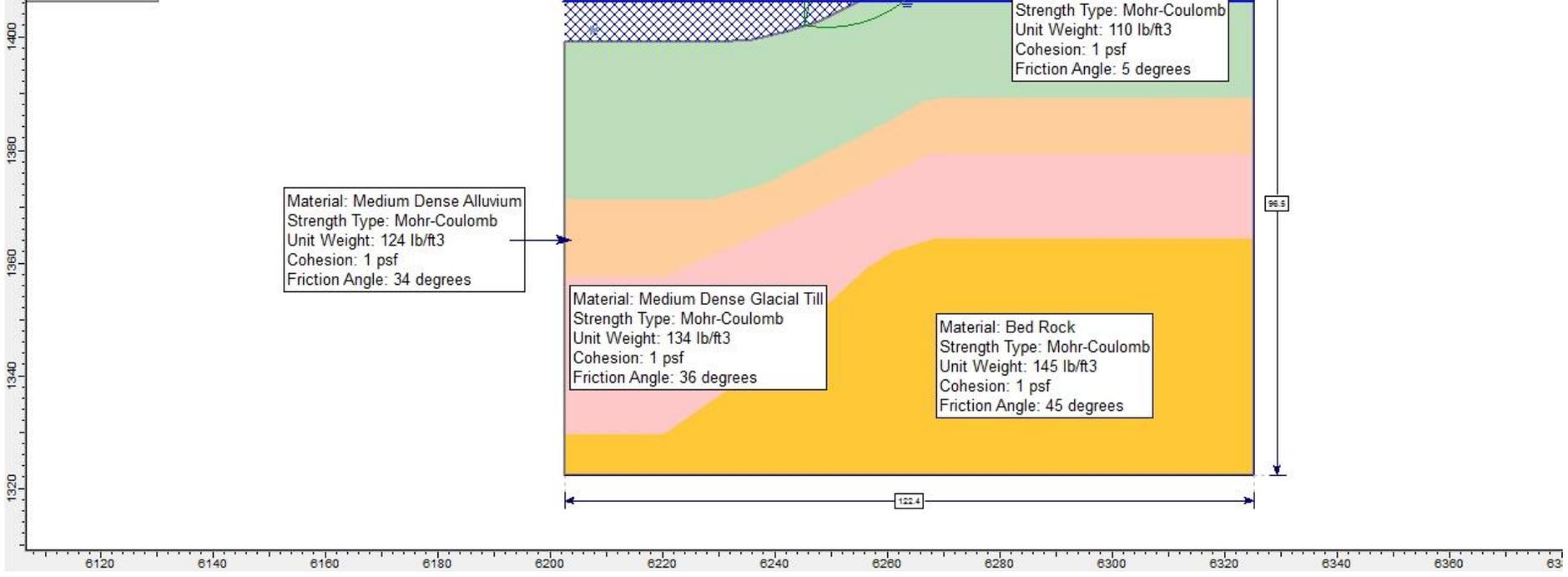
Material: Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees

Material: Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 5 degrees

Material: Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 34 degrees

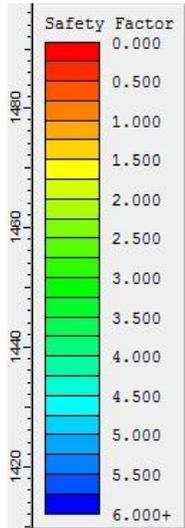
Material: Medium Dense Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees

Material: Bed Rock
 Strength Type: Mohr-Coulomb
 Unit Weight: 145 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 45 degrees



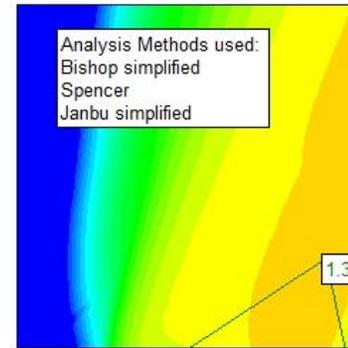
POST LIQUEFACTION STABILITY: NORTH ABUTMENT (DESIGN EVENT)

FIGURE NO.
C-6
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington

South Side: Static Analysis
 After Ground Improvements
 (Stone Columns)



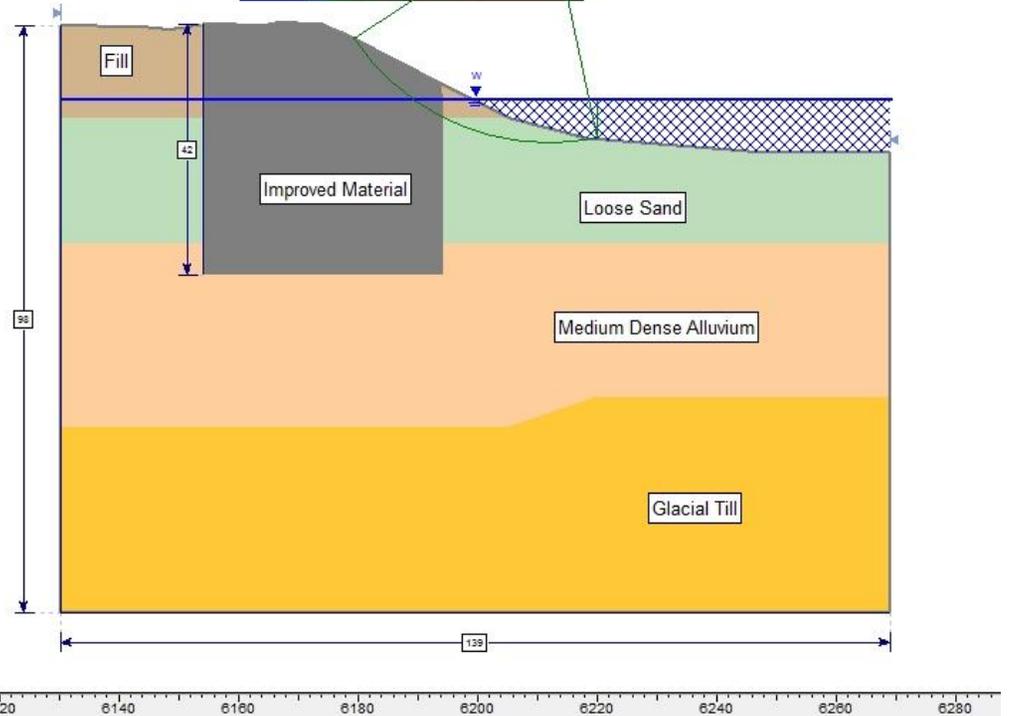
Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees
 Water Surface: Water Table

Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 35 degrees
 Water Surface: Water Table

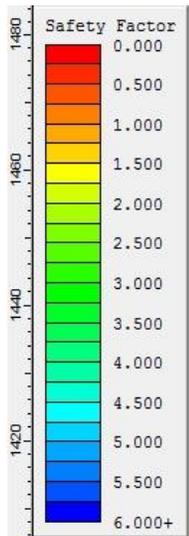
Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Improved Material
 Strength Type: Mohr-Coulomb
 Unit Weight: 115 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 32 degrees
 Water Surface: Water Table



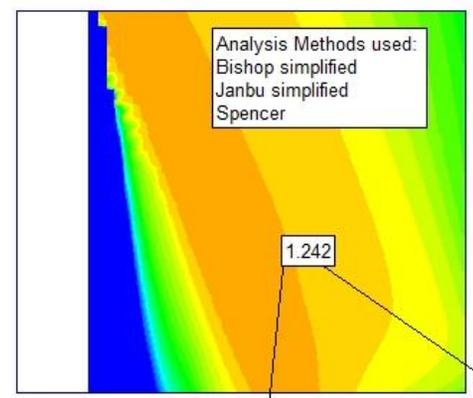
STATIC STABILITY AFTER GROUND IMPROVEMENTS:
 STONE COLUMNS - SOUTH ABUTMENT

FIGURE NO.
C-7
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington

North Side: Static Analysis
 After Ground Improvements
 (Stone Columns)



Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

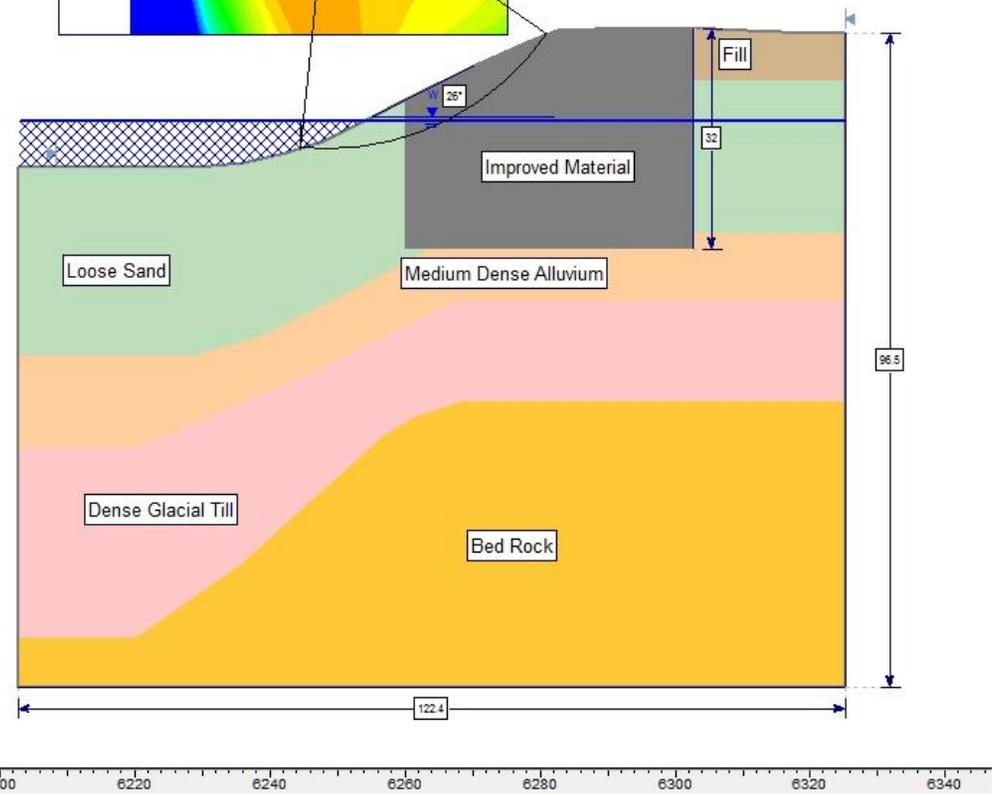
Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees
 Water Surface: Water Table

Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 34 degrees
 Water Surface: Water Table

Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

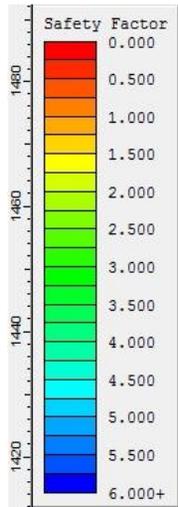
Bed Rock
 Strength Type: Mohr-Coulomb
 Unit Weight: 145 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 45 degrees
 Water Surface: Water Table

Improved Material
 Strength Type: Mohr-Coulomb
 Unit Weight: 115 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 32 degrees
 Water Surface: Water Table



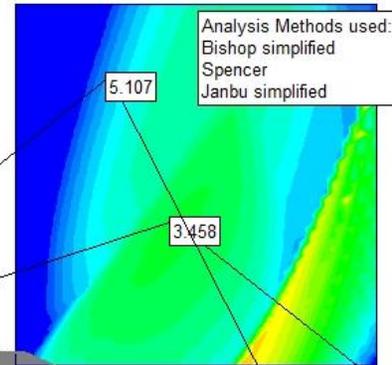
STATIC STABILITY AFTER GROUND IMPROVEMENTS:
 STONE COLUMNS - NORTH ABUTMENT

FIGURE NO.
C-8
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington

South Side: Pseudo-Static Analysis
 After Ground Improvements
 (Deep Soil Mixing)



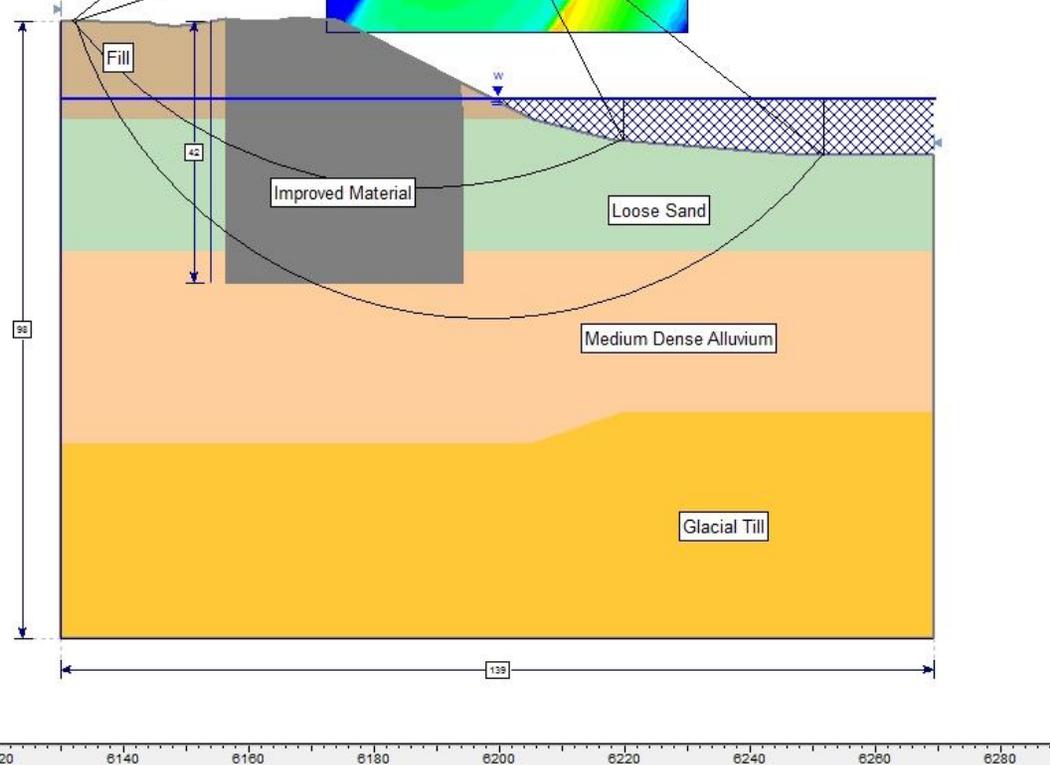
Fill
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 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees
 Water Surface: Water Table

Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 35 degrees
 Water Surface: Water Table

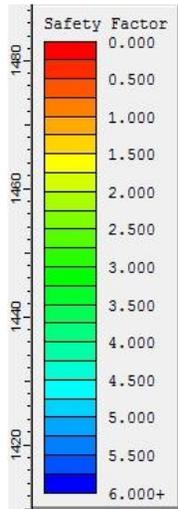
Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Improved Material
 Strength Type: Mohr-Coulomb
 Unit Weight: 120 lb/ft³
 Cohesion: 2000 psf
 Friction Angle: 32 degrees
 Water Surface: Water Table

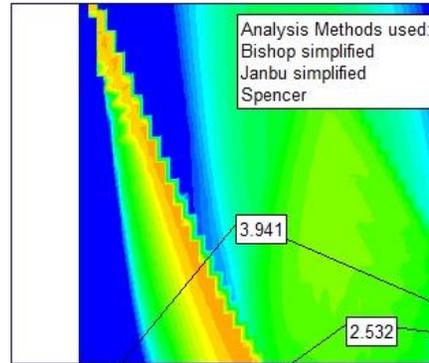


STATIC STABILITY AFTER GROUND IMPROVEMENTS:
 DEEP SOIL MIXING - SOUTH ABUTMENT

FIGURE NO.
C-9
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington
 North Side: Pseudo-Static Analysis
 After Ground Improvements
 (Deep Soil Mixing)



Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

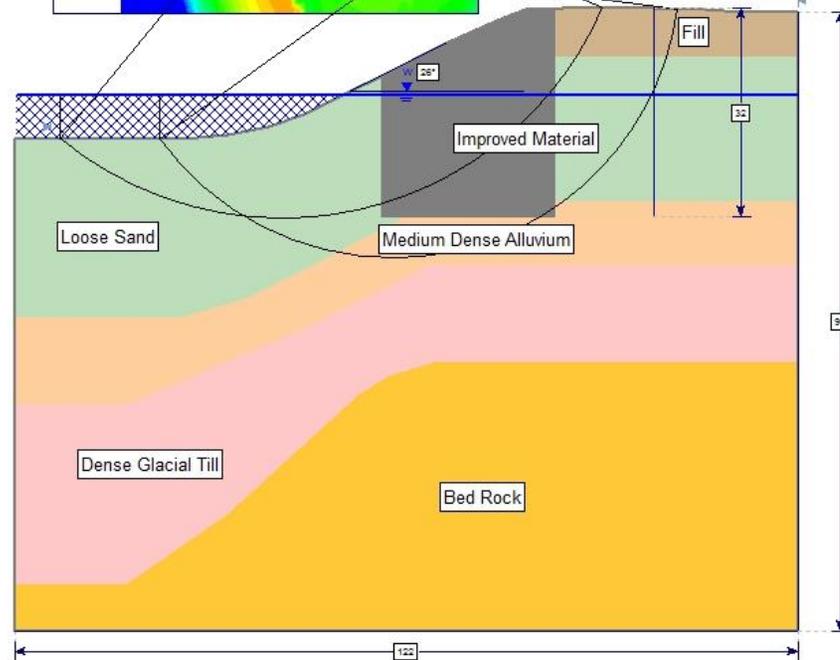
Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees
 Water Surface: Water Table

Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 35 degrees
 Water Surface: Water Table

Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

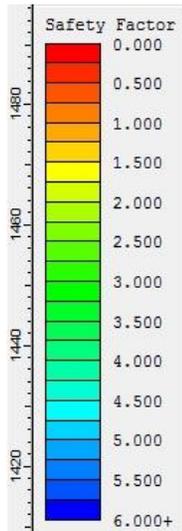
Bed Rock
 Strength Type: Mohr-Coulomb
 Unit Weight: 145 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 45 degrees
 Water Surface: Water Table

Improved Material
 Strength Type: Mohr-Coulomb
 Unit Weight: 120 lb/ft³
 Cohesion: 2000 psf
 Friction Angle: 32 degrees
 Water Surface: Water Table



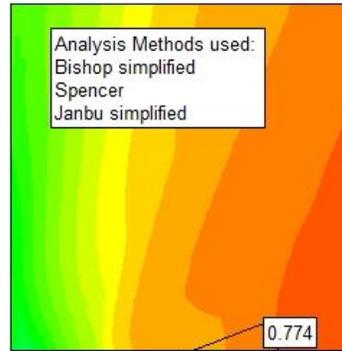
STATIC STABILITY AFTER GROUND IMPROVEMENTS:
 DEEP SOIL MIXING - NORTH ABUTMENT

FIGURE NO.
C-10
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington

South Side: Pseudo Static Analysis
 After Ground Improvements
 (Stone Columns)



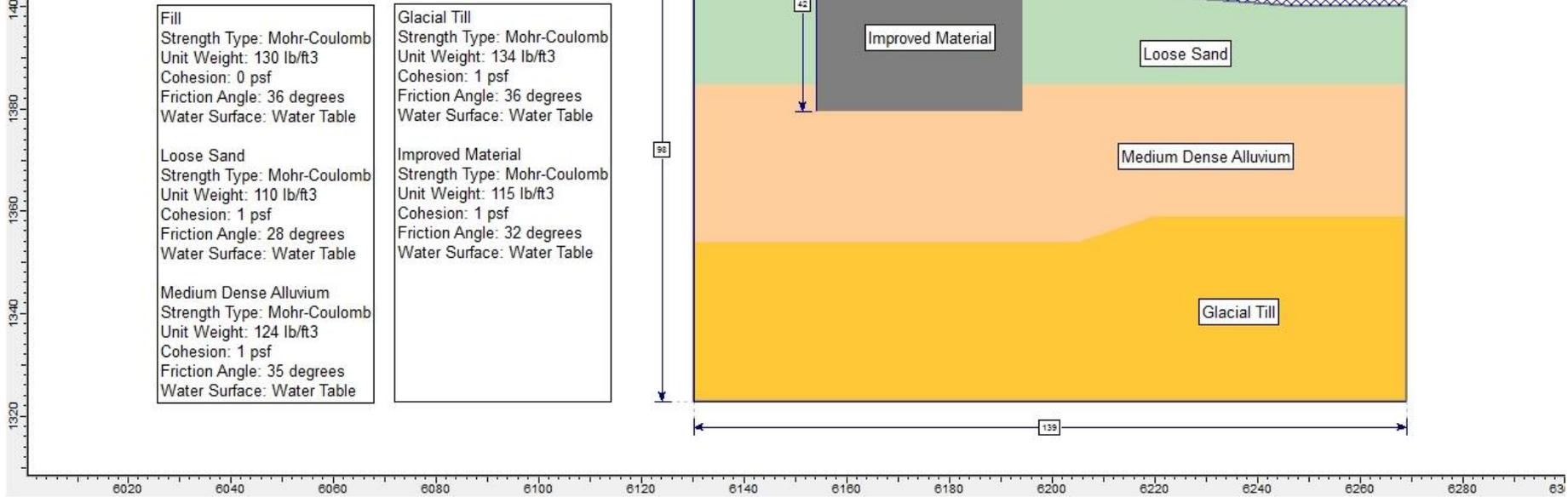
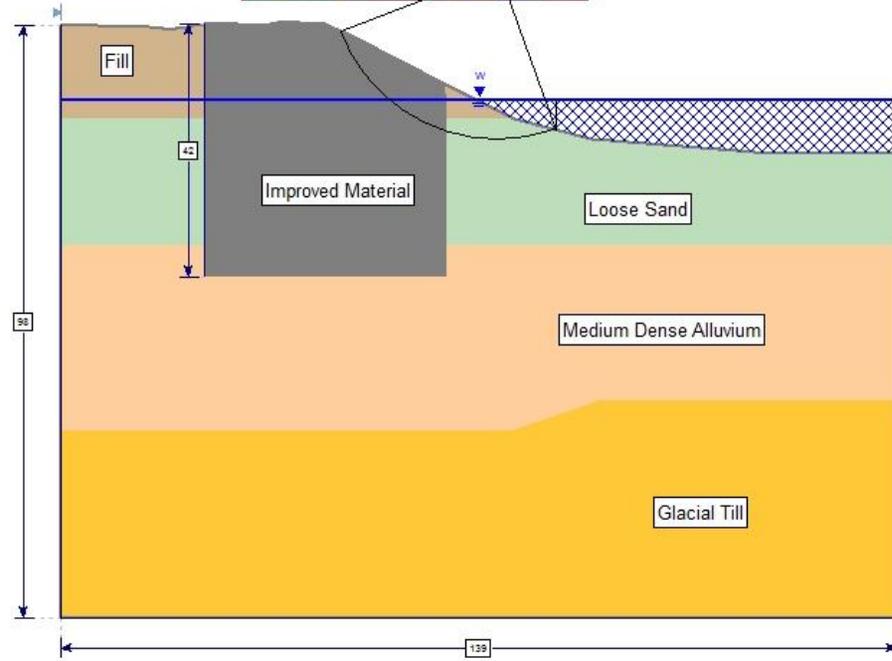
Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees
 Water Surface: Water Table

Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 35 degrees
 Water Surface: Water Table

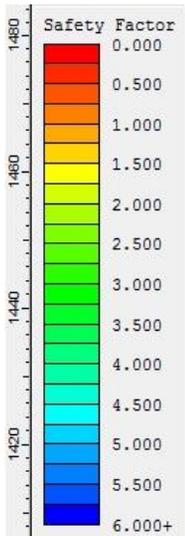
Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Improved Material
 Strength Type: Mohr-Coulomb
 Unit Weight: 115 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 32 degrees
 Water Surface: Water Table



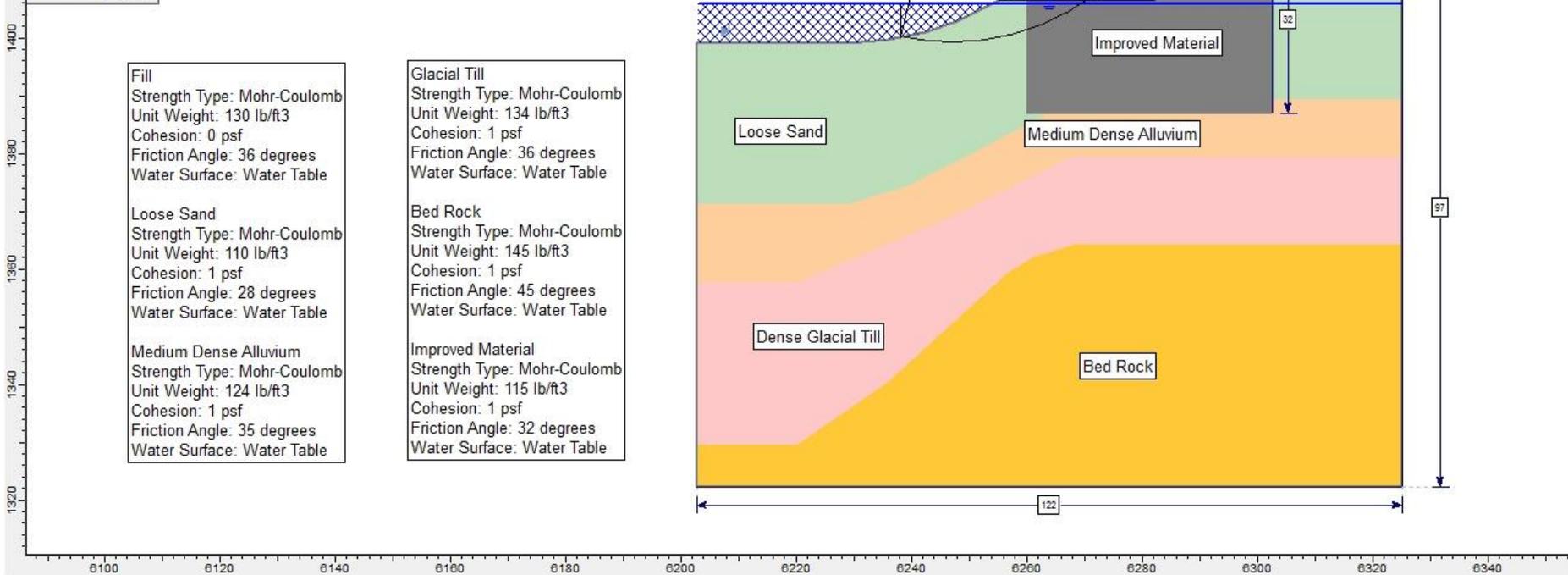
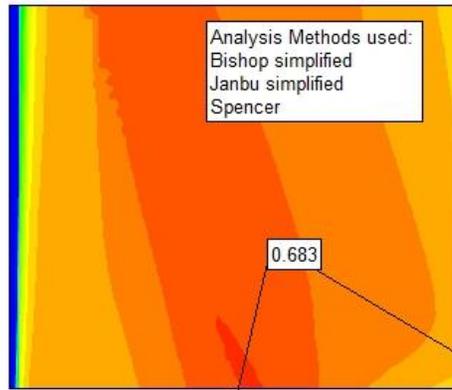
PSEUDO STATIC STABILITY AFTER GROUND IMPROVEMENTS: STONE COLUMNS- SOUTH ABUTMENT

FIGURE NO.
C-11
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington

North Side: Pseudo-Static Analysis
 After Ground Improvements
 (Stone Columns)



Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees
 Water Surface: Water Table

Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 35 degrees
 Water Surface: Water Table

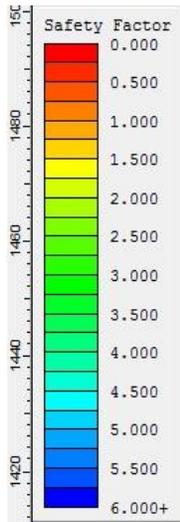
Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Bed Rock
 Strength Type: Mohr-Coulomb
 Unit Weight: 145 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 45 degrees
 Water Surface: Water Table

Improved Material
 Strength Type: Mohr-Coulomb
 Unit Weight: 115 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 32 degrees
 Water Surface: Water Table

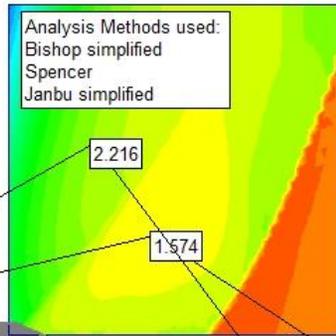
PSEUDO STATIC STABILITY AFTER GROUND IMPROVEMENTS: STONE COLUMNS- NORTH ABUTMENT

FIGURE NO. **C-12**
 PROJECT NO. 2010-100-21

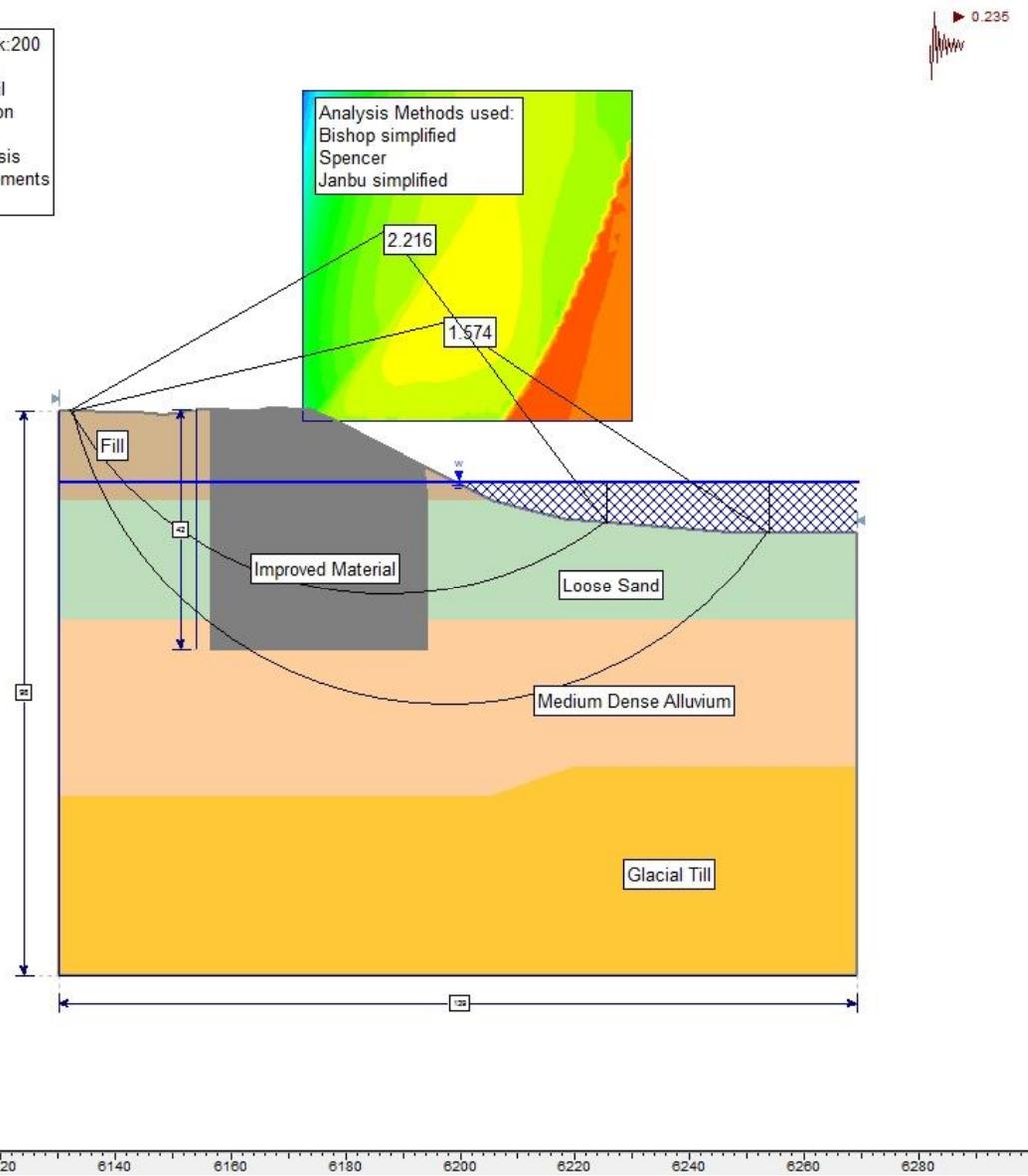


Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington

South Side: Pseudo-Static Analysis
 After Ground Improvements
 (Deep Soil Mixing)

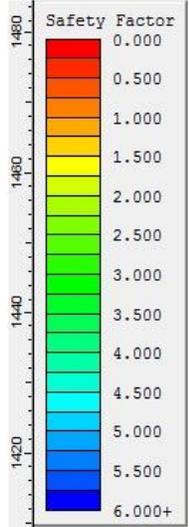


Fill Strength Type: Mohr-Coulomb Unit Weight: 130 lb/ft ³ Cohesion: 0 psf Friction Angle: 36 degrees Water Surface: Water Table	Glacial Till Strength Type: Mohr-Coulomb Unit Weight: 134 lb/ft ³ Cohesion: 1 psf Friction Angle: 36 degrees Water Surface: Water Table
Loose Sand Strength Type: Mohr-Coulomb Unit Weight: 110 lb/ft ³ Cohesion: 1 psf Friction Angle: 28 degrees Water Surface: Water Table	Improved Material Strength Type: Mohr-Coulomb Unit Weight: 120 lb/ft ³ Cohesion: 2000 psf Friction Angle: 32 degrees Water Surface: Water Table
Medium Dense Alluvium Strength Type: Mohr-Coulomb Unit Weight: 124 lb/ft ³ Cohesion: 1 psf Friction Angle: 35 degrees Water Surface: Water Table	



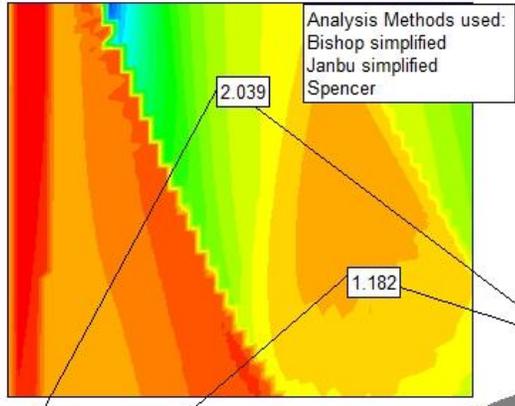
PSEUDO STATIC STABILITY AFTER GROUND IMPROVEMENTS: DEEP SOIL MIXING - SOUTH ABUTMENT

FIGURE NO.
C-13
 PROJECT NO.
 2010-100-21



Project Number: 2010-100-21 Task:200
 Project Name: Black River Bridge
 Lake to Sound Trail
 Renton, Washington

North Side: Pseudo-Static Analysis
 After Ground Improvements
 (Deep Soil Mixing)



Fill
 Strength Type: Mohr-Coulomb
 Unit Weight: 130 lb/ft³
 Cohesion: 0 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

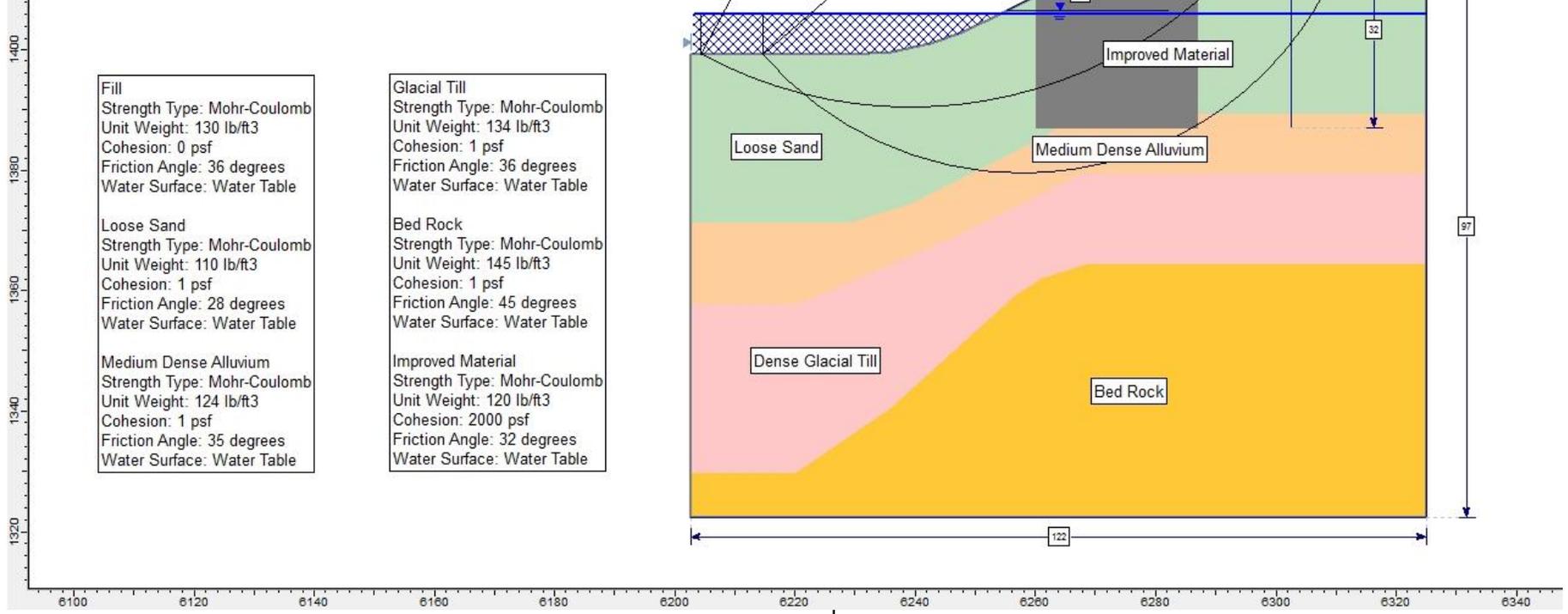
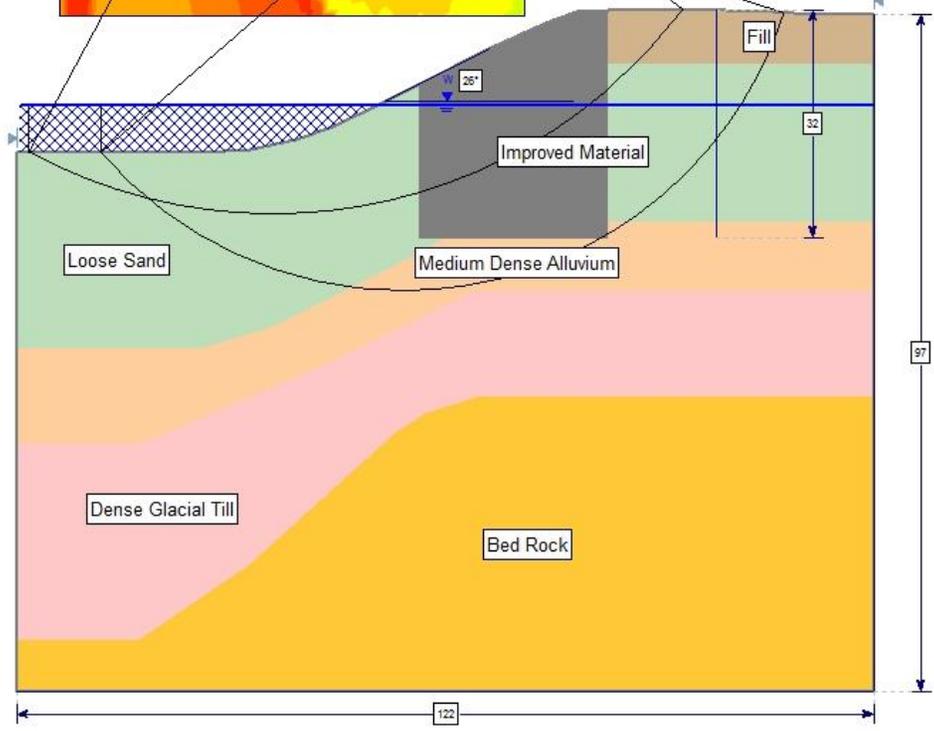
Loose Sand
 Strength Type: Mohr-Coulomb
 Unit Weight: 110 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 28 degrees
 Water Surface: Water Table

Medium Dense Alluvium
 Strength Type: Mohr-Coulomb
 Unit Weight: 124 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 35 degrees
 Water Surface: Water Table

Glacial Till
 Strength Type: Mohr-Coulomb
 Unit Weight: 134 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 36 degrees
 Water Surface: Water Table

Bed Rock
 Strength Type: Mohr-Coulomb
 Unit Weight: 145 lb/ft³
 Cohesion: 1 psf
 Friction Angle: 45 degrees
 Water Surface: Water Table

Improved Material
 Strength Type: Mohr-Coulomb
 Unit Weight: 120 lb/ft³
 Cohesion: 2000 psf
 Friction Angle: 32 degrees
 Water Surface: Water Table



PSEUDO STATIC STABILITY AFTER GROUND IMPROVEMENTS: DEEP SOIL MIXING - NORTH ABUTMENT

FIGURE NO. **C-14**

BLACK RIVER BRIDGE
 LAKE TO SOUND TRAIL
 RENTON, WA

PROJECT NO.
 2010-100-21

APPENDIX D

FUGITIVE DUST PLAN



King County

Department of Transportation
Road Services Division
Construction Engineering Unit
201 S Jackson Street
Seattle, WA 98104-3856

Fugitive Dust Control Plan

This plan, upon signature and submittal to the Engineer, will serve as an approved Fugitive Dust Control Plan to be implemented at the designated site. This plan must be submitted by the Contractor and received by the Engineer on or before the Pre-Construction Conference.

The approved plan serves as an acknowledgement by the Contractor to their duty to address state and local laws governing dust emissions and the potential for first offense issuance of a Notice of Violation by the air district where violations are substantiated by the Puget Sound Clean Air Agency staff.

The Contractor agrees to comply with all the requirements issued by the Puget Sound Clean Air Agency and will hold the County harmless for any violation incurred by the issuing agency.

Site Location: _____

Contractor: _____
(Name, Phone, Fax)

List of Responsible Persons:

Office: _____
(Name, Title, Address, Phone)

Field: _____
(Name, Title, Phone)

Site Information:

Fugitive Dust Sources:

Fugitive Dust Control Methods:

Materials Source for Fugitive Dust Control:

Schedule, Rate of Application or Calculations for Identifying How Often, How Much and When:

Signature: _____ Title: _____

Date: _____

By my signature I acknowledge that I have read the Special Provisions regarding Fugitive Dust Control and understand that it is my responsibility as the Contractor to ensure that appropriate materials and instructions are available to site employees to implement Fugitive Dust Mitigation measures appropriate for each phase of the project.

I further acknowledge that it is my responsibility to ensure that site employees are made formally aware of fugitive dust control requirements and available mitigation techniques, and that appropriate measures are to be implemented at the site as necessary to prevent fugitive dust violations.

APPENDIX E

**MONITORING PLAN AND
UNANTICIPATED DISCOVERY
PROTOCOL**

Cultural Resource Monitoring Plan for the Lake to Sound Trail, Segment A

King County, Washington

Report No. KI-03-17
March 28, 2017

Prepared for:

Parametrix
719 2nd Avenue, Suite 200
Seattle, WA 98104

Prepared by:

Scott Pierson, B.A.
Sarah J. Amell, M.M.A., RPA



Aqua Terra Cultural Resource Consultants
8525 Stoney Creek Ln
Olympia, WA 98512
www.AquaTerraCRC.com

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Acronyms

ATCRC	Aqua Terra Cultural Resource Consultants
APE	Area of Potential Effects
DAHP	Washington State Department of Archaeology and Historic Preservation
FHWA	Federal Highway Administration
KCRSD	King County Road Services Division
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
UDP	Unanticipated Discovery Plan
WSDOT	Washington State Department of Transportation

Executive Summary

King County requested a cultural resource monitoring plan for the construction of the Lake to Sound Trail, Segment A, located in King County, Washington. The Lake to Sound Trail is a 16 mile non-motorized, multi-use recreational trail intended to connect the southernmost point of Lake Washington to the Puget Sound through the cities of Renton, Tukwila, SeaTac, Burien and Des Moines, Washington. Segment A of the Lake to Sound Trail is a 1.2 mile section located between the cities of Renton and Tukwila. The Area of Potential Effects (APE) includes the entire 1.2 mile section with an 18 foot project corridor. Vertical impacts are expected to be up to two feet for grading over the majority of the trail segment and up to 60 feet at the bridge abutments, where the segment crosses the Black River. Proposed ground disturbing activities include vegetation clearing, removal and replacement of existing traffic markers, curbs, and sidewalks, replacement of the existing drainage system, and excavation and grading for the trail itself.

The Lake to Sound Trail is a joint partnership of the cities of Renton, Tukwila, SeaTac, Burien, Des Moines and King County. The project is funded by the Federal Highway Administration (FHWA). The Washington State Department of Transportation (WSDOT) Highways and Local Programs is assisting King County with FHWA funding and is acting on behalf of FHWA as the lead federal agency. Regulatory compliance for the project is managed by the King County Road Services Division (KCRSD). Federal funding requires that the project be conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA). The western part of the trail segment within Fort Dent Park crosses over a National Register of Historic Places (NRHP) eligible property, White Lake Site, 45KI438. Section 106 requires federal agencies to consider the effect of undertakings on historic properties that are or may be eligible for nomination to the National Register of Historic Places (NRHP). The following Monitoring Plan was prepared at the request of King County to assist in fulfilling these requirements. This Monitoring Plan will be implemented during project excavation activity.

Project Description

Lake to Sound Trail, Segment A is located in the Duwamish Valley between the cities of Renton and Tukwila, stretching from Naches Avenue SW in Renton to Fort Dent Park in Tukwila (Figure 1). The Area of Potential Effects (APE) is 1.2 miles with an 18-foot project corridor (Figure 2). The project corridor will include a 12-foot asphalt trail with two foot soft shoulders and a one foot clear zone on each side of the trail. The project will also include other elements related to the trail construction such as augmentation of the current traffic controls and drainage system, as well as other trail amenities. A portion of the proposed trail segment bisects a previously recorded archaeological site, 45KI438. A detailed list of the

ground disturbing activities likely to occur during construction within the APE can be seen below.

Planned Construction Activities

- Installation and removal of silt fencing
- Removal of vegetation (grass, trees and stumps)
- Grading
- Adjustment of water meter box
- Paving

King County contracted Aqua Terra Cultural Resource Consultants (ATCRC) to prepare this Monitoring Plan to assist the King County Road Services Division in satisfying Section 106 of the NHPA requirements. This Monitoring Plan will include the following:

- Description of ground disturbing activities
- Specific discussion of how the discovery of different types of cultural resource material will be handled, and anticipated impacts to construction excavation activities; and
- Specific protocol for addressing the discovery of human skeletal remains.

This Cultural Resource Monitoring Plan is designed to minimize the disturbance to potentially significant cultural resources during construction. Under this plan, ground disturbing project activities within a 100-foot buffer of 45KI438 will require archaeological monitoring (Figure 3). The following document describes the monitoring protocol, the procedures to be followed in the event of inadvertent discoveries, and the process for determining resource significance.



Figure 1. Location of the Lake to Sound Trail, Segment A Project located on the Renton, WA 7.5' USGS (1965) Topographic Map.

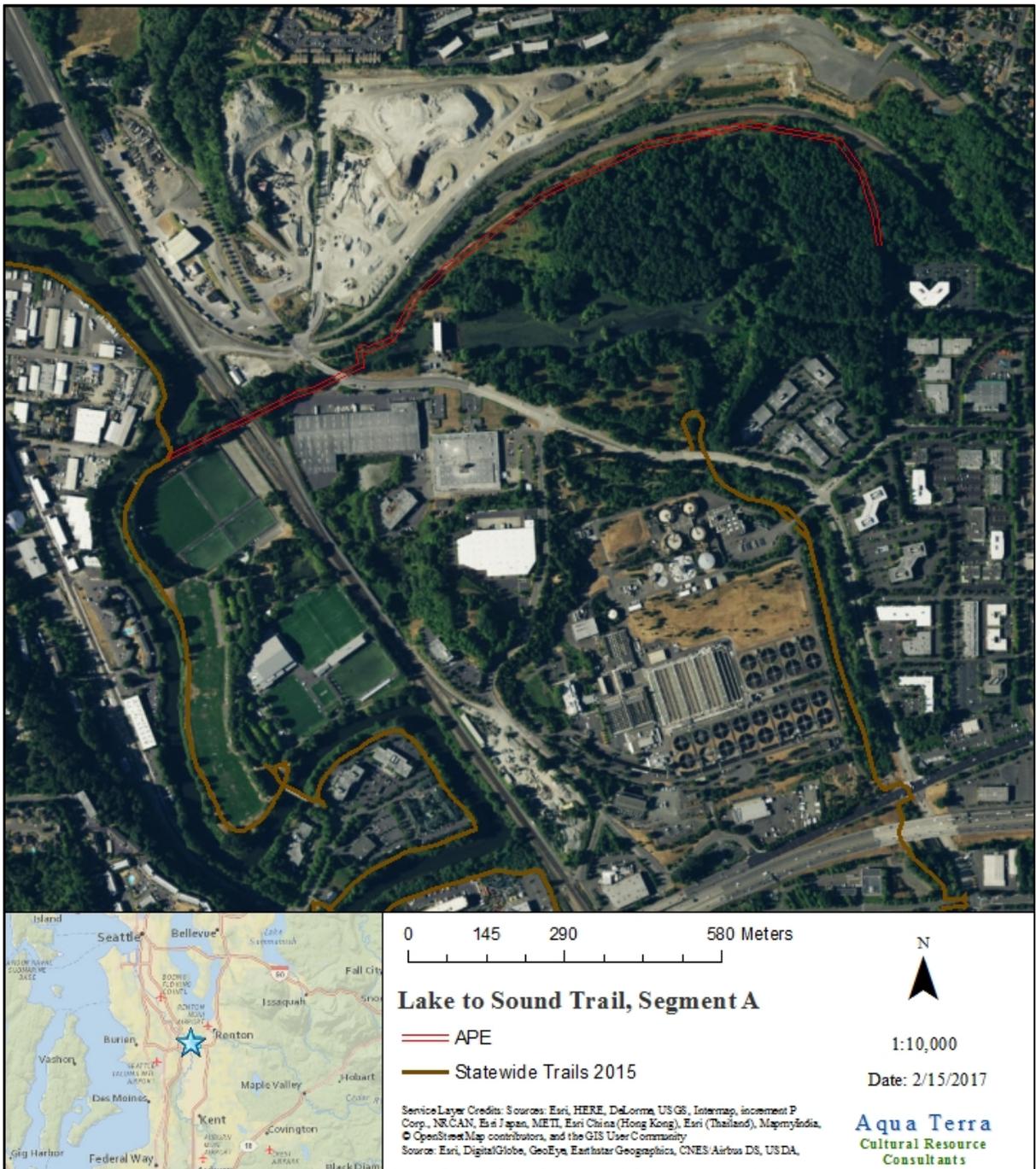


Figure 2. Lake to Sound, Segment A Area of Potential Effects

Regulatory Context

This project is subject to Section 106 of the NHPA, as amended, and the implementing regulations in 36 CFR Part 800. The lead federal agency is the Federal Highway Administration. Section 106 requires federal agencies take into account the effects of their undertakings on historic properties. An historic property is typically aged 50 years or older and is defined in 36 CFR part 800.16(l)(1), as follows:

... any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

The procedures under Section 106 generally require the federal agency involved in the undertaking to identify the area of potential effects (APE), inventory any historic properties that may be located within the APE, and determine if the identified historic properties located within the APE may be eligible to be listed in or eligible for listing in the National Register of Historic Places (NRHP). An APE is defined in 36 CFR 800.16(d), as follows:

... the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

If NRHP-eligible historic properties are identified within an APE then potential adverse effects to the historic properties must be assessed, and a resolution of adverse effects recommended.

Relevant Washington State laws also address archeological sites and Native American burials. The Archaeological Sites and Resources Act [RCW 27.53] prohibits disturbance of known prehistoric and historic archaeological sites on public or private lands. The Indian Graves and Records Act [RCW 27.44] prohibits disturbance of American Indian graves and provides that inadvertent disturbance through construction or other activity requires re-interment under supervision of the appropriate Indian tribe.

Background Review

Environmental Context

The APE lies within the southeastern Puget Lowland geologic province, an area encompassing the Puget Sound that extends from the foothills of the Cascade mountain range to the Olympic mountain range on the west side of the sound. The climate is typically referred to as temperate with mild summers and cool, wet winters.

The topology and geology of northwest Washington was shaped by at least six glacial advances in the last 2.5 million years (Booth et al 2003). During the most recent glacial advance, known as the Vashon Stade of the Fraser Glaciation, the Puget lobe advanced into northern Washington around 17,000 years ago at a rate of 135 meters per year. The Puget lobe retreated from its terminal position 16 to 24 km south of Olympia, WA about 14,000 years ago (Booth et al 2003, Franklin and Dyrness 1973). The retreat of the Puget lobe left massive glacial deposits throughout the region.

The APE is located in the vicinity of the Black River, near its confluence with the Duwamish (Green) River in Renton, King County, Washington. See Lewarch et al. 1996 for a detailed description of the Duwamish-Green River Valley geomorphology.

The Natural Resource Conservation Service web soil survey records alluvial deposits throughout the APE from the Woodinville silt loam, Puyallup fine sandy loam, and Newberry silt loam series (NRCS 2016).

Cultural and Historical Context

The APE is located in the traditional territory of the Duwamish, a Coast Salish group who occupied much of present day Seattle and the Duwamish River valley to the southeast (Ruby and Brown 1986:72). Precontact settlements of Coast Salish groups were often established along major waterways and inlets, as well as tertiary rivers and streams. These environments supported the communities with fish, waterfowl, shellfish, large and small mammals, roots, herbs, and berries. Previous ethnographic and archaeological studies have determined that multiple Duwamish villages were located near the confluence of the Green River and the Black River in close proximity to the APE (Fernandez et al 2011). Site 45Ki438, also called the White Lake site, located within the APE may be associated with a known ethnographic site. As stated in Fernandez et al. 2011:

“The site [45KI438] is in the vicinity of the ethnographically known Duwamish village called *Sqoa’lqo* and dates from 500 to 150 BP... the Duwamish village *Sqoa’lqo* (meaning “the meeting of two rivers”)... occupied the land southeast of the confluence [of the Green River and Black River] and is the village nearest to the APE. This winter village reportedly included two houses but was not mentioned in the 1862 United States Surveyor General survey notes” [Lewarch et al. 1996:3–16 as cited in Fernandez et al. 2011: 2-4].

Euroamerican settlers gradually displaced the native groups in the region. After the arrival of the first Euroamerican settlers to the Duwamish River Valley in the 1850s, local tribes were relocated to reservations. As summarized by Fernandez et al. (2011):

“Like the Duwamish residents that preceded them, the first Euroamerican settlers in the 1850s to 1870s established their homesteads and Donation Land Claims along the rivers (Courtois et al. 1999:135; Bean 1985). The rivers granted settlers access to Seattle, which was a couple days by boat up the Duwamish River.... These early

settlers were building homes and new lives at the same time the local Native American tribes were being relocated to reservations, following the Treaty of Point Elliot in 1855. The Duwamish who lived along the White and Green rivers were ordered to relocate to the Port Madison Indian Reservation with the Suquamish (Lewarch et al. 1996:3–13). The 1855–1856 Indian Wars were ignited by the tribes to the south (upriver) over the poor terms of the treaty and the lack of reservations near their traditional territories. In an effort to defend the land claims and homesteads, the U.S. Army built a series of blockhouses along the Duwamish starting near Seattle’s Pioneer Square (Courtois et al. 1999:135). One of these blockhouses was Fort Dent, located in what is now Fort Dent Park, south of the Black River and Green River confluence. Built in 1856, this was a strategic location that benefited from its ability to observe and sometimes control river transportation” (Lewarch et al. 1996:3-16–3-18).

Timber, coal mining, and agriculture attracted more settlers to the area from the mid to late 19th century. The addition of the Seattle-Walla Walla Railway in 1875 and the Northern Pacific Railroad in 1887 further stimulated population growth and established Renton as an economic center in the region (Amell 2015:10, Lewarch et al. 1996:3-25).

Results of Previous Cultural Resource Studies

Numerous cultural resource studies have been conducted within one mile of the APE (Table 1). Two recent cultural resource assessments have been conducted within the APE itself. In 2011 ICF International completed a cultural resource survey for the Lake to Sound Trail, Segment A. The survey included both pedestrian survey over the course of the segment and subsurface testing. A total of 25 Shovel Test Probes (STPs) were excavated along the APE. No evidence of precontact cultural materials were recovered during subsurface testing. However,

ICF recommended that construction activity be monitored by a professional archaeologist within the recorded site boundaries and within a 100-foot radius of the site. In 2015 an amendment to Segment A, including the addition of a 114 foot long pedestrian bridge and 100 feet of trail was surveyed by ATCRC. No historic or precontact cultural materials were encountered during the survey. ATCRC recommended the determination of No Historic Properties Affected for the project amendment.

One NRHP eligible property (45KI438), a food processing site, has been recorded within the APE. Within one mile of the APE there are eight recorded archaeological sites (Table 2). These include three precontact camps, a precontact lithic scatter, and three historic railroad properties.

Table 1. Cultural Resource Studies conducted within 1-mile of the APE

Author	Title	Recommendations
Amell, Sarah 2015	Cultural Resources Survey of the Amended APE for the Lake to Sound Trail, Segment A	No further assessment recommended

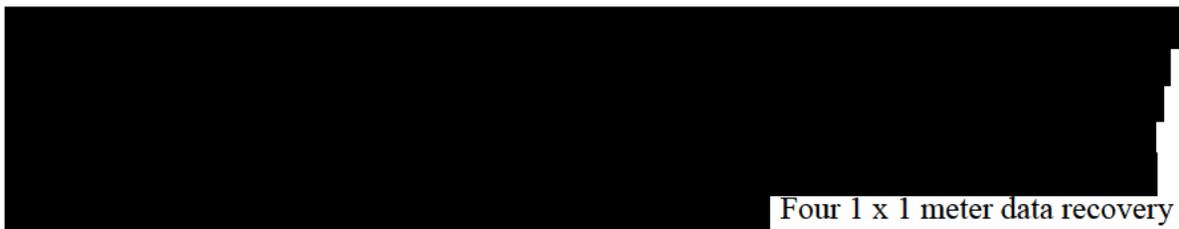
Author	Title	Recommendations
Fernandez et al. 2011	Cultural Resources Survey Report Lake to Sound Trail, Segment A	Monitoring and avoidance of 45KI438
Ellis and Erickson 2000	Archaeological Monitoring at Three Locations for the Level 3 Construction Project from the Lewis River to Seattle	No further assessment recommended
Courtois 1999	Sound Transit Central Link Light Rail Draft EIS Historic and Archaeological Resources Technical Report	No further assessment recommended
Lewarch et al. 1996	King County Department of Natural Resources Water Pollution Control Division Alki Transfer/CSO Facilities Project Allentown Site and White Lake Site Data Recovery	Avoid adverse effects
Bangs 1996	Cultural Resource Monitoring of the Waterworks Project at King County's East Division Reclamation Plant, Renton	No further assessment recommended
Lewarch 1998	Letter to Jacquelynn Roswell Regarding King County Fort Dent Park Reclaimed Water Irrigation Project, Assessment of Revised Construction Plans and Potential Cultural Resources	No further assessment recommended
Cagle 2012	An Archaeological Survey of the Sanft Property, Tukwila, King County	No further assessment recommended
Trudel et al. 2004	South Treatment Plant Cogeneration Facility Archaeological Resources Assessment	Archaeological monitoring of native sediments
Robbins 2000	Letter to Edward MacLeod Regarding Fort Dent Park Soccer Fields #7 and #8 Improvement Project Cultural Resource Assessment, Tukwila	No further assessment recommended
Forsman 2002	Proposed Foster Golf Course Clubhouse Archaeological Resources and Traditional Cultural Places Assessment.	Archaeological monitoring of native sediments
Shong 2014	Letter to Mike Giseburt RE: Addendum to the Cultural Resources Overview for the SW 7th St.Naches Ave SW Storm System Improvement Project, Renton	Archaeological monitoring of native sediments

Author	Title	Recommendations
Cooper 2003	Letter to Rick Still Regarding Archaeological Monitoring of Foster Golf Course Clubhouse Demolition	No further assessment recommended

Table 2. Archaeological Sites recorded within 1-mile of the APE

Smithsonian Number	NRHP Eligibility	Site Type
45KI538	Potentially Eligible	Historic Railroad grade
45KI438	Determined Eligible	Pre Contact Camp/Food processing/Refuse Disposal
45KI267	Not Evaluated	Pre Contact Lithic Scatter
45KI768	Potentially Eligible	Historic Railroad Property
45KI006	Not Evaluated	Pre Contact Shell Midden/Fishing Camp
45KI516	Not Evaluated	Pre Contact Camp
45KI059	Not evaluated	Pre Contact Camp
45KI1132	Not Eligible	Historic Railroad Property

45KI438



Four 1 x 1 meter data recovery units were excavated by LAAS archaeologists within the pipeline trench. Cultural material observed at the site included a shallow basin hearth feature, processed plant material, the tip of a bone tool, a wire nail, and two folded copper fragments. As described by Lewarch et al. 1996:

“Four radiocarbon dates from the White Lake Site indicate hunter-fisher-gatherer occupations began in the area ca 487 BP and continued through the early historical period. The site deposits were formed during a series of large flood events, separated by smaller flood episodes. Ethnohistoric and archaeological data suggest the site is probably part of the village of Sqa'lqo, which was on the south bank of the Black River, north of White Lake.”

The hearth, observed 130-140 cm below ground surface, included evidence of fishbone, wapato, and berries. Other faunal and plant materials, as well as shell fragments were observed at 165-180 cm below ground surface (Lewarch et al. 1996 as cited in Fernandez et al. 2011: 4-1). During the ICF survey in 2011, nine shovel test probes were excavated in the vicinity of site, [REDACTED]

[REDACTED] Although no precontact cultural material was recovered during the survey, ICF

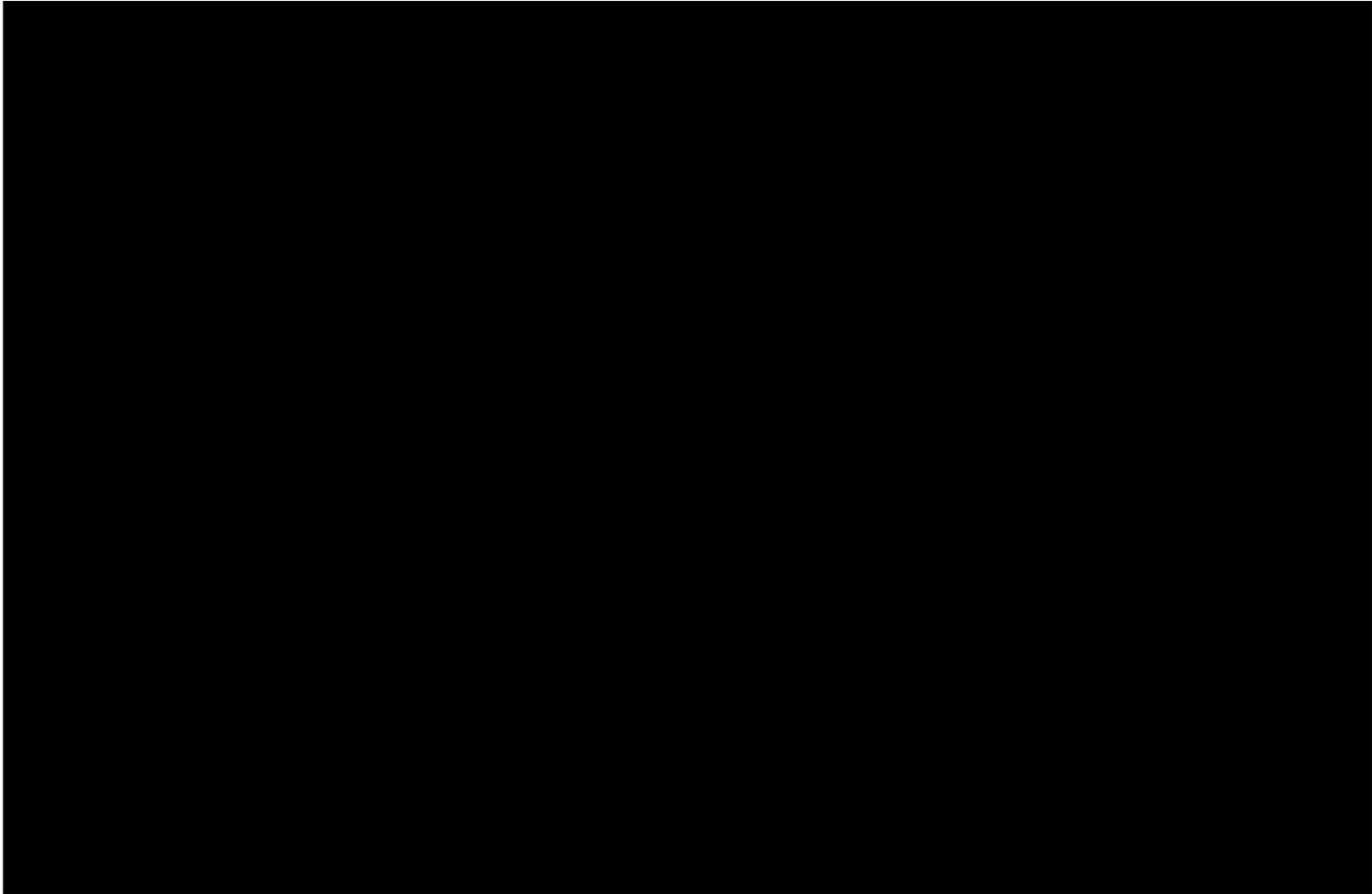
recommended a qualified cultural monitor be present during all construction activities within a 100 foot buffer of the site (Fernandez et al. 2001: 6-1).

Expectations

Based on ATCRC's review of local cultural resource studies, and environmental and cultural contexts, the APE is considered to be located in an area of very high probability for encountering historic properties. [REDACTED]

[REDACTED], a precontact low density refuse disposal and food processing site. Additionally, three precontact camps and a lithic scatter have been previously identified within one mile of the APE. This concentration of archaeological sites suggests that excavation near the Black River's confluence with the Duwamish River may unearth additional unrecorded subsurface archaeological deposits.

The objective of cultural resource monitoring is to identify and manage any discoveries if in-situ cultural resources exist. An archaeological monitor should be present for all construction activity within site 45KI438 and within 100 feet of the site. If any cultural resources are encountered outside of this 100 foot buffer, the Unanticipated Discovery Plan (UDP) should be followed.



Methods

Washington State law requires that archaeological monitors meet the definition of a “professional archaeologist” under RCW 27.53.030(8). If the monitor does not meet this definition, they can be supervised by a Principal Investigator who meets the qualification requirements. According to the Secretary of the Interior’s standards for a professional archaeologist, the minimum qualifications include a graduate degree in archaeology, anthropology, or a closely related field, plus:

- at least one year of full time professional experience or equivalent specialized training in archaeological research, administration or management;
- at least four months of supervised field and analytic experience in general North American archaeology; and
- demonstrated ability to carry research to completion.

In addition to the minimum qualifications, a professional archaeologist shall have at least one year of full time professional experience at a supervisory level in the study of archaeological resources of the prehistoric and/or historic period.

The archaeological monitor will take daily notes and detailed photographs of the excavation activity and project location. The archaeological monitor may periodically stop excavation to examine soils/sediments as appropriate. The archaeologist will observe excavated materials for prehistoric or historic artifacts or lenses of shell/organic material, charcoal stained soils, or other visible indications of past human use.

Recognizing Cultural Resources

Cultural material previously recorded at 45KI438 included a shallow basin hearth feature, the tip of a bone tool, shell fragments, mammal and fish bone, fire modified rock (FMR), processed edible plant material, one wire nail, and two folded copper fragments. The shallow basin hearth feature, identified at 130-140 centimeters below surface, included wapato, elderberries, and fishbone. A lower cultural strata, identified at 165-180 centimeters below surface, included mammal bone fragments, fish bones, shell fragments, elderberry seeds, and processed edible plant tissue. The site was interpreted as a low density refuse disposal and food processing area. Although no chipped stone tools were observed in the portion of the site to be monitored, cryptocrystalline silicate and basalt, which may have been used for food processing, could also be present at the site. The general vicinity of the site was used for animal grazing and agriculture from the 1870s to the 1960s, so historic materials associated with these activities may also be present. Examples of material that could be encountered include:

- An area of charcoal or very dark stained soil with associated artifacts and/or plant material;
- Edible plant material (wapato, elderberry, Indian plum, hazelnut);
- Shell fragments
- Concentrations of FMR with associated artifacts and/or plant material;
- Culturally modified animal bone;

- Animal bones (fish and mammal) possibly associated with a cooking feature;
- Artifacts made of chipped or ground stone (i.e. an arrowhead, adze or maul) of cryptocrystalline silicate or basalt (lithic debitage);
- Clusters of tin cans or bottles, agricultural equipment that appear to be older than 50 years; and/or
- Human remains

Procedure for New Discoveries

If cultural materials and/or features are identified during project construction, the archaeological monitor will contact the KCRSD Archaeologist, who will then contact the WSDOT H&LP Archaeologist. The KCRSD Archaeologist and the WSDOT H&LP Archaeologist will then determine if the discovery warrants notification of the affected tribes and DAHP. If the discovery warrants notification, the WSDOT H&LP Archaeologist will be responsible for contacting DAHP and the tribes. If the discovery is determined to be insignificant by the KCRSD Archaeologist and the WSDOT H&LP Archaeologist, the discovery will be documented, photographed, mapped with a GPS unit, and returned to its location.

If cultural resources are discovered during project activities, the King County Project Engineer will halt all work activities at the location of the discovery and all areas of ground disturbance within 30 meters (100 feet). The King County Project Engineer will be responsible for stopping work and securing the resource. The archaeological monitor will consult with the King County Project Engineer to ensure all work has stopped in an area adequate to provide for the total security, protection, and integrity of the resource until all appropriate procedures have been completed. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Excavations may continue in areas that are greater than 30 meters (100 feet) away from the location of discovery.

If the archaeological monitor is not present when a previously unknown cultural resource is discovered during construction activities, the contractor will immediately cease all ground-disturbing activities within 30 meters (100 feet) of the discovery and immediately notify the archaeological monitor or the KCRSD Archaeologist as outlined in the UDP. The contractor will stop all ground disturbing work in proximity to the discovery and flag the area for easily visible identification. The contractor will protect the discovery site from vandalism or further disturbance of any kind.

Protocol for Discovery of Human Skeletal Remains

Washington State law requires immediate notification of known or suspected human remains whenever they are uncovered by investigation or construction activities to county and/or municipal law enforcement agencies, county medical examiner or coroner's offices, DAHP, and federal and local agencies involved directly with the project or having jurisdiction over the subject properties.

If the archaeological monitor or any King County employee, contractor, or subcontractor believes that human remains have been uncovered during project construction, all work within 15 meters (50 feet) and all ground disturbing activity within 30 meters (100 feet) must cease. In the event that suspected human remains are uncovered during construction activities, the KCRSD Archaeologist will be contacted to confirm that the remains are human. If the KCRSD Archaeologist confirms the presence of human remains in the work area, the following protocol will be implemented. Per Guy Tasa, State Physical Anthropologist:

“If ground disturbing activities encounter human skeletal remains during the course of construction, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance. The finding of human skeletal remains will be reported to the county medical examiner/coroner and local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic. If the county medical examiner/coroner determines the remains are non-forensic, then they will report that finding to the Department of Archaeology and Historic Preservation (DAHP) who will then take jurisdiction over the remains. DAHP will notify any appropriate cemeteries and all affected tribes of the find. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected tribes. DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.”

If the archaeological monitor is not present when suspected human remains are discovered during construction activities, the contractor will follow the protocol outlined in the UDP.

Construction may continue at the discovery location after DAHP determines the boundaries of the discovery location and compliance with state and federal law requirements are complete.

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Appendix A: Contact List

FHWA

Lindsey Handel, Area Engineer (360) 753-9550

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Parametrix

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PLAN AND PROCEDURES FOR DEALING WITH THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES DURING THE LAKE TO SOUND TRAIL, SEGMENT A PROJECT, KING COUNTY, WASHINGTON

1. INTRODUCTION

In order to address the need for post review discovery and consultation among the Federal Highway Administration (FHWA), the Washington State Department of Transportation Highways and Local Programs (WSDOT H&LP), Washington State Historic Preservation Officer (SHPO), the King County Road Services Division (KCRSD), King County Parks and Recreation Division (KCPRD) and affected tribe(s), this document serves as the primary guidance tool for the treatment of cultural resources discovered during the project. Discovered archaeological materials could include human skeletal remains, artifacts, sites, or any other cultural resources eligible, or potentially eligible, for listing in the NRHP. This plan is intended to provide guidance to King County and their contractors so they can:

- Comply with any applicable Federal and State laws and regulations, particularly 36 CFR 800 (as amended August 5, 2004) that implements section 106 of the National Historic Preservation Act of 1966, and seek guidance from Title 27 Revised Codes of Washington Chapter 27.44 Indian Graves and Records, Chapter 27.53 Archaeological Sites and Resources, and
- Describe to regulatory and review agencies the procedures agents will follow to prepare for and deal with unanticipated discoveries, and
- Provide direction and guidance to project personnel for the proper procedures to be followed should an unanticipated discovery occur.

2. DISCOVERY OF CULTURAL RESOURCES

Should construction activities cause disturbance to underground cultural/archaeological resources the following section establishes provisions for the professional archaeological treatment of cultural materials discovered during usual construction activities.

Provisions of the Cultural / Archaeological Resource Procedures are as follows:

A. If any King County employee, contractor, or subcontractor believes that he or she has uncovered any cultural resource at any point in the project, all work adjacent to the discovery shall cease. The King County Project Engineer will immediately notify the KCRSD Archaeologist who will determine whether actual resources have been encountered. If such a determination has been made the KCRSD Archaeologist will immediately notify the WSDOT H&LP Engineer who will notify the WSDOT H&LP Archaeologist immediately. A cultural resource discovery could be prehistoric or historic and consist of:

- areas of charcoal or charcoal - stained soil and stones,
- stone tools or waste flakes (i.e. an arrowhead, or stone chips),
- bones, burned rocks, or other food related materials in association with stone tools or flakes or
- a cluster of tin cans or bottles, logging or agricultural equipment older than 50 years.

B. In order to protect the integrity of a discovery the King County Project Engineer will take appropriate steps to protect the discovery site by ceasing all work in an area of 30 feet to provide for the total security, protection, and integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/cultural material as set forth in this document. All communications between KCRSD and KCPRD with any agency on cultural resource issues will go through the KCRSD Archaeologist.

C. King County Project Engineer, or their appointee, will immediately contact the KCRSD archaeologist. The KCRSD Archaeologist will determine on site whether actual historic resources or human remains have been encountered. If such a determination is made or if the finding is unclear the KCRSD Archaeologist will immediately contact the appropriate WSDOT H&LP Engineer and they will contact the WSDOT H&LP Archaeologist to immediately report any unanticipated discovery of cultural resources. All material will be treated as potentially eligible for listing in the NRHP. Any material encountered during construction will be reported to the Regional FHWA Administrator (Administrator), or the proper designee, for the purpose of establishing contact with the concerned parties on a government-to-government level. The Administrator will be responsible for all communications with other federal agencies. Notifications will begin with the King County Project Engineer who will contact Tom Minichillo, KCRSD Archaeologist who will contact Phil Segami, WSDOT H&LP, who will contact Trent de Boer the WSDOT H&LP Archaeologist, who will notify the Administrator, the SHPO, and the WSDOT Tribal Liaison's Office. The WSDOT Tribal Liaison's Office will contact the affected tribe(s) and inform them of the unanticipated discovery. Construction will be halted within the immediate area of the discovery and the scene will be protected until consultation to determine the appropriate course of action has been conducted.

D. Archaeological deposits discovered during construction will be assumed eligible under criteria (d) for inclusion in the NRHP for the purposes of section 106 compliance, in accordance with 36 CFR 800.13(c).

E. Where cultural resources are encountered during construction, but additional project effects to the resources are not anticipated, project construction may continue while documentation and assessment of the cultural resources proceed. Continued construction will be conducted to the extent that no additional impacts to resources should take place. The total area of work stoppage will be adequate to provide for the security, protection, and integrity of the discovery in accordance with Washington State Law. Construction

may continue at the discovery location only after the process outlined in this plan is followed and the FHWA is satisfied the caveats of Section 106 have been met.

F. Routine documentation of newly discovered cultural material should not impact construction schedules. Where complex or extensive cultural remains are encountered, the project manager, KCRSD Archaeologist and qualified archaeological personnel will determine the appropriate level of documentation and treatment of the resource after consultation with SHPO, WSDOT, and affected tribal representatives.

G. Non-intrusive field documentation of all human remains will be undertaken immediately. All prehistoric and historic cultural material discovered during project construction will be professionally recorded on a State of Washington cultural resource site or isolate form using standard techniques, including amendment to existing site forms. Site overviews, features, and artifacts will be photographed; stratigraphic profiles and soil/sediment descriptions will be prepared for any subsurface exposures. Discovery locations will be documented on scaled site plans and site location maps.

H. Cultural features, horizons, and artifacts detected in buried sediments may require further evaluation using hand-dug test units to clarify aspects of integrity, stratigraphic context, or feature function. Units may be dug in controlled fashion to expose features, collect radiocarbon or animal/plant macrofossil samples from undisturbed contexts, or interpret complex stratigraphy. A test excavation unit or small trench might also be used to cross-section a feature to determine if an intact occupation surface is present. Test units will be used only when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's potential to address significant research domains. Excavations will be conducted using state-of-the-art techniques for controlling provenience of recovered remains.

I. Sediments excavated for purposes of cultural resources investigation will be screened through 1/8-inch mesh. Spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock will be recorded on a standard form. Test excavation units will be recorded on unit level forms, which include plan maps for each excavated level, and material type, number, and vertical provenience (depth below surface and stratum association where applicable) for all artifacts recovered from the level. Radiocarbon and macrofossil samples will be taken from intact subsurface features exposed by shovel/auger probes or test units. A stratigraphic profile will be drawn for at least one wall of each test excavation unit.

J. All prehistoric and historic artifacts collected from the surface and from probes and excavation units will be analyzed, catalogued, and temporarily curated by the consulting archaeologist on behalf of King County. Ultimate disposition of cultural materials will be determined in consultation with the SHPO and the affected tribe(s). The preferred repository is the Burke Museum of Natural History and Culture.

K. Within 90 days of concluding fieldwork, a management summary describing any and all monitoring and resultant archaeological excavations will be provided to the project manager or the region. The project manager will forward the report to the WSDOT H&LP Archaeologist for review and delivery to FHWA, SHPO, and the affected tribe(s).

L. If assessment activity exposes human remains (burials, isolated teeth, or bones) all defined procedures outlined below will be followed.

3. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL MATERIAL

Any human skeletal remains regardless of ethnic origin, which may be discovered during this project, will at all times be treated with dignity and respect. In the event that any human remains are discovered and they are determined to be of Native American origin, the affected Native American Tribe(s) will be immediately notified by WSDOT. No part of this plan shall be construed as superseding RCW 27.44.

A. During all project operations, if any King County employee or any of the contractors or subcontractors believes that he or she has made an unanticipated discovery of human skeletal remains, all work adjacent to the discovery shall cease. A 50-foot work stoppage area will be maintained around the discovery to provide for the total security, protection, and integrity of the human skeletal remains, in accordance with Washington State Law. No persons other than the proper law enforcement personnel, KCRSD Archaeologist, WSDOT H&LP Archaeologist, State Physical Anthropologist and staff, and the SHPO will be authorized direct access to the discovery location after the area is secured. If the remains are determined to be of Native American ancestry thorough consultation with the SHPO and local law enforcement, tribal access will be allowed when the affected tribe(s) representative(s) are designated. Coordination for tribal member access must go through the designated tribal representative. The strict control of a burial location is mandated to insure the safety and integrity of the burial feature and remains.

B. Representatives of King County are responsible for taking appropriate steps to protect the discovery. A 50-foot diameter area will be secured to provide for the total security, protection, and integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse or enter the discovery site.

C. Following the specific guidance set forth here, the King County Project Engineer will immediately call the KCRSD Archaeologist who will immediately call the local law enforcement official (county sheriff or police department) and will insure an individual competent and qualified to identify human skeletal remains is present. The ethnic origin, or ancestry, of the discovered human remains will be determined by the State Physical Anthropologist in the Department of Archaeology and Historic Preservation. The remains will remain under the jurisdiction of the DAHP physical anthropologist until final determinations have been made.

D. If the human skeletal remains are determined to be Native American, the participating parties will consult to determine what treatment is appropriate for the human remains. At this point, if warranted, FHWA will assume all authority over the government-to-government consultation process.

E. If disinterment of Native American human remains becomes necessary, the consulting parties, which will include the FHWA, WSDOT, SHPO, and affected tribe(s), will jointly determine the final custodian of the human skeletal remains for reinterment.

F. WSDOT and/or the FHWA will make a good faith effort at accommodating requests from the affected tribe(s) to be present after they are notified of discoveries, and prior to the implementation of mitigation measures related to the human remains.

CONTACT LIST

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DAHP

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APPENDIX F

RAILROAD REQUIREMENTS

EXHIBIT "C"

CONTRACTOR REQUIREMENTS

1.01 General:

- **1.01.01** The Contractor must cooperate with **BNSF RAILWAY COMPANY**, hereinafter referred to as "**Railway**" where work is over or under on or adjacent to Railway property and/or right-of-way, hereafter referred to as "Railway Property", during the construction of King County's **Lake to Sound Trail Connector Pedestrian Underpass**.
- **1.01.02** The Contractor must execute and deliver to the Railway duplicate copies of the Exhibit "C-1" Agreement, in the form attached hereto, obligating the Contractor to provide and maintain in full force and effect the insurance called for under Section 3 of said Exhibit "C-1". Questions regarding procurement of the Railroad Protective Liability Insurance should be directed to Rosa Martinez at Marsh, USA, 214-303-8519.
- **1.01.03** The Contractor must plan, schedule and conduct all work activities so as not to interfere with the movement of any trains on Railway Property.
- **1.01.04** The Contractor's right to enter Railway's Property is subject to the absolute right of Railway to cause the Contractor's work on Railway's Property to cease if, in the opinion of Railway, Contractor's activities create a hazard to Railway's Property, employees, and/or operations. Railway will have the right to stop construction work on the Project if any of the following events take place: (i) Contractor (or any of its subcontractors) performs the Project work in a manner contrary to the plans and specifications approved by Railway; (ii) Contractor (or any of its subcontractors), in Railway's opinion, prosecutes the Project work in a manner which is hazardous to Railway property, facilities or the safe and expeditious movement of railroad traffic; (iii) the insurance described in the attached Exhibit C-1 is canceled during the course of the Project; or (iv) Contractor fails to pay Railway for the Temporary Construction License or the Easement. The work stoppage will continue until all necessary actions are taken by Contractor or its subcontractor to rectify the situation to the satisfaction of Railway's Division Engineer or until additional insurance has been delivered to and accepted by Railway. In the event of a breach of (i) this Agreement, (ii) the Temporary Construction License, or (iii) the Easement, Railway may immediately terminate the Temporary Construction License or the Easement. Any such work stoppage under this provision will not give rise to any liability on the part of Railway. Railway's right to stop the work is in addition to any other rights Railway may have including, but not limited to, actions or suits for damages or lost profits. In the event that Railway desires to stop construction work



on the Project, Railway agrees to immediately notify the following individual in writing:

David Shaw, Project Manager
King County Parks
201 S. Jackson St. Suite 700
Seattle, WA 98104

- **1.01.05** The Contractor is responsible for determining and complying with all Federal, State and Local Governmental laws and regulations, including, but not limited to environmental laws and regulations (including but not limited to the Resource Conservation and Recovery Act, as amended; the Clean Water Act, the Oil Pollution Act, the Hazardous Materials Transportation Act, CERCLA), and health and safety laws and regulations. The Contractor hereby indemnifies, defends and holds harmless Railway for, from and against all fines or penalties imposed or assessed by Federal, State and Local Governmental Agencies against the Railway which arise out of Contractor's work under this Agreement.
- **1.01.06** The Contractor must notify David Shaw, King County Parks at **206-263-2164** and Railway's Manager Public Projects, telephone number **(206) 625-6152** at least thirty (30) calendar days before commencing any work on Railway Property. Contractor's notification to Railway must refer to Railway's file .
- **1.01.07** For any bridge demolition and/or falsework above any tracks or any excavations located with any part of the excavations located within, whichever is greater, twenty-five (25) feet of the nearest track or intersecting a slope from the plane of the top of rail on a 2 horizontal to 1 vertical slope beginning at eleven (11) feet from centerline of the nearest track, both measured perpendicular to center line of track, the Contractor must furnish the Railway five sets of working drawings showing details of construction affecting Railway Property and tracks. The working drawing must include the proposed method of installation and removal of falsework, shoring or cribbing, not included in the contract plans and two sets of structural calculations of any falsework, shoring or cribbing. For all excavation and shoring submittal plans, the current "BNSF-UPRR Guidelines for Temporary Shoring" must be used for determining the design loading conditions to be used in shoring design, and all calculations and submittals must be in accordance with the current "BNSF-UPRR Guidelines for Temporary Shoring". All submittal drawings and calculations must be stamped by a registered professional engineer licensed to practice in the state the project is located. All calculations must take into consideration railway surcharge loading and must be designed to meet American Railway Engineering and Maintenance-of-Way Association (previously known as American Railway

Engineering Association) Coopers E-80 live loading standard. All drawings and calculations must be stamped by a registered professional engineer licensed to practice in the state the project is located. The Contractor must not begin work until notified by the Railway that plans have been approved. The Contractor will be required to use lifting devices such as, cranes and/or winches to place or to remove any falsework over Railway's tracks. In no case will the Contractor be relieved of responsibility for results obtained by the implementation of said approved plans.

- **1.01.08** Subject to the movement of Railway's trains, Railway will cooperate with the Contractor such that the work may be handled and performed in an efficient manner. The Contractor will have no claim whatsoever for any type of damages or for extra or additional compensation in the event his work is delayed by the Railway.

1.02 Contractor Safety Orientation

- **1.02.01** No employee of the Contractor, its subcontractors, agents or invitees may enter Railway Property without first having completed Railway's Engineering Contractor Safety Orientation, found on the web site www.bnsfcontractor.com. The Contractor must ensure that each of its employees, subcontractors, agents or invitees completes Railway's Engineering Contractor Safety Orientation through internet sessions before any work is performed on the Project. Additionally, the Contractor must ensure that each and every one of its employees, subcontractors, agents or invitees possesses a card certifying completion of the Railway Contractor Safety Orientation before entering Railway Property. The Contractor is responsible for the cost of the Railway Contractor Safety Orientation. The Contractor must renew the Railway Contractor Safety Orientation annually. Further clarification can be found on the web site or from the Railway's Representative.

1.03 Railway Requirements

- **1.03.01** The Contractor must take protective measures as are necessary to keep railway facilities, including track ballast, free of sand, debris, and other foreign objects and materials resulting from his operations. Any damage to railway facilities resulting from Contractor's operations will be repaired or replaced by Railway and the cost of such repairs or replacement must be paid for by the Agency.
- **1.03.02** The Contractor must notify the Railway's Division Engineer _____ at (_____) _____ and provide blasting plans to the Railway for review seven (7) calendar days prior to conducting any blasting operations adjacent to or on Railway's Property.



- **1.03.03** The Contractor must abide by the following temporary clearances during construction:
 - 15'-0" Horizontally from centerline of nearest track
 - 21'-6" Vertically above top of rail
 - 27'-0" Vertically above top of rail for electric wires carrying less than 750 volts
 - 28'-0" Vertically above top of rail for electric wires carrying 750 volts to 15,000 volts
 - 30'-0" Vertically above top of rail for electric wires carrying 15,000 volts to 20,000 volts
 - 34'-0" Vertically above top of rail for electric wires carrying more than 20,000 volts

- **1.03.04** Upon completion of construction, the following minimum clearances shall be maintained:
 - 25' Horizontally from centerline of nearest track
 - 23' 6" Vertically above top of rail

- **1.03.05** Any infringement within State statutory clearances due to the Contractor's operations must be submitted to the Railway and to King County and must not be undertaken until approved in writing by the Railway, and until King County has obtained any necessary authorization from the State Regulatory Authority for the infringement. No extra compensation will be allowed in the event the Contractor's work is delayed pending Railway approval, and/or the State Regulatory Authority's approval.

- **1.03.06** In the case of impaired vertical clearance above top of rail, Railway will have the option of installing tell-tales or other protective devices Railway deems necessary for protection of Railway operations. The cost of tell-tales or protective devices will be borne by the Agency.

- **1.03.07** The details of construction affecting the Railway's Property and tracks not included in the contract plans must be submitted to the Railway by King County for approval before work is undertaken and this work must not be undertaken until approved by the Railway.

- **1.03.08** At other than public road crossings, the Contractor must not move any equipment or materials across Railway's tracks until permission has been obtained from the Railway. The Contractor must obtain a "Temporary Construction Crossing Agreement" from the Railway prior to moving his equipment or materials across the Railways tracks. The temporary crossing must be gated and locked at all times when not required for use by the Contractor. The temporary crossing for use of the Contractor will be constructed and, at the completion of the project, removed at the expense of the Contractor.



- **1.03.09** Discharge, release or spill on the Railway Property of any hazardous substances, oil, petroleum, constituents, pollutants, contaminants, or any hazardous waste is prohibited and Contractor must immediately notify the **Railway's Resource Operations Center at 1(800) 832-5452**, of any discharge, release or spills in excess of a reportable quantity. Contractor must not allow Railway Property to become a treatment, storage or transfer facility as those terms are defined in the Resource Conservation and Recovery Act or any state analogue.
- **1.03.10** The Contractor upon completion of the work covered by this contract, must promptly remove from the Railway's Property all of Contractor's tools, equipment, implements and other materials, whether brought upon said property by said Contractor or any Subcontractor, employee or agent of Contractor or of any Subcontractor, and must cause Railway's Property to be left in a condition acceptable to the Railway's representative.

1.04 Contractor Roadway Worker on Track Safety Program and Safety Action Plan:

- **1.04.01** Each Contractor that will perform work within 25 feet of the centerline of a track must develop and implement a Roadway Worker Protection/On Track Safety Program and work with Railway Project Representative to develop an on track safety strategy as described in the guidelines listed in the on track safety portion of the Safety Orientation. This Program must provide Roadway Worker protection/on track training for all employees of the Contractor, its subcontractors, agents or invitees. This training is reinforced at the job site through job safety briefings. Additionally, each Contractor must develop and implement the Safety Action Plan, as provided for on the web site www.bnsfcontractor.com, which will be made available to Railway prior to commencement of any work on Railway Property. During the performance of work, the Contractor must audit its work activities. The Contractor must designate an on-site Project Supervisor who will serve as the contact person for the Railway and who will maintain a copy of the Safety Action Plan, safety audits, and Material Safety Datasheets (MSDS), at the job site.
- **1.04.02** Contractor shall have a background investigation performed on all of its employees, subcontractors and agents who will be performing any services for Railroad under this Agreement which are determined by Railroad in its sole discretion **a)** to be on Railroad's property, or **b)** that require access to Railroad Critical Infrastructure, Railroad Critical Information Systems, Railroad's Employees, Hazardous Materials on Railroad's property or is being transported by or otherwise in the custody of Railroad, or Freight in Transit involving Railroad.

The required background screening shall at a minimum meet the rail industry background screening criteria defined by the e-RAILSAFE Program as outlined at www.eVerify.com, in addition to any other applicable regulatory requirements.

Contractor shall obtain written consent from all its employees, subcontractors or agents screened in compliance with the e-RAILSAFE Program to participate in the Program on their behalf and to release completed background information to Railroad's designee. Contractor shall be subject to periodic audit to ensure compliance.

Contractor subject to the e-RAILSAFE Program hereunder shall not permit any of its employees, subcontractors or agents to perform services hereunder who are not first approved under e-RAILSAFE Program standards. Railroad shall have the right to deny entry onto its premises or access as described in this section above to any of Contractor's employees, subcontractors or agents who do not display the authorized identification badge issued by a background screening service meeting the standards set forth in the e-RAILSAFE Program, or who in Railroad's opinion, which may not be unreasonable, may pose a threat to the safety or security of Railroad's operations, assets or personnel.

Contractors shall be responsible for ensuring that its employees, subcontractors and agents are United States citizens or legally working in the United States under a lawful and appropriate work VISA or other work authorization.

1.05 Railway Flagger Services:

- **1.05.01** The Contractor must give Railway's **Roadmaster (telephone [REDACTED])** a minimum of thirty (30) calendar days advance notice when flagging services will be required so that the Roadmaster can make appropriate arrangements (i.e., bulletin the flagger's position). If flagging services are scheduled in advance by the Contractor and it is subsequently determined by the parties hereto that such services are no longer necessary, the Contractor must give the Roadmaster five (5) working days advance notice so that appropriate arrangements can be made to abolish the position pursuant to union requirements.
- **1.05.02** Unless determined otherwise by Railway's Project Representative, Railway flagger will be required and furnished when Contractor's work activities are located over, under and/or within twenty-five (25) feet measured horizontally from centerline of the nearest track and when cranes or similar equipment positioned beyond 25-feet from the track centerline could foul the track in the event of tip over or other catastrophic occurrence, but not limited thereto for the following conditions:
 - **1.05.02a** When, upon inspection by Railway's Representative, other conditions warrant.
 - **1.05.02b** When any excavation is performed below the bottom of tie elevation, if, in the opinion of Railway's representative, track or other Railway



facilities may be subject to movement or settlement.

- **1.05.02c** When work in any way interferes with the safe operation of trains at timetable speeds.
- **1.05.02d** When any hazard is presented to Railway track, communications, signal, electrical, or other facilities either due to persons, material, equipment or blasting in the vicinity.
- **1.05.02e** Special permission must be obtained from the Railway before moving heavy or cumbersome objects or equipment which might result in making the track impassable.
- **1.05.03** Flagging services will be performed by qualified Railway flaggers.
 - **1.05.03a** Flagging crew generally consists of one employee. However, additional personnel may be required to protect Railway Property and operations, if deemed necessary by the Railways Representative.
 - **1.05.03b** Each time a flagger is called, the minimum period for billing will be the eight (8) hour basic day.
 - **1.05.03c** The cost of flagger services provided by the Railway will be borne by King County . The estimated cost for one (1) flagger is approximately between \$800.00-\$1,600.00 for an eight (8) hour basic day with time and one-half or double time for overtime, rest days and holidays. The estimated cost for each flagger includes vacation allowance, paid holidays, Railway and unemployment insurance, public liability and property damage insurance, health and welfare benefits, vehicle, transportation, meals, lodging, radio, equipment, supervision and other costs incidental to performing flagging services. Negotiations for Railway labor or collective bargaining agreements and rate changes authorized by appropriate Federal authorities may increase actual or estimated flagging rates. **THE FLAGGING RATE IN EFFECT AT THE TIME OF PERFORMANCE BY THE CONTRACTOR HEREUNDER WILL BE USED TO CALCULATE THE ACTUAL COSTS OF FLAGGING PURSUANT TO THIS PARAGRAPH.**
 - **1.05.03d** The average train traffic on this route is 32 freight trains per 24-hour period at a timetable speed 50 MPH and 40 passenger trains at a timetable speed of 73 MPH.

1.06 Contractor General Safety Requirements

- **1.06.01** Work in the proximity of railway track(s) is potentially hazardous where

movement of trains and equipment can occur at any time and in any direction. All work performed by contractors within 25 feet of any track must be in compliance with FRA Roadway Worker Protection Regulations.

- **1.06.02** Before beginning any task on Railway Property, a thorough job safety briefing must be conducted with all personnel involved with the task and repeated when the personnel or task changes. If the task is within 25 feet of any track, the job briefing must include the Railway's flagger, as applicable, and include the procedures the Contractor will use to protect its employees, subcontractors, agents or invitees from moving any equipment adjacent to or across any Railway track(s).
- **1.06.03** Workers must not work within 25 feet of the centerline of any track without an on track safety strategy approved by the Railway's Project Representative. When authority is provided, every contractor employee must know: (1) who the Railway flagger is, and how to contact the flagger, (2) limits of the authority, (3) the method of communication to stop and resume work, and (4) location of the designated places of safety. Persons or equipment entering flag/work limits that were not previously job briefed, must notify the flagger immediately, and be given a job briefing when working within 25 feet of the center line of track.
- **1.06.04** When Contractor employees are required to work on the Railway Property after normal working hours or on weekends, the Railway's representative in charge of the project must be notified. A minimum of two employees must be present at all times.
- **1.06.05** Any employees, agents or invitees of Contractor or its subcontractors under suspicion of being under the influence of drugs or alcohol, or in the possession of same, will be removed from the Railway's Property and subsequently released to the custody of a representative of Contractor management. Future access to the Railway's Property by that employee will be denied.
- **1.06.06** Any damage to Railway Property, or any hazard noticed on passing trains must be reported immediately to the Railway's representative in charge of the project. Any vehicle or machine which may come in contact with track, signal equipment, or Project (bridge) and could result in a train derailment must be reported immediately to the Railway representative in charge of the project and to the Railway's Resource Operations Center at 1(800) 832-5452. Local emergency numbers are to be obtained from the Railway representative in charge of the project prior to the start of any work and must be posted at the job site.
- **1.06.07** For safety reasons, all persons are prohibited from having pocket knives, firearms or other deadly weapons in their possession while working on Railway's Property.
- **1.06.08** All personnel protective equipment (PPE) used on Railway Property must meet applicable OSHA and ANSI specifications. Current Railway personnel

protective equipment requirements are listed on the web site, www.bnsfcontractor.com, however, a partial list of the requirements include: a) safety glasses with permanently affixed side shields (no yellow lenses); b) hard hats; c) safety shoe with: hardened toes, above-the-ankle lace-up and a defined heel; and d) high visibility retro-reflective work wear. The Railway's representative in charge of the project is to be contacted regarding local specifications for meeting requirements relating to hi-visibility work wear. Hearing protection, fall protection, gloves, and respirators must be worn as required by State and Federal regulations. **(NOTE – Should there be a discrepancy between the information contained on the web site and the information in this paragraph, the web site will govern.)**

- **1.06.09 THE CONTRACTOR MUST NOT PILE OR STORE ANY MATERIALS, MACHINERY OR EQUIPMENT CLOSER THAN 25'-0" TO THE CENTER LINE OF THE NEAREST RAILWAY TRACK. MATERIALS, MACHINERY OR EQUIPMENT MUST NOT BE STORED OR LEFT WITHIN 250 FEET OF ANY HIGHWAY/RAIL AT-GRADE CROSSINGS OR TEMPORARY CONSTRUCTION CROSSING, WHERE STORAGE OF THE SAME WILL OBSTRUCT THE VIEW OF A TRAIN APPROACHING THE CROSSING. PRIOR TO BEGINNING WORK, THE CONTRACTOR MUST ESTABLISH A STORAGE AREA WITH CONCURRENCE OF THE RAILWAY'S REPRESENTATIVE.**
- **1.06.10** Machines or vehicles must not be left unattended with the engine running. Parked machines or equipment must be in gear with brakes set and if equipped with blade, pan or bucket, they must be lowered to the ground. All machinery and equipment left unattended on Railway's Property must be left inoperable and secured against movement. (See internet Engineering Contractor Safety Orientation program for more detailed specifications)
- **1.06.11** Workers must not create and leave any conditions at the work site that would interfere with water drainage. Any work performed over water must meet all Federal, State and Local regulations.
- **1.06.12** All power line wires must be considered dangerous and of high voltage unless informed to the contrary by proper authority. For all power lines the minimum clearance between the lines and any part of the equipment or load must be; 200 KV or below - 15 feet; 200 to 350 KV - 20 feet; 350 to 500 KV - 25 feet; 500 to 750 KV - 35 feet; and 750 to 1000 KV - 45 feet. If capacity of the line is not known, a minimum clearance of 45 feet must be maintained. A person must be designated to observe clearance of the equipment and give a timely warning for all operations where it is difficult for an operator to maintain the desired clearance by visual means.

1.07 Excavation:

- **1.07.01** Before excavating, the Contractor must determine whether any underground pipe lines, electric wires, or cables, including fiber optic cable systems

are present and located within the Project work area. The Contractor must determine whether excavation on Railway's Property could cause damage to buried cables resulting in delay to Railway traffic and disruption of service to users. Delays and disruptions to service may cause business interruptions involving loss of revenue and profits. Before commencing excavation, the Contractor must contact **BNSF's Field Engineering Representative ([REDACTED])**. All underground and overhead wires will be considered HIGH VOLTAGE and dangerous until verified with the company having ownership of the line. **It is the Contractor's responsibility to notify any other companies that have underground utilities in the area and arrange for the location of all underground utilities before excavating.**

- **1.07.02** The Contractor must cease all work and notify the Railway immediately before continuing excavation in the area if obstructions are encountered which do not appear on drawings. If the obstruction is a utility and the owner of the utility can be identified, then the Contractor must also notify the owner immediately. If there is any doubt about the location of underground cables or lines of any kind, no work must be performed until the exact location has been determined. There will be no exceptions to these instructions.
- **1.07.03** All excavations must be conducted in compliance with applicable OSHA regulations and, regardless of depth, must be shored where there is any danger to tracks, Projects or personnel.
- **1.07.04** Any excavations, holes or trenches on the Railway's Property must be covered, guarded and/or protected when not being worked on. When leaving work site areas at night and over weekends, the areas must be secured and left in a condition that will ensure that Railway employees and other personnel who may be working or passing through the area are protected from all hazards. All excavations must be back filled as soon as possible.

1.08 Hazardous Waste, Substances and Material Reporting:

- **1.08.01** If Contractor discovers any hazardous waste, hazardous substance, petroleum or other deleterious material, including but not limited to any non-containerized commodity or material, on or adjacent to Railway's Property, in or near any surface water, swamp, wetlands or waterways, while performing any work under this Agreement, Contractor must immediately: (a) notify the Railway's Resource Operations Center at 1(800) 832-5452, of such discovery: (b) take safeguards necessary to protect its employees, subcontractors, agents and/or third parties: and (c) exercise due care with respect to the release, including the taking of any appropriate measure to minimize the impact of such release.

1.09 Personal Injury Reporting



- **1.09.01** The Railway is required to report certain injuries as a part of compliance with Federal Railroad Administration (FRA) reporting requirements. Any personal injury sustained by an employee of the Contractor, subcontractor or Contractor's invitees while on the Railway's Property must be reported immediately (by phone mail if unable to contact in person) to the Railway's representative in charge of the project. The Non-Employee Personal Injury Data Collection Form contained herein is to be completed and sent by Fax to the Railway at 1(817) 352-7595 and to the Railway's Project Representative no later than the close of shift on the date of the injury.



NON-EMPLOYEE PERSONAL INJURY DATA COLLECTION

(If injuries are in connection with rail equipment accident/incident, highway rail grade crossing accident or automobile accident, ensure that appropriate information is obtained, forms completed and that data entry personnel are aware that injuries relate to that specific event.)

Injured Person Type:

Passenger on train (C)

Non-employee (N)
(i.e., emp of another railroad, or, non-BNSF emp involved in vehicle accident, including company vehicles)

Contractor/safety sensitive (F)

Contractor/non-safety sensitive (G)

Volunteer/safety sensitive (H)

Volunteer/other non-safety sensitive (I)

Non-trespasser (D) - to include highway users involved in highway rail grade crossing accidents who did not go around or through gates

Trespasser (E) - to include highway users involved in highway rail grade crossing accidents who went around or through gates

Non-trespasser (J) - Off railroad property

If train involved, Train ID:

Transmit attached information to Accident/Incident Reporting Center by:

Fax 1-817-352-7595

or by Phone 1-800-697-6736

or email to: Accident-Reporting.Center@BNSF.com

Officer Providing Information:

(Name)

(Employee No.)

(Phone #)

REPORT PREPARED TO COMPLY WITH FEDERAL ACCIDENT REPORTING REQUIREMENTS AND PROTECTED FROM DISCLOSURE PURSUANT TO 49 U.S.C. 20903 AND 83 U.S.C. 490

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EXHIBIT "C-1"

Agreement Between BNSF RAILWAY COMPANY and the CONTRACTOR

Railway File: _____

Agency Project: Lake to Sound Trail Connector Pedestrian Underpass

<%Contractor.LegalName%> [Insert contractor's legal name here](hereinafter called "Contractor"), has entered into an agreement (hereinafter called "Agreement") dated _____, 201_, [***Drafter's Note: insert the date of the contract between the Agency and the Contractor here] with King County for the performance of certain work in connection with the following project: **Lake to Sound Trail Connector Pedestrian Underpass** Performance of such work will necessarily require Contractor to enter **BNSF RAILWAY COMPANY** (hereinafter called "Railway") right of way and property (hereinafter called "Railway Property"). The Agreement provides that no work will be commenced within Railway Property until the Contractor employed in connection with said work for King County (i) executes and delivers to Railway an Agreement in the form hereof, and (ii) provides insurance of the coverage and limits specified in such Agreement and Section 3 herein. If this Agreement is executed by a party who is not the Owner, General Partner, President or Vice President of Contractor, Contractor must furnish evidence to Railway certifying that the signatory is empowered to execute this Agreement on behalf of Contractor.

Accordingly, in consideration of Railway granting permission to Contractor to enter upon Railway Property and as an inducement for such entry, Contractor, effective on the date of the Agreement, has agreed and does hereby agree with Railway as follows:

1) RELEASE OF LIABILITY AND INDEMNITY

Contractor hereby waives, releases, indemnifies, defends and holds harmless Railway for all judgments, awards, claims, demands, and expenses (including attorneys' fees), for injury or death to all persons, including Railway's and Contractor's officers and employees, and for loss and damage to property belonging to any person, arising in any manner from Contractor's or any of Contractor's subcontractors' acts or omissions or any work performed on or about Railway's property or right-of-way. **THE LIABILITY ASSUMED BY CONTRACTOR WILL NOT BE AFFECTED BY THE FACT, IF IT IS A FACT,**

THAT THE DESTRUCTION, DAMAGE, DEATH, OR INJURY WAS OCCASIONED BY OR CONTRIBUTED TO BY THE NEGLIGENCE OF RAILWAY, ITS AGENTS, SERVANTS, EMPLOYEES OR OTHERWISE, EXCEPT TO THE EXTENT THAT SUCH CLAIMS ARE PROXIMATELY CAUSED BY THE INTENSIONAL MISCONDUCT OR GROSS NEGLIGENCE OF RAILWAY.

This obligation shall not include such claims, costs, damages, or expenses which may be caused by the sole negligence of Railway or its contractors, agents or employees; Provided, that if the claims or damages are caused by or result from the concurrent negligence or other acts or omissions of (a) Railway, its contractors, agents or employees and (b) Contractor, its subcontractors, agents or employees, this provision shall be valid and enforceable only to the extent of the negligence of the Contractor, its subcontractors, agents or employees.

It is mutually negotiated between the parties that the indemnification obligation shall include all claims brought by Contractor's employees against Railway, its agents, servants, employees or otherwise, and Contractor expressly waives its immunity under the industrial insurance act (RCW Title 51) and assumes potential liability for all actions brought by its employees.

THE INDEMNIFICATION OBLIGATION ASSUMED BY CONTRACTOR INCLUDES ANY CLAIMS, SUITS OR JUDGMENTS BROUGHT AGAINST RAILWAY UNDER THE FEDERAL EMPLOYEE'S LIABILITY ACT, INCLUDING CLAIMS FOR STRICT LIABILITY UNDER THE SAFETY APPLIANCE ACT OR THE LOCOMOTIVE INSPECTION ACT, WHENEVER SO CLAIMED.

Contractor further agrees, at its expense, in the name and on behalf of Railway, that it will adjust and settle all claims made against Railway, and will, at Railway's discretion, appear and defend any suits or actions of law or in equity brought against Railway on any claim or cause of action arising or growing out of or in any manner connected with any liability assumed by Contractor under this Agreement for which Railway is liable or is alleged to be liable. Railway will give notice to Contractor, in writing, of the receipt or dependency of such claims and thereupon Contractor must proceed to adjust and handle to a conclusion such claims, and in the event of a suit being brought against Railway, Railway may forward summons and complaint or other process in connection therewith to Contractor, and Contractor, at Railway's discretion, must defend, adjust, or settle such suits and protect, indemnify, and save harmless Railway from and against all damages, judgments, decrees, attorney's fees, costs, and expenses growing out of or resulting from or incident to any such claims or suits.

In addition to any other provision of this Agreement, in the event that all or any portion of this Article shall be deemed to be inapplicable for any reason, including without limitation as a result of a decision of an applicable court, legislative enactment or regulatory order, the parties agree that this Article shall be interpreted as requiring Contractor to indemnify Railway to the fullest extent permitted by applicable law.

It is mutually understood and agreed that the assumption of liabilities and indemnification provided for in this Agreement survive any termination of this Agreement.

2) TERM

This Agreement is effective from the date of the Agreement until (i) the completion of the project set forth herein, and (ii) full and complete payment to Railway of any and all sums or other amounts owing and due hereunder.

3) INSURANCE

Contractor shall, at its sole cost and expense, procure and maintain during the life of this Agreement the following insurance coverage:

A. Commercial General Liability insurance. This insurance shall contain broad form contractual liability with a combined single limit of a minimum of \$2,000,000 each occurrence and an aggregate limit of at least \$6,000,000 but in no event less than the amount otherwise carried by the Contractor. Coverage must be purchased on a post 2004 ISO occurrence form or equivalent and include coverage for, but not limit to the following:

- ◆ Bodily Injury and Property Damage
- ◆ Personal Injury and Advertising Injury
- ◆ Fire legal liability
- ◆ Products and completed operations

This policy shall also contain the following endorsements, which shall be indicated on the certificate of insurance:

- ◆ The definition of insured contract shall be amended to remove any exclusion or other limitation for any work being done within 50 feet of railroad property.
- ◆ Waiver of subrogation in favor of and acceptable to Railway.
- ◆ Additional insured endorsement in favor of and acceptable to Railway.
- ◆ Separation of insureds.

- ◆ The policy shall be primary and non-contributing with respect to any insurance carried by Railway.

It is agreed that the workers' compensation and employers' liability related exclusions in the Commercial General Liability insurance policy(s) required herein are intended to apply to employees of the policy holder and shall not apply to **Railway** employees.

No other endorsements limiting coverage as respects obligations under this Agreement may be included on the policy with regard to the work being performed under this agreement.

B. Business Automobile Insurance. This insurance shall contain a combined single limit of at least \$1,000,000 per occurrence, and include coverage for, but not limited to the following:

- ◆ Bodily injury and property damage
- ◆ Any and all vehicles owned, used or hired

The policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- ◆ Waiver of subrogation in favor of and acceptable to Railway.
- ◆ Additional insured endorsement in favor of and acceptable to Railway.
- ◆ Separation of insureds.
- ◆ The policy shall be primary and non-contributing with respect to any insurance carried by Railway.

C. Workers Compensation and Employers Liability insurance including coverage for, but not limited to:

- ◆ Contractor's statutory liability under the worker's compensation laws of the state(s) in which the work is to be performed. If optional under State law, the insurance must cover all employees anyway.
- ◆ Employers' Liability (Part B) with limits of at least \$500,000 each accident, \$500,000 by disease policy limit, \$500,000 by disease each employee.

This policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- ◆ Waiver of subrogation in favor of and acceptable to Railway.

D. Railroad Protective Liability insurance naming only the **Railway** as the Insured with coverage of at least \$2,000,000 per occurrence and \$5,000,000

in the aggregate. The policy Must be issued on a standard ISO form CG 00 35 12 04 and include the following:

- ◆ Endorsed to include the Pollution Exclusion Amendment
- ◆ Endorsed to include the Limited Seepage and Pollution Endorsement.
- ◆ Endorsed to remove any exclusion for punitive damages.
- ◆ No other endorsements restricting coverage may be added.
- ◆ The original policy must be provided to the **Railway** prior to performing any work or services under this Agreement
- ◆ Definition of “Physical Damage to Property” shall be endorsed to read: “means direct and accidental loss of or damage to all property owned by any named insured and all property in any named insured’ care, custody, and control arising out of the acts or omissions of the contractor named on the Declarations.

In lieu of providing a Railroad Protective Liability Policy, Licensee may participate (if available) in Railway’s Blanket Railroad Protective Liability Insurance Policy.

Other Requirements:

Where allowable by law, all policies (applying to coverage listed above) shall contain no exclusion for punitive damages.

Contractor agrees to waive its right of recovery against **Railway** for all claims and suits against **Railway**. In addition, its insurers, through the terms of the policy or policy endorsement, waive their right of subrogation against **Railway** for all claims and suits. Contractor further waives its right of recovery, and its insurers also waive their right of subrogation against **Railway** for loss of its owned or leased property or property under Contractor’s care, custody or control.

Allocated Loss Expense shall be in addition to all policy limits for coverages referenced above.

Contractor is not allowed to self-insure without the prior written consent of **Railway**. If granted by **Railway**, any self-insured retention or other financial responsibility for claims shall be covered directly by Contractor in lieu of insurance. Any and all **Railway** liabilities that would otherwise, in accordance with the provisions of this Agreement, be covered by Contractor’s insurance will be covered as if Contractor elected not to include a deductible, self-insured retention or other financial responsibility for claims.

Prior to commencing services, Contractor shall furnish to **Railway** an acceptable certificate(s) of insurance from an authorized representative evidencing the required coverage(s), endorsements, and amendments. The certificate should be directed to the following address:

BNSF Railway Company
c/o CertFocus
P.O. Box 140528
Kansas City, MO 64114
Toll Free: 877-576-2378
Fax number: 817-840-7487
Email: BNSF@certfocus.com
www.certfocus.com

Contractor shall notify **Railway** in writing at least 30 days prior to any cancellation, non-renewal, substitution or material alteration.

Any insurance policy shall be written by a reputable insurance company acceptable to **Railway** or with a current Best's Guide Rating of A- and Class VII or better, and authorized to do business in the state(s) in which the service is to be provided.

If coverage is purchased on a "claims made" basis, Contractor hereby agrees to maintain coverage in force for a minimum of three years after expiration, cancellation or termination of this Agreement. Annually Contractor agrees to provide evidence of such coverage as required hereunder.

Contractor represents that this Agreement has been thoroughly reviewed by Contractor's insurance agent(s)/broker(s), who have been instructed by Contractor to procure the insurance coverage required by this Agreement.

Not more frequently than once every five years, **Railway** may reasonably modify the required insurance coverage to reflect then-current risk management practices in the railroad industry and underwriting practices in the insurance industry.

If any portion of the operation is to be subcontracted by Contractor, Contractor shall require that the subcontractor shall provide and maintain insurance coverage(s) as set forth herein, naming **Railway** as an additional insured, and shall require that the subcontractor shall release, defend and indemnify **Railway** to the same extent and under the same terms and conditions as Contractor is required to release, defend and indemnify **Railway** herein.

Failure to provide evidence as required by this section shall entitle, but not require, **Railway** to terminate this Agreement immediately. Acceptance of a certificate that does not comply with this section shall not operate as a waiver of Contractor's obligations hereunder.

The fact that insurance (including, without limitation, self-insurance) is obtained by Contractor shall not be deemed to release or diminish the liability of Contractor including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by **Railway** shall not be limited by the amount of the required insurance coverage.

In the event of a claim or lawsuit involving **Railway** arising out of this agreement, Contractor will make available any required policy covering such claim or lawsuit.

These insurance provisions are intended to be a separate and distinct obligation on the part of the Contractor. Therefore, these provisions shall be enforceable and Contractor shall be bound thereby regardless of whether or not indemnity provisions are determined to be enforceable in the jurisdiction in which the work covered hereunder is performed.

For purposes of this section, **Railway** shall mean "Burlington Northern Santa Fe LLC", "BNSF Railway Company" and the subsidiaries, successors, assigns and affiliates of each.

4) SALES AND OTHER TAXES

In the event applicable sales taxes of a state or political subdivision of a state of the United States are levied or assessed in connection with and directly related to any amounts invoiced by Contractor to Railway ("Sales Taxes"), Railway shall be responsible for paying only the Sales Taxes that Contractor separately states on the invoice or other billing documents provided to Railway; *provided, however*, that (i) nothing herein shall preclude Railway from claiming whatever Sales Tax exemptions are applicable to amounts Contractor bills Railway, (ii) Contractor shall be responsible for all sales, use, excise, consumption, services and other taxes which may accrue on all services, materials, equipment, supplies or fixtures that Contractor and its subcontractors use or consume in the performance of this Agreement, (iii) Contractor shall be responsible for Sales Taxes (together with any penalties, fines or interest thereon) that Contractor fails to separately state on the invoice or other billing documents provided to Railway or fails to collect at the time of payment by Railway of invoiced amounts (except where Railway claims a Sales Tax exemption), and (iv) Contractor shall be responsible for Sales Taxes (together with any penalties, fines or interest thereon) if Contractor fails to issue separate invoices for each state in which Contractor delivers goods, provides services or, if applicable, transfers intangible rights to Railway.

Upon request, Contractor shall provide Railway satisfactory evidence that all taxes (together with any penalties, fines or interest thereon) that Contractor is responsible to pay under this Agreement have been paid. If a written claim is made against Contractor for Sales Taxes with respect to which Railway may be

liable for under this Agreement, Contractor shall promptly notify Railway of such claim and provide Railway copies of all correspondence received from the taxing authority. Railway shall have the right to contest, protest, or claim a refund, in Railway's own name, any Sales Taxes paid by Railway to Contractor or for which Railway might otherwise be responsible for under this Agreement; provided, however, that if Railway is not permitted by law to contest any such Sales Tax in its own name, Contractor shall, if requested by Railway at Railway's sole cost and expense, contest in Contractor's own name the validity, applicability or amount of such Sales Tax and allow Railway to control and conduct such contest.

Railway retains the right to withhold from payments made under this Agreement amounts required to be withheld under tax laws of any jurisdiction. If Contractor is claiming a withholding exemption or a reduction in the withholding rate of any jurisdiction on any payments under this Agreement, before any payments are made (and in each succeeding period or year as required by law), Contractor agrees to furnish to Railway a properly completed exemption form prescribed by such jurisdiction. Contractor shall be responsible for any taxes, interest or penalties assessed against Railway with respect to withholding taxes that Railway does not withhold from payments to Contractor.

5) EXHIBIT "C" CONTRACTOR REQUIREMENTS

The Contractor must observe and comply with all provisions, obligations, requirements and limitations contained in the Agreement, and the Contractor Requirements set forth on Exhibit "C" attached to the Agreement and this Agreement, including, but not be limited to, payment of all costs incurred for any damages to Railway roadbed, tracks, and/or appurtenances thereto, resulting from use, occupancy, or presence of its employees, representatives, or agents or subcontractors on or about the construction site. Contractor shall execute a Temporary Construction Crossing Agreement or Private Crossing Agreement (<http://www.bnsf.com/communities/faqs/permits-real-estate/>), for any temporary crossing requested to aid in the construction of this Project, if approved by BNSF.

6) TRAIN DELAY

Contractor is responsible for and hereby indemnifies and holds harmless Railway (including its affiliated railway companies, and its tenants) for, from and against all damages arising from any unscheduled delay to a freight or passenger train which affects Railway's ability to fully utilize its equipment and to meet customer service and contract obligations. Contractor will be billed, as further provided below, for the economic losses arising from loss of use of equipment, contractual loss of incentive pay and bonuses and contractual penalties resulting from train delays, whether caused by Contractor, or subcontractors, or by the Railway

performing work under this Agreement. Railway agrees that it will not perform any act to unnecessarily cause train delay.

For loss of use of equipment, Contractor will be billed the current freight train hour rate per train as determined from Railway's records. Any disruption to train traffic may cause delays to multiple trains at the same time for the same period.

Additionally, the parties acknowledge that passenger, U.S. mail trains and certain other grain, intermodal, coal and freight trains operate under incentive/penalty contracts between Railway and its customer(s). Under these arrangements, if Railway does not meet its contract service commitments, Railway may suffer loss of performance or incentive pay and/or be subject to penalty payments. Contractor is responsible for any train performance and incentive penalties or other contractual economic losses actually incurred by Railway which are attributable to a train delay caused by Contractor or its subcontractors.

The contractual relationship between Railway and its customers is proprietary and confidential. In the event of a train delay covered by this Agreement, Railway will share information relevant to any train delay to the extent consistent with Railway confidentiality obligations. The rate then in effect at the time of performance by the Contractor hereunder will be used to calculate the actual costs of train delay pursuant to this agreement.

Contractor and its subcontractors must give Railway's representative () (4) weeks advance notice of the times and dates for proposed work windows. Railway and Contractor will establish mutually agreeable work windows for the project. Railway has the right at any time to revise or change the work windows due to train operations or service obligations. Railway will not be responsible for any additional costs or expenses resulting from a change in work windows. Additional costs or expenses resulting from a change in work windows shall be accounted for in Contractor's expenses for the project.

Contractor and subcontractors must plan, schedule, coordinate and conduct all Contractor's work so as to not cause any delays to any trains.

IN WITNESS WHEREOF, each of the parties hereto has caused this Agreement to be executed by its duly authorized officer the day and year first above written.

<%Contractor.LegalName%>

BNSF Railway Company

By: _____

By: _____

Printed Name: _____

Name: _____

Manager Public Projects NW Division

Title: _____

Accepted and effective

2017.

Contact Person: _____

Address: _____

City: _____

State: _____ Zip: _____

Fax: _____

Phone: _____

E-mail: _____

Folder No.:
UPRR Audit No.:

CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

THIS AGREEMENT is made and entered into as of the ____ day of _____, 2017, by and between **UNION PACIFIC RAILROAD COMPANY**, a Delaware corporation ("Railroad"); and

_____ (*Name of Contractor*)

a _____ corporation ("Contractor").

RECITALS:

Contractor has been hired by _____ for _____ of the at-grade public road crossing DOT _____ at Mile Posts _____ on the _____ Subdivision in _____, _____ County, _____, in the general location shown on the Railroad Location Print marked **Exhibit A**, attached hereto and hereby made a part hereof, which work is the subject of an Agreement dated _____, between the Railroad and the _____.

The Railroad is willing to permit the Contractor to perform the work described above at the location described above subject to the terms and conditions contained in this Agreement

AGREEMENT:

NOW, THEREFORE, it is mutually agreed by and between Railroad and Contractor, as follows:

ARTICLE 1 - DEFINITION OF CONTRACTOR.

For purposes of this Agreement, all references in this agreement to Contractor shall include Contractor's contractors, subcontractors, officers, agents and employees, and others acting under its or their authority.

ARTICLE 2 - RIGHT GRANTED; PURPOSE.

Railroad hereby grants to Contractor the right, during the term hereinafter stated and upon and subject to each and all of the terms, provisions and conditions herein contained, to enter upon and have ingress to and egress from the property described in the Recitals for the purpose of performing the work described in the Recitals above. The right herein granted to Contractor is limited to those portions of Railroad's property specifically described herein, or as designated by the Railroad Representative named in Article 4.

ARTICLE 3 - TERMS AND CONDITIONS CONTAINED IN EXHIBITS B, C & D.

The General Terms and Conditions contained in **Exhibit B**, the Insurance Requirements contained in **Exhibit C**, and the Minimum Safety Requirements contained in **Exhibit D**, each attached hereto, are hereby made a part of this Agreement.

ARTICLE 4 - ALL EXPENSES TO BE BORNE BY CONTRACTOR; RAILROAD REPRESENTATIVE.

- A. Contractor shall bear any and all costs and expenses associated with any work performed by Contractor, or any costs or expenses incurred by Railroad relating to this Agreement.
- B. Contractor shall coordinate all of its work with the following Railroad representative or his or her duly authorized representative (the "Railroad Representative"):

- C. Contractor, at its own expense, shall adequately police and supervise all work to be performed by Contractor and shall ensure that such work is performed in a safe manner as set forth in Section 7 of **Exhibit B**. The responsibility of Contractor for safe conduct and adequate policing and supervision of Contractor's work shall not be lessened or otherwise affected by Railroad's approval of plans and specifications involving the work, or by Railroad's collaboration in performance of any work, or by the presence at the work site of a Railroad Representative, or by compliance by Contractor with any requests or recommendations made by Railroad Representative.

ARTICLE 5 - SCHEDULE OF WORK ON A MONTHLY BASIS.

The Contractor, at its expense, shall provide on a monthly basis a detailed schedule of work to the Railroad Representative named in Article 4B above. The reports shall start at the execution of this Agreement and continue until this Agreement is terminated as provided in this Agreement or until the Contractor has completed all work on Railroad's property.

ARTICLE 6 - TERM; TERMINATION.

- A. The grant of right herein made to Contractor shall commence on the date of this Agreement, and continue until _____, unless sooner terminated as herein
(Expiration Date)
provided, or at such time as Contractor has completed its work on Railroad's property, whichever is earlier. Contractor agrees to notify the Railroad Representative in writing when it has completed its work on Railroad's property.
- B. This Agreement may be terminated by either party on ten (10) days written notice to the other party.

ARTICLE 7 - CERTIFICATE OF INSURANCE.

- A. Before commencing any work, Contractor will provide Railroad with the (i) insurance binders, policies, certificates and endorsements set forth in **Exhibit C** of this Agreement, and (ii) the insurance endorsements obtained by each subcontractor as required under Section 12 of **Exhibit B** of this Agreement.
- B. All insurance correspondence, binders, policies, certificates and endorsements shall be sent to:

*Union Pacific Railroad Company
Real Estate Department
1400 Douglas Street, MS 1690
Omaha, NE 68179-1690
UPRR Folder No.: _____*

ARTICLE 8 - DISMISSAL OF CONTRACTOR'S EMPLOYEE.

At the request of Railroad, Contractor shall remove from Railroad's property any employee of Contractor who fails to conform to the instructions of the Railroad Representative in connection with the work on Railroad's property, and any right of Contractor shall be suspended until such removal has occurred. Contractor shall indemnify Railroad against any claims arising from the removal of any such employee from Railroad's property.

ARTICLE 9 - CROSSINGS.

No additional vehicular crossings (including temporary haul roads) or pedestrian crossings over Railroad's trackage shall be installed or used by Contractor without the prior written permission of Railroad.

ARTICLE 10 - CROSSINGS; COMPLIANCE WITH MUTCD AND FRA GUIDELINES.

- A. No additional vehicular crossings (including temporary haul roads) or pedestrian crossings over Railroad's trackage shall be installed or used by Contractor without the prior written permission of Railroad.
- B. Any permanent or temporary changes, including temporary traffic control, to crossings must conform to the Manual of Uniform Traffic Control Devices (MUTCD) and any applicable Federal Railroad Administration rules, regulations and guidelines, and must be reviewed by the Railroad prior to any changes being implemented. In the event the Railroad is found to be out of compliance with federal safety regulations due to the Contractor's modifications, negligence, or any other reason arising from the Contractor's presence on the Railroad's property, the Contractor agrees to assume liability for any civil penalties imposed upon the Railroad for such noncompliance.

ARTICLE 11 - EXPLOSIVES.

Explosives or other highly flammable substances shall not be stored or used on Railroad's property without the prior written approval of Railroad.

IN WITNESS WHEREOF, the parties hereto have duly executed this agreement in duplicate as of the date first herein written.

UNION PACIFIC RAILROAD COMPANY
(Federal Tax ID #94-6001323)

By: _____
Daniel Peters
Real Estate – Public Projects

(Name of Contractor)

By _____

Printed Name: _____

Title: _____

EXHIBIT B

TO CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

GENERAL TERMS & CONDITIONS

Section 1. NOTICE OF COMMENCEMENT OF WORK - FLAGGING.

- A. Contractor agrees to notify the Railroad Representative at least thirty (30) working days in advance of Contractor commencing its work and at least ten (10) working days in advance of proposed performance of any work by Contractor in which any person or equipment will be within twenty-five (25) feet of any track, or will be near enough to any track that any equipment extension (such as, but not limited to, a crane boom) will reach to within twenty-five (25) feet of any track. No work of any kind shall be performed, and no person, equipment, machinery, tool(s), material(s), vehicle(s), or thing(s) shall be located, operated, placed, or stored within twenty-five (25) feet of any of Railroad's track(s) at any time, for any reason, unless and until a Railroad flagman is provided to watch for trains. Upon receipt of such ten (10)-day notice, the Railroad Representative will determine and inform Contractor whether a flagman need be present and whether Contractor needs to implement any special protective or safety measures. If flagging or other special protective or safety measures are performed by Railroad, Railroad will bill Contractor for such expenses incurred by Railroad, unless Railroad and a federal, state or local governmental entity have agreed that Railroad is to bill such expenses to the federal, state or local governmental entity. If Railroad will be sending the bills to Contractor, Contractor shall pay such bills within thirty (30) days of Contractor's receipt of billing. If Railroad performs any flagging, or other special protective or safety measures are performed by Railroad, Contractor agrees that Contractor is not relieved of any of its responsibilities or liabilities set forth in this Agreement.
- B. The rate of pay per hour for each flagman will be the prevailing hourly rate in effect for an eight-hour day for the class of flagmen used during regularly assigned hours and overtime in accordance with Labor Agreements and Schedules in effect at the time the work is performed. In addition to the cost of such labor, a composite charge for vacation, holiday, health and welfare, supplemental sickness, Railroad Retirement and unemployment compensation, supplemental pension, Employees Liability and Property Damage and Administration will be included, computed on actual payroll. The composite charge will be the prevailing composite charge in effect at the time the work is performed. One and one-half times the current hourly rate is paid for overtime, Saturdays and Sundays, and two and one-half times current hourly rate for holidays. Wage rates are subject to change, at any time, by law or by agreement between Railroad and its employees, and may be retroactive as a result of negotiations or a ruling of an authorized governmental agency. Additional charges on labor are also subject to change. If the wage rate or additional charges are changed, Contractor (or the governmental entity, as applicable) shall pay on the basis of the new rates and charges.
- C. Reimbursement to Railroad will be required covering the full eight-hour day during which any flagman is furnished, unless the flagman can be assigned to other Railroad work during a portion of such day, in which event reimbursement will not be required for the portion of the day during which the flagman is engaged in other Railroad work. Reimbursement will also be required for any day not actually worked by the flagman following the flagman's assignment to work on the project for which Railroad is required to pay the flagman and which could not reasonably be avoided by Railroad by assignment of such flagman to other work, even though Contractor may not be working during such time. When it becomes necessary for Railroad to bulletin and assign an employee to a flagging position in compliance with union collective bargaining agreements, Contractor must provide Railroad a minimum of five (5) days notice prior to the cessation of the need for a flagman. If five (5) days notice of cessation is not given, Contractor will still be required to pay flagging charges for the five (5) day notice period required by union agreement to be given to the employee, even though flagging is not required for that period. An additional ten (10) days notice must then be given to Railroad if flagging services are needed again after such five day cessation notice has been given to Railroad.

Section 2. LIMITATION AND SUBORDINATION OF RIGHTS GRANTED

- A. The foregoing grant of right is subject and subordinate to the prior and continuing right and obligation of the Railroad to use and maintain its entire property including the right and power of Railroad to construct, maintain, repair, renew, use, operate, change, modify or relocate railroad tracks, roadways, signal, communication, fiber optics, or other wirelines, pipelines and other facilities upon, along or across any or all parts of its property, all or any of which may be

freely done at any time or times by Railroad without liability to Contractor or to any other party for compensation or damages.

- B. The foregoing grant is also subject to all outstanding superior rights (including those in favor of licensees and lessees of Railroad's property, and others) and the right of Railroad to renew and extend the same, and is made without covenant of title or for quiet enjoyment.

Section 3. NO INTERFERENCE WITH OPERATIONS OF RAILROAD AND ITS TENANTS.

- A. Contractor shall conduct its operations so as not to interfere with the continuous and uninterrupted use and operation of the railroad tracks and property of Railroad, including without limitation, the operations of Railroad's lessees, licensees or others, unless specifically authorized in advance by the Railroad Representative. Nothing shall be done or permitted to be done by Contractor at any time that would in any manner impair the safety of such operations. When not in use, Contractor's machinery and materials shall be kept at least fifty (50) feet from the centerline of Railroad's nearest track, and there shall be no vehicular crossings of Railroads tracks except at existing open public crossings.
- B. Operations of Railroad and work performed by Railroad personnel and delays in the work to be performed by Contractor caused by such railroad operations and work are expected by Contractor, and Contractor agrees that Railroad shall have no liability to Contractor, or any other person or entity for any such delays. The Contractor shall coordinate its activities with those of Railroad and third parties so as to avoid interference with railroad operations. The safe operation of Railroad train movements and other activities by Railroad takes precedence over any work to be performed by Contractor.

Section 4. LIENS.

Contractor shall pay in full all persons who perform labor or provide materials for the work to be performed by Contractor. Contractor shall not create, permit or suffer any mechanic's or materialmen's liens of any kind or nature to be created or enforced against any property of Railroad for any such work performed. Contractor shall indemnify and hold harmless Railroad from and against any and all liens, claims, demands, costs or expenses of whatsoever nature in any way connected with or growing out of such work done, labor performed, or materials furnished. If Contractor fails to promptly cause any lien to be released of record, Railroad may, at its election, discharge the lien or claim of lien at Contractor's expense.

Section 5. PROTECTION OF FIBER OPTIC CABLE SYSTEMS.

- A. Fiber optic cable systems may be buried on Railroad's property. Protection of the fiber optic cable systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. Contractor shall telephone Railroad during normal business hours (7:00 a.m. to 9:00 p.m. Central Time, Monday through Friday, except holidays) at 1-800-336-9193 (also a 24-hour, 7-day number for emergency calls) to determine if fiber optic cable is buried anywhere on Railroad's property to be used by Contractor. If it is, Contractor will telephone the telecommunications company(ies) involved, make arrangements for a cable locator and, if applicable, for relocation or other protection of the fiber optic cable. Contractor shall not commence any work until all such protection or relocation (if applicable) has been accomplished.
- B. In addition to other indemnity provisions in this Agreement, Contractor shall indemnify, defend and hold Railroad harmless from and against all costs, liability and expense whatsoever (including, without limitation, attorneys' fees, court costs and expenses) arising out of any act or omission of Contractor, its agents and/or employees, that causes or contributes to (1) any damage to or destruction of any telecommunications system on Railroad's property, and/or (2) any injury to or death of any person employed by or on behalf of any telecommunications company, and/or its contractor, agents and/or employees, on Railroad's property. Contractor shall not have or seek recourse against Railroad for any claim or cause of action for alleged loss of profits or revenue or loss of service or other consequential damage to a telecommunication company using Railroad's property or a customer or user of services of the fiber optic cable on Railroad's property.

Section 6. PERMITS - COMPLIANCE WITH LAWS.

In the prosecution of the work covered by this Agreement, Contractor shall secure any and all necessary permits and shall comply with all applicable federal, state and local laws, regulations and enactments affecting the work including, without limitation, all applicable Federal Railroad Administration regulations.

Section 7. SAFETY.

- A. Safety of personnel, property, rail operations and the public is of paramount importance in the prosecution of the work performed by Contractor. Contractor shall be responsible for initiating, maintaining and supervising all safety, operations and programs in connection with the work. Contractor shall at a minimum comply with Railroad's safety standards listed in **Exhibit D**, hereto attached, to ensure uniformity with the safety standards followed by Railroad's own forces. As a part of Contractor's safety responsibilities, Contractor shall notify Railroad if Contractor determines that any of Railroad's safety standards are contrary to good safety practices. Contractor shall furnish copies of **Exhibit D** to each of its employees before they enter the job site.
- B. Without limitation of the provisions of paragraph A above, Contractor shall keep the job site free from safety and health hazards and ensure that its employees are competent and adequately trained in all safety and health aspects of the job.
- C. Contractor shall have proper first aid supplies available on the job site so that prompt first aid services may be provided to any person injured on the job site. Contractor shall promptly notify Railroad of any U.S. Occupational Safety and Health Administration reportable injuries. Contractor shall have a nondelegable duty to control its employees while they are on the job site or any other property of Railroad, and to be certain they do not use, be under the influence of, or have in their possession any alcoholic beverage, drug or other substance that may inhibit the safe performance of any work.
- D. If and when requested by Railroad, Contractor shall deliver to Railroad a copy of Contractor's safety plan for conducting the work (the "Safety Plan"). Railroad shall have the right, but not the obligation, to require Contractor to correct any deficiencies in the Safety Plan. The terms of this Agreement shall control if there are any inconsistencies between this Agreement and the Safety Plan.

Section 8. INDEMNITY.

- A. To the extent not prohibited by applicable statute, Contractor shall indemnify, defend and hold harmless Railroad, its affiliates, and its and their officers, agents and employees (individually an "Indemnified Party" or collectively "Indemnified Parties") from and against any and all loss, damage, injury, liability, claim, demand, cost or expense (including, without limitation, attorney's, consultant's and expert's fees, and court costs), fine or penalty (collectively, "Loss") incurred by any person (including, without limitation, any Indemnified Party, Contractor, or any employee of Contractor or of any Indemnified Party) arising out of or in any manner connected with (i) any work performed by Contractor, or (ii) any act or omission of Contractor, its officers, agents or employees, or (iii) any breach of this Agreement by Contractor.
- B. The right to indemnity under this Section 8 shall accrue upon occurrence of the event giving rise to the Loss, and shall apply regardless of any negligence or strict liability of any Indemnified Party, except where the Loss is caused by the sole active negligence of an Indemnified Party as established by the final judgment of a court of competent jurisdiction. The sole active negligence of any Indemnified Party shall not bar the recovery of any other Indemnified Party.
- C. Contractor expressly and specifically assumes potential liability under this Section 8 for claims or actions brought by Contractor's own employees. Contractor waives any immunity it may have under worker's compensation or industrial insurance acts to indemnify the Indemnified Parties under this Section 8. Contractor acknowledges that this waiver was mutually negotiated by the parties hereto.
- D. No court or jury findings in any employee's suit pursuant to any worker's compensation act or the Federal Employers' Liability Act against a party to this Agreement may be relied upon or used by Contractor in any attempt to assert liability against any Indemnified Party.
- E. The provisions of this Section 8 shall survive the completion of any work performed by Contractor or the termination or

expiration of this Agreement. In no event shall this Section 8 or any other provision of this Agreement be deemed to limit any liability Contractor may have to any Indemnified Party by statute or under common law.

Section 9. RESTORATION OF PROPERTY.

In the event Railroad authorizes Contractor to take down any fence of Railroad or in any manner move or disturb any of the other property of Railroad in connection with the work to be performed by Contractor, then in that event Contractor shall, as soon as possible and at Contractor's sole expense, restore such fence and other property to the same condition as the same were in before such fence was taken down or such other property was moved or disturbed. Contractor shall remove all of Contractor's tools, equipment, rubbish and other materials from Railroad's property promptly upon completion of the work, restoring Railroad's property to the same state and condition as when Contractor entered thereon.

Section 10. WAIVER OF DEFAULT.

Waiver by Railroad of any breach or default of any condition, covenant or agreement herein contained to be kept, observed and performed by Contractor shall in no way impair the right of Railroad to avail itself of any remedy for any subsequent breach or default.

Section 11. MODIFICATION - ENTIRE AGREEMENT.

No modification of this Agreement shall be effective unless made in writing and signed by Contractor and Railroad. This Agreement and the exhibits attached hereto and made a part hereof constitute the entire understanding between Contractor and Railroad and cancel and supersede any prior negotiations, understandings or agreements, whether written or oral, with respect to the work to be performed by Contractor.

Section 12. ASSIGNMENT - SUBCONTRACTING.

Contractor shall not assign or subcontract this Agreement, or any interest therein, without the written consent of the Railroad. Contractor shall be responsible for the acts and omissions of all subcontractors. Before Contractor commences any work, the Contractor shall, except to the extent prohibited by law; (1) require each of its subcontractors to include the Contractor as "Additional Insured" in the subcontractor's Commercial General Liability policy and Business Automobile policies with respect to all liabilities arising out of the subcontractor's performance of work on behalf of the Contractor by endorsing these policies with ISO Additional Insured Endorsements CG 20 26, and CA 20 48 (or substitute forms providing equivalent coverage; (2) require each of its subcontractors to endorse their Commercial General Liability Policy with "Contractual Liability Railroads" ISO Form CG 24 17 10 01 (or a substitute form providing equivalent coverage) for the job site; and (3) require each of its subcontractors to endorse their Business Automobile Policy with "Coverage For Certain Operations In Connection With Railroads" ISO Form CA 20 70 10 01 (or a substitute form providing equivalent coverage) for the job site.

EXHIBIT C

TO CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

INSURANCE REQUIREMENTS

Contractor shall, at its sole cost and expense, procure and maintain during the course of the Project and until all Project work on Railroad's property has been completed and the Contractor has removed all equipment and materials from Railroad's property and has cleaned and restored Railroad's property to Railroad's satisfaction, the following insurance coverage:

A. COMMERCIAL GENERAL LIABILITY INSURANCE. Commercial general liability (CGL) with a limit of not less than \$5,000,000 each occurrence and an aggregate limit of not less than \$10,000,000. CGL insurance must be written on ISO occurrence form CG 00 01 12 04 (or a substitute form providing equivalent coverage).

The policy must also contain the following endorsement, which must be stated on the certificate of insurance:

- Contractual Liability Railroads ISO form CG 24 17 10 01 (or a substitute form providing equivalent coverage) showing "Union Pacific Railroad Company Property" as the Designated Job Site.
- Designated Construction Project(s) General Aggregate Limit ISO Form CG 25 03 03 97 (or a substitute form providing equivalent coverage) showing the project on the form schedule.

B. BUSINESS AUTOMOBILE COVERAGE INSURANCE. Business auto coverage written on ISO form CA 00 01 10 01 (or a substitute form providing equivalent liability coverage) with a combined single limit of not less \$5,000,000 for each accident and coverage must include liability arising out of any auto (including owned, hired and non-owned autos).

The policy must contain the following endorsements, which must be stated on the certificate of insurance:

- Coverage For Certain Operations In Connection With Railroads ISO form CA 20 70 10 01 (or a substitute form providing equivalent coverage) showing "Union Pacific Property" as the Designated Job Site.
- Motor Carrier Act Endorsement - Hazardous materials clean up (MCS-90) if required by law.

C. WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE. Coverage must include but not be limited to:

- Contractor's statutory liability under the workers' compensation laws of the state where the work is being performed.
- Employers' Liability (Part B) with limits of at least \$500,000 each accident, \$500,000 disease policy limit \$500,000 each employee.

If Contractor is self-insured, evidence of state approval and excess workers compensation coverage must be provided.

Coverage must include liability arising out of the U. S. Longshoremen's and Harbor Workers' Act, the Jones Act, and the Outer Continental Shelf Land Act, if applicable.

The policy must contain the following endorsement, which must be stated on the certificate of insurance:

- Alternate Employer endorsement ISO form WC 00 03 01 A (or a substitute form providing equivalent coverage) showing Railroad in the schedule as the alternate employer (or a substitute form providing equivalent coverage).

D. RAILROAD PROTECTIVE LIABILITY INSURANCE. Contractor must maintain Railroad Protective Liability insurance written on ISO occurrence form CG 00 35 12 04 (or a substitute form providing equivalent coverage) on behalf of Railroad as named insured, with a limit of not less than \$2,000,000 per occurrence and an aggregate of \$6,000,000. A binder stating the policy is in place must be submitted to Railroad before the work may be commenced and until the original policy is forwarded to Railroad.

E. UMBRELLA OR EXCESS INSURANCE. If Contractor utilizes umbrella or excess policies, these policies must "follow form" and afford no less coverage than the primary policy.

- F. POLLUTION LIABILITY INSURANCE.** Pollution liability coverage must be written on ISO form Pollution Liability Coverage Form Designated Sites CG 00 39 12 04 (or a substitute form providing equivalent liability coverage), with limits of at least \$5,000,000 per occurrence and an aggregate limit of \$10,000,000.

If the scope of work as defined in this Agreement includes the disposal of any hazardous or non-hazardous materials from the job site, Contractor must furnish to Railroad evidence of pollution legal liability insurance maintained by the disposal site operator for losses arising from the insured facility accepting the materials, with coverage in minimum amounts of \$1,000,000 per loss, and an annual aggregate of \$2,000,000.

OTHER REQUIREMENTS

- G.** All policy(ies) required above (except worker's compensation and employers liability) must include Railroad as "Additional Insured" using ISO Additional Insured Endorsements CG 20 26, and CA 20 48 (or substitute forms providing equivalent coverage). The coverage provided to Railroad as additional insured shall, to the extent provided under ISO Additional Insured Endorsement CG 20 26, and CA 20 48 provide coverage for Railroad's negligence whether sole or partial, active or passive, and shall not be limited by Contractor's liability under the indemnity provisions of this Agreement.
- H.** Punitive damages exclusion, if any, must be deleted (and the deletion indicated on the certificate of insurance), unless the law governing this Agreement prohibits all punitive damages that might arise under this Agreement.
- I.** Contractor waives all rights of recovery, and its insurers also waive all rights of subrogation of damages against Railroad and its agents, officers, directors and employees. This waiver must be stated on the certificate of insurance.
- J.** Prior to commencing the work, Contractor shall furnish Railroad with a certificate(s) of insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements in this Agreement.
- K.** All insurance policies must be written by a reputable insurance company acceptable to Railroad or with a current Best's Insurance Guide Rating of A- and Class VII or better, and authorized to do business in the state where the work is being performed.
- L.** The fact that insurance is obtained by Contractor or by Railroad on behalf of Contractor will not be deemed to release or diminish the liability of Contractor, including, without limitation, liability under the indemnity provisions of this Agreement. Damages recoverable by Railroad from Contractor or any third party will not be limited by the amount of the required insurance coverage.

EXHIBIT D

TO CONTRACTOR'S RIGHT OF ENTRY AGREEMENT

MINIMUM SAFETY REQUIREMENTS

The term "employees" as used herein refer to all employees of Contractor as well as all employees of any subcontractor or agent of Contractor.

I. CLOTHING

- A. All employees of Contractor will be suitably dressed to perform their duties safely and in a manner that will not interfere with their vision, hearing, or free use of their hands or feet.

Specifically, Contractor's employees must wear:

- i. Waist-length shirts with sleeves.
 - ii. Trousers that cover the entire leg. If flare-legged trousers are worn, the trouser bottoms must be tied to prevent catching.
 - iii. Footwear that covers their ankles and has a defined heel. Employees working on bridges are required to wear safety-toed footwear that conforms to the American National Standards Institute (ANSI) and FRA footwear requirements.
- B. Employees shall not wear boots (other than work boots), sandals, canvas-type shoes, or other shoes that have thin soles or heels that are higher than normal.
- C. Employees must not wear loose or ragged clothing, neckties, finger rings, or other loose jewelry while operating or working on machinery.

II. PERSONAL PROTECTIVE EQUIPMENT

Contractor shall require its employees to wear personal protective equipment as specified by Railroad rules, regulations, or recommended or requested by the Railroad Representative.

- i. Hard hat that meets the American National Standard (ANSI) Z89.1 – latest revision. Hard hats should be affixed with Contractor's company logo or name.
- ii. Eye protection that meets American National Standard (ANSI) for occupational and educational eye and face protection, Z87.1 – latest revision. Additional eye protection must be provided to meet specific job situations such as welding, grinding, etc.
- iii. Hearing protection, which affords enough attenuation to give protection from noise levels that will be occurring on the job site. Hearing protection, in the form of plugs or muffs, must be worn when employees are within:
 - 100 feet of a locomotive or roadway/work equipment
 - 15 feet of power operated tools
 - 150 feet of jet blowers or pile drivers
 - 150 feet of retarders in use (when within 10 feet, employees must wear dual ear protection – plugs and muffs)
- iv. Other types of personal protective equipment, such as respirators, fall protection equipment, and face shields, must be worn as recommended or requested by the Railroad Representative.

III. ON TRACK SAFETY

Contractor is responsible for compliance with the Federal Railroad Administration's Roadway Worker Protection regulations – 49CFR214, Subpart C and Railroad's On-Track Safety rules. Under 49CFR214, Subpart C, railroad contractors are responsible for the training of their employees on such regulations. In addition to the instructions contained in Roadway Worker Protection regulations, all employees must:

- i. Maintain a distance of twenty-five (25) feet to any track unless the Railroad Representative is present to authorize movements.

- ii. Wear an orange, reflectorized workwear approved by the Railroad Representative.
- iii. Participate in a job briefing that will specify the type of On-Track Safety for the type of work being performed. Contractor must take special note of limits of track authority, which tracks may or may not be fouled, and clearing the track. Contractor will also receive special instructions relating to the work zone around machines and minimum distances between machines while working or traveling.

IV. EQUIPMENT

- A. It is the responsibility of Contractor to ensure that all equipment is in a safe condition to operate. If, in the opinion of the Railroad Representative, any of Contractor's equipment is unsafe for use, Contractor shall remove such equipment from Railroad's property. In addition, Contractor must ensure that the operators of all equipment are properly trained and competent in the safe operation of the equipment. In addition, operators must be:
 - i. Familiar and comply with Railroad's rules on lockout/tagout of equipment.
 - ii. Trained in and comply with the applicable operating rules if operating any hy-rail equipment on-track.
 - iii. Trained in and comply with the applicable air brake rules if operating any equipment that moves rail cars or any other railbound equipment.
- B. All self-propelled equipment must be equipped with a first-aid kit, fire extinguisher, and audible back-up warning device.
- C. Unless otherwise authorized by the Railroad Representative, all equipment must be parked a minimum of twenty-five (25) feet from any track. Before leaving any equipment unattended, the operator must stop the engine and properly secure the equipment against movement.
- D. Cranes must be equipped with three orange cones that will be used to mark the working area of the crane and the minimum clearances to overhead powerlines.

V. GENERAL SAFETY REQUIREMENTS

- A. Contractor shall ensure that all waste is properly disposed of in accordance with applicable federal and state regulations.
- B. Contractor shall ensure that all employees participate in and comply with a job briefing conducted by the Railroad Representative, if applicable. During this briefing, the Railroad Representative will specify safe work procedures, (including On-Track Safety) and the potential hazards of the job. If any employee has any questions or concerns about the work, the employee must voice them during the job briefing. Additional job briefings will be conducted during the work as conditions, work procedures, or personnel change.
- C. All track work performed by Contractor meets the minimum safety requirements established by the Federal Railroad Administration's Track Safety Standards 49CFR213.
- D. All employees comply with the following safety procedures when working around any railroad track:
 - i. Always be on the alert for moving equipment. Employees must always expect movement on any track, at any time, in either direction.
 - ii. Do not step or walk on the top of the rail, frog, switches, guard rails, or other track components.
 - iii. In passing around the ends of standing cars, engines, roadway machines or work equipment, leave at least 20 feet between yourself and the end of the equipment. Do not go between pieces of equipment of the opening is less than one car length (50 feet).
 - iv. Avoid walking or standing on a track unless so authorized by the employee in charge.
 - v. Before stepping over or crossing tracks, look in both directions first.
 - vi. Do not sit on, lie under, or cross between cars except as required in the performance of your duties and only when track and equipment have been protected against movement.
- E. All employees must comply with all federal and state regulations concerning workplace safety.

APPENDIX G

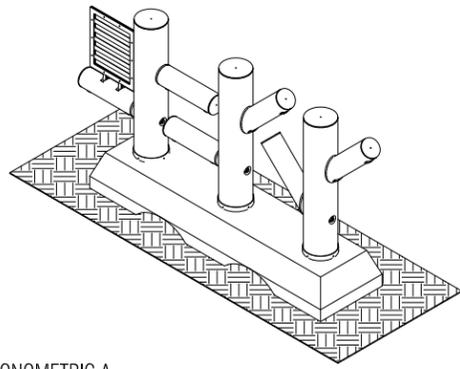
MARKING SCULPTURE PLANS

Sculpture Schedule of Materials*

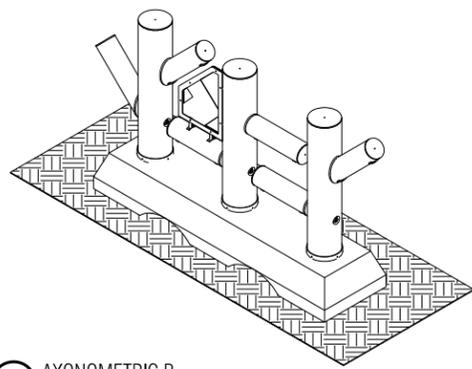
LAKE TO SOUND TRAIL SEGMENT A																
LOCATION	CLUSTER	NO. OF ASSEMBLIES AT LOCATION	NOTES	Timber Form A	Timber Form B	Timber Form C	Timber Form D	Long Block	Notched Rock**	Large Striped Rock**	Small Striped Rock**	Chevron Frameset	Striped Frameset	Triangle Frameset	Standard King County Trail Sign**	Metal Sign**
STA 1+00, 12' LT	Marking Sculpture F	1	Trail entrance sign installed on back of cluster.	1	2			2	1			1		1	1	
STA 1+00, 40' RT	Marking Sculpture H	2					2			2			2			
STA 4+50, 12' LT	Marking Sculpture B	1	Linear arrangement of Marking Sculpture E, D (reversed), B (reversed).	1	1	1		1				1				
	Marking Sculpture D	1			2	1		1								
	Marking Sculpture E	1			1	1		1	1							
STA 12+65, 12' LT	Marking Sculpture C	1	Installed within 3' of Marking Sculpture G	1	1	1		1				1		1		
	Marking Sculpture G	1	Installed near utility pole		1					1				1		
STA 104+00, 12' LT	Trail Sign in Rock	1	Trail sign to indicate turn in trail to cross bridge.							1						1
STA 105+25, 12' LT	Marking Sculpture D	1			2	1		1								
	Marking Sculpture E	1		1	1			1	1							
STA 130+40, 12' LT	Marking Sculpture D	1	Sculptural elements surrounding rest stop. From L to R (facing rest stop): Marking sculpture E, small striped rock, marking sculpture D, marking sculpture G, small striped rock, small striped rock.		2	1		1								
	Marking Sculpture E	1		1	1		1	1								
	Marking Sculpture G	1			1						1				1	
	Small Striped Rock	3										3				
STA 143+00, 12' LT	Marking Sculpture F	1	Trail entrance sign installed on back of cluster.	1	2			2	1			1		1	1	
	TOTALS			7	17	5	2	12	5	5	3	4	2	5	2	1

*The components listed in the schedule are not a comprehensive list of materials required to construct each assembly. Refer to Artwork Details for all materials

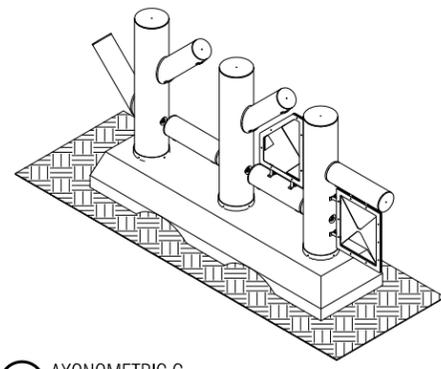
**Item to be provided by King County.



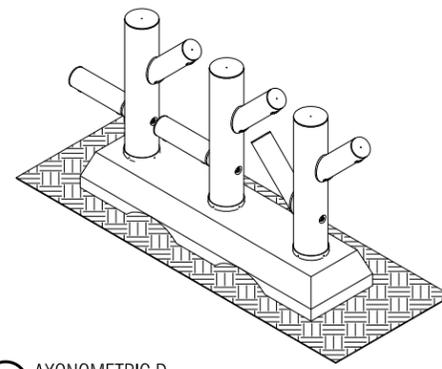
1 AXONOMETRIC A



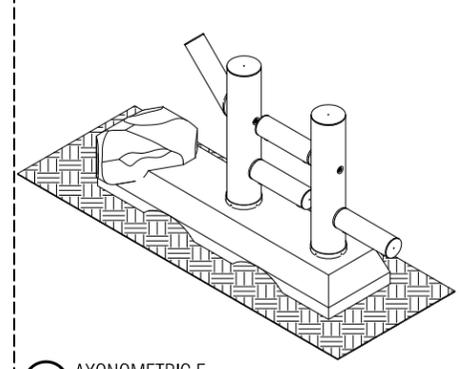
2 AXONOMETRIC B



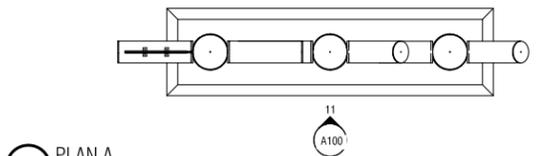
3 AXONOMETRIC C



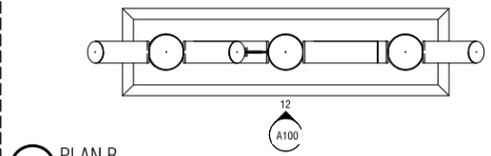
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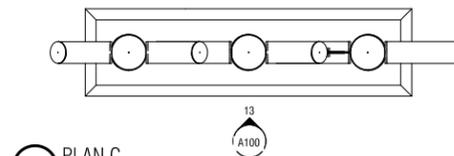
5 AXONOMETRIC E



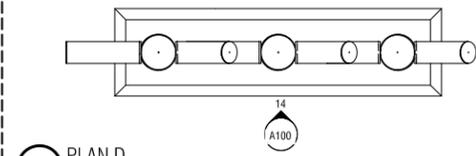
6 PLAN A
1/2" = 1'-0"



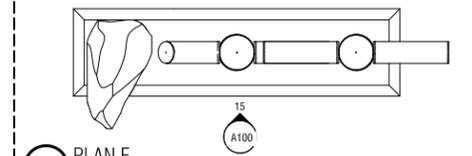
7 PLAN B
1/2" = 1'-0"



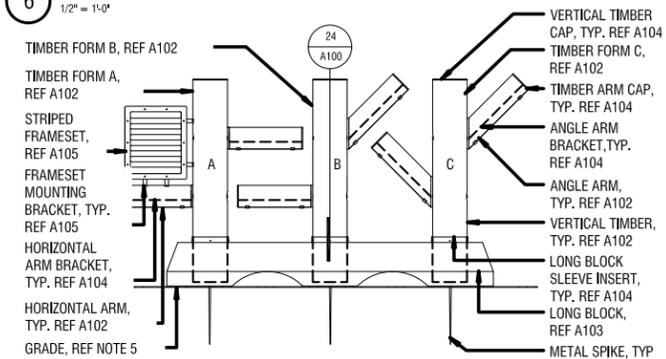
8 PLAN C
1/2" = 1'-0"



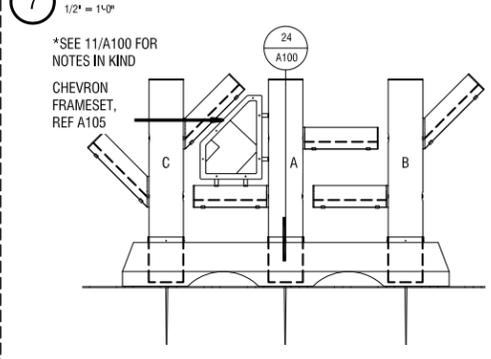
9 PLAN D
1/2" = 1'-0"



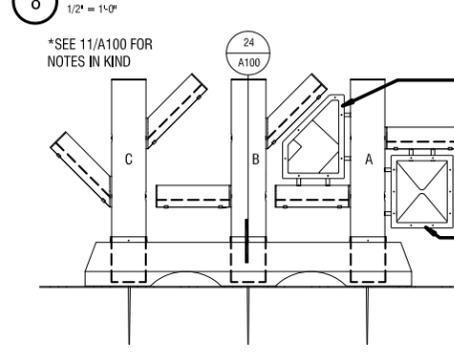
10 PLAN E
1/2" = 1'-0"



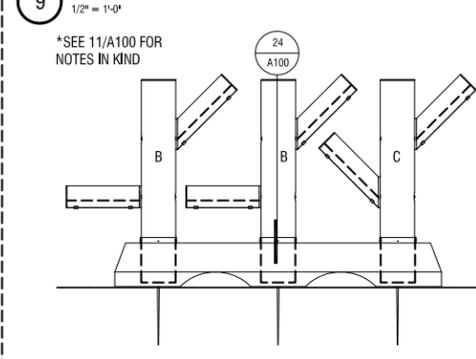
11 ELEVATION A
1/2" = 1'-0"



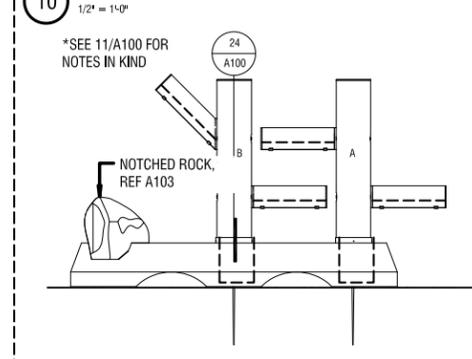
12 ELEVATION B
1/2" = 1'-0"



13 ELEVATION C
1/2" = 1'-0"



14 ELEVATION D
1/2" = 1'-0"



15 ELEVATION E
1/2" = 1'-0"

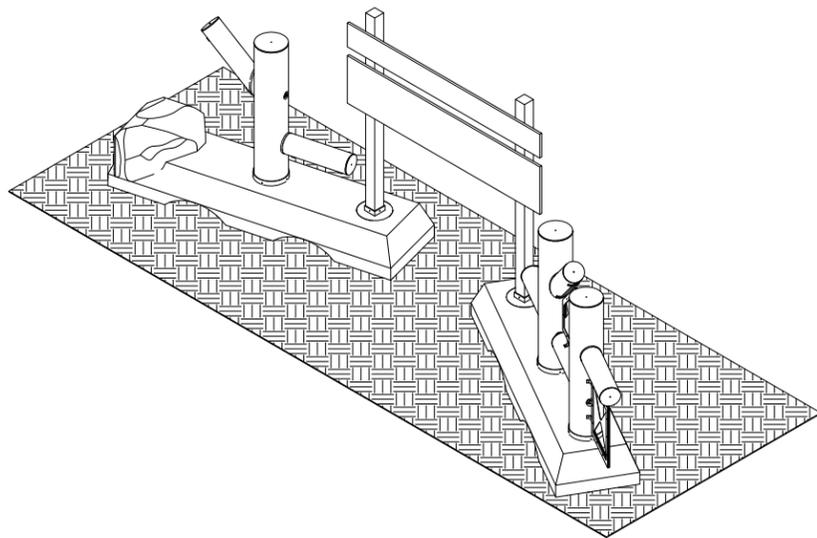
MARKING SCULPTURE A

MARKING SCULPTURE B

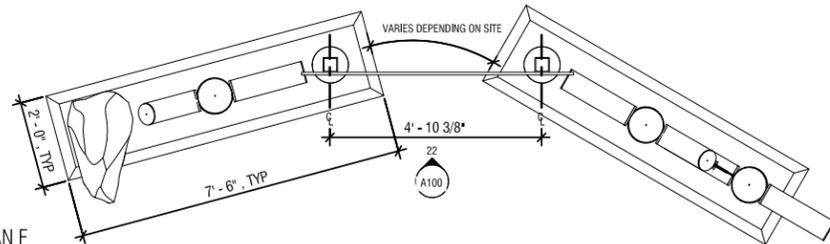
MARKING SCULPTURE C

MARKING SCULPTURE D

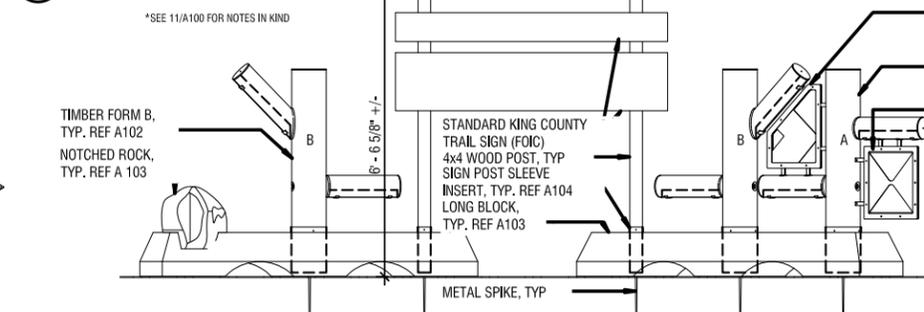
MARKING SCULPTURE E



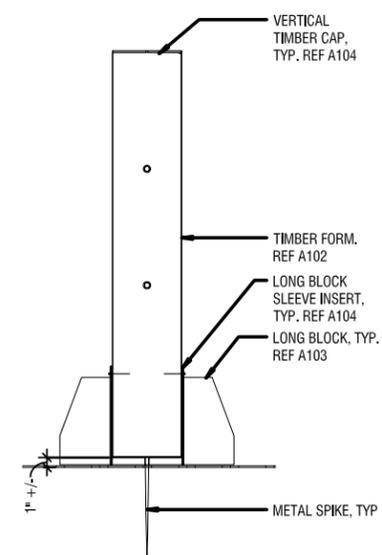
21 AXONOMETRIC F



17 PLAN F
1/2" = 1'-0"



22 ELEVATION F
1/2" = 1'-0"



24 TYPICAL SECTION
1" = 1'-0"

GENERAL NOTES

- TIMBER ASSEMBLIES ARE SECURED WITHIN A GALVANIZED STEEL SLEEVE WITH STAINLESS STEEL LAG SCREWS. STEEL SLEEVES ARE PLACED WITHIN PRECAST CONCRETE BLOCK HOLES AND ARE SECURED TO GROUND WITH A METAL SPIKE.
- PRECAST CONCRETE NOTCHED ROCK IN MARKING SCULPTURES E & F ARE AFFIXED USING EPOXY.
- EACH MARKING SCULPTURE IS ANCHORED TO THE GROUND SURFACE WITH METAL SPIKES DRIVEN THROUGH A CENTER HOLE IN BASE OF THE GALVANIZED STEEL INSERT.
- BLOCKS FOR MARKING SCULPTURE F MAY BE INSTALLED AT ANY ANGLE TO ONE ANOTHER AS LONG AS THE TRAIL ENTRANCE SIGN'S UPRIGHT STRUCTURE IS SPACED APPROPRIATELY.
- MARKING SCULPTURES TO BE INSTALLED ON A FLAT, LEVEL COMPACTED BED OF 3/8" +/- CRUSHED GRAVEL BASE OR CONCRETE OR ASPHALT SURFACE.

ABBREVIATIONS

- CONG: CONCRETE
 DIAM: DIAMETER
 GALV: GALVANIZED
 I.D.: INTERIOR DIAMETER
 MTL: METAL
 O.D.: OUTSIDE DIAMETER
 PNT: PAINT
 REF: REFERENCE
 S.S.: STAINLESS STEEL
 STL: STEEL
 TYP: TYPICAL
 FOIC: FURNISHED BY OWNER, INSTALLED BY CONTRACTOR

MARKING SCULPTURE F

PROJ #	FILE #
DATE	REVISION
DRAWN	Issue Date
CHECKED	Author
	Checker



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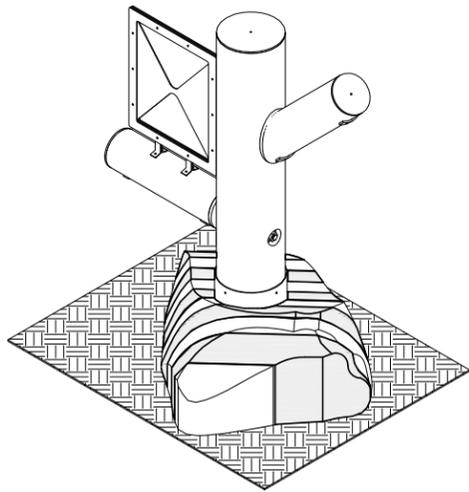
HEISHMAN AND KIEFER, ARTISTS
 DEVELOPMENT FOR 4 CULTURE

PROJECT NAME

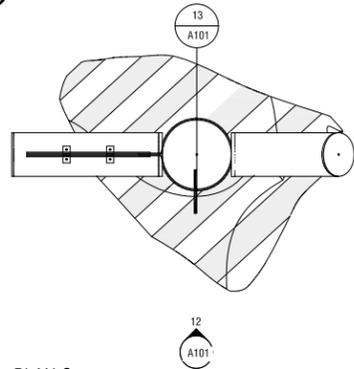
LAKE TO SOUND TRAIL SEGMENT A
 GREEN RIVER TRAIL TO NACHES AVENUE SW

ARTWORK DETAILS
 MARKING SCULPTURE ASSEMBLIES 1

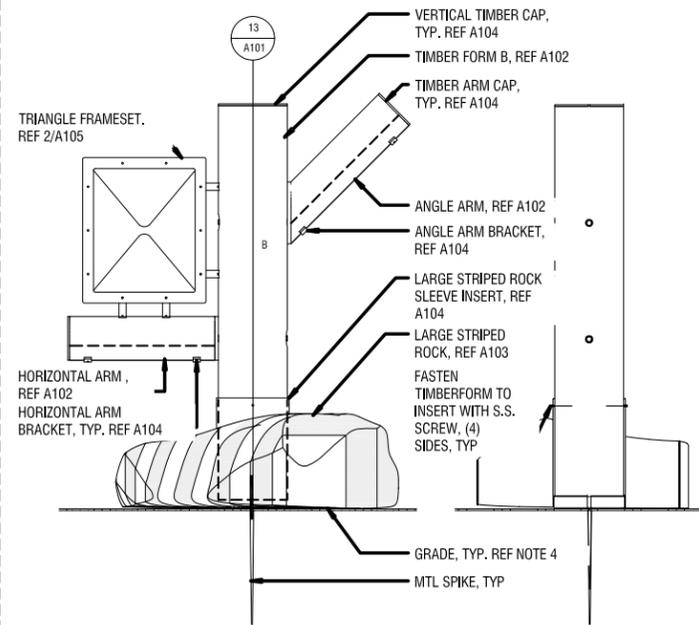
A100



1 AXONOMETRIC G

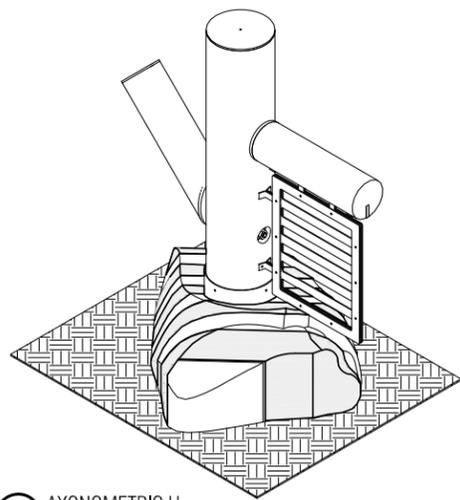


6 PLAN G
1" = 1'-0"

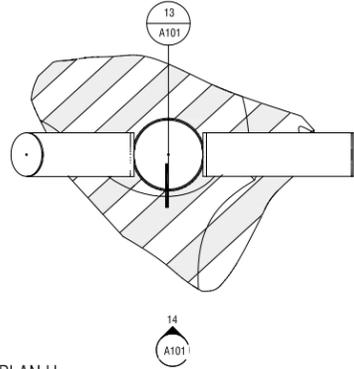


12 ELEVATION G
1" = 1'-0"

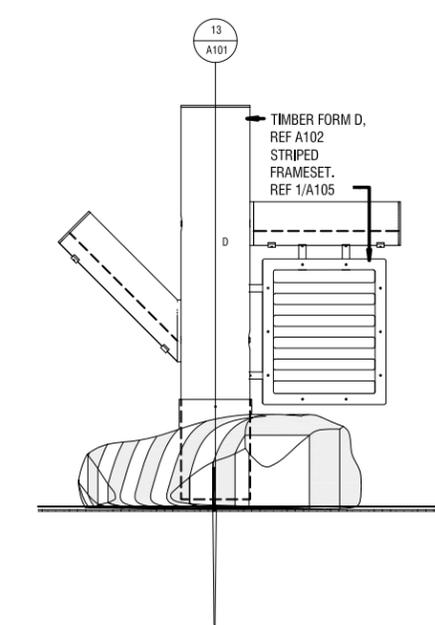
13 TYPICAL SECTION G & H
1" = 1'-0"



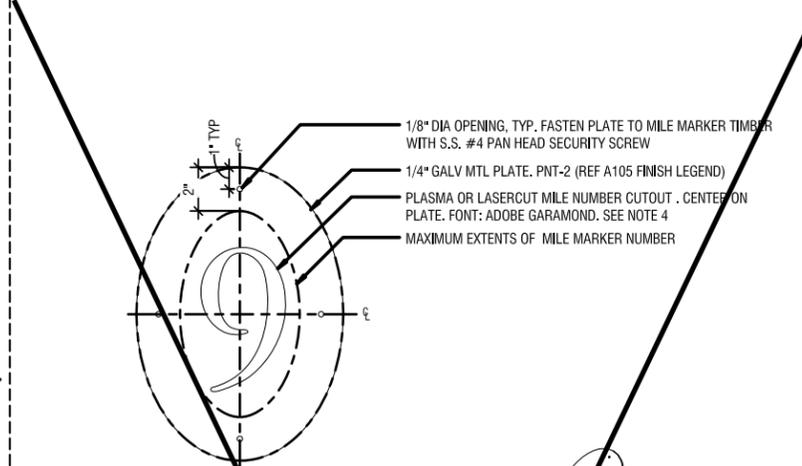
2 AXONOMETRIC H



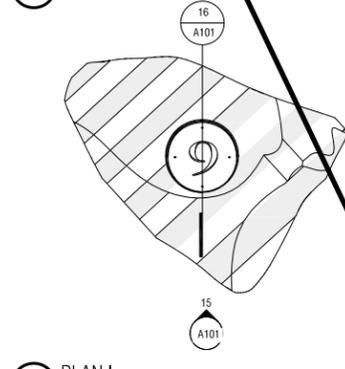
7 PLAN H
1" = 1'-0"



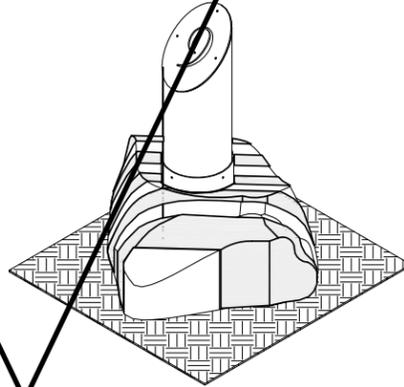
14 ELEVATION H
1" = 1'-0"



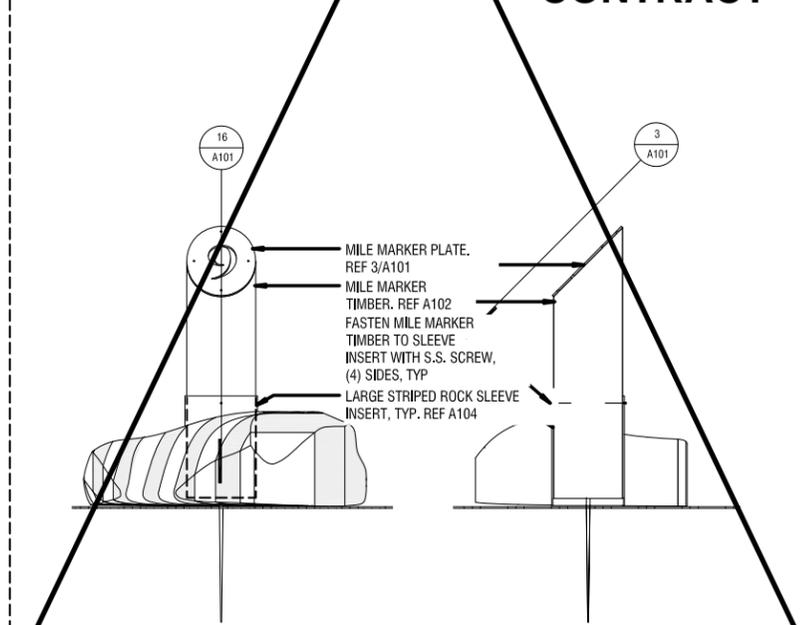
3 MILE MARKER PLATE
3" = 1'-0"



8 PLAN I
1" = 1'-0"



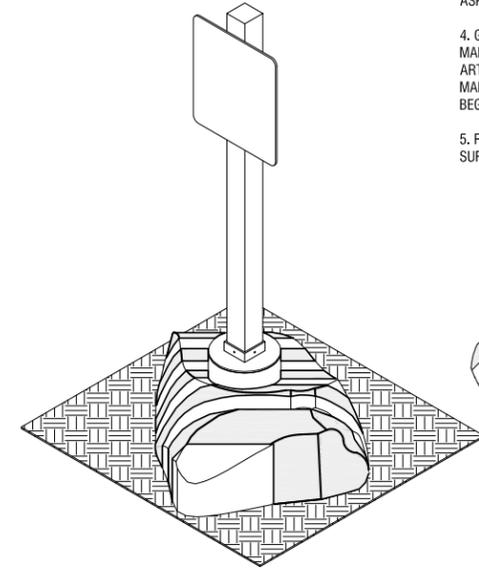
9 AXONOMETRIC I



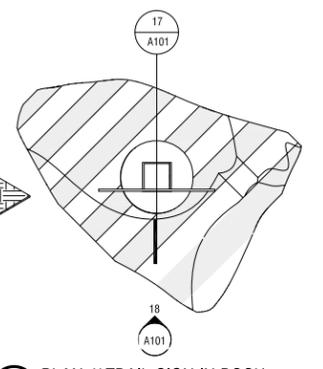
15 ELEVATION I
1" = 1'-0"

16 SECTION I
1" = 1'-0"

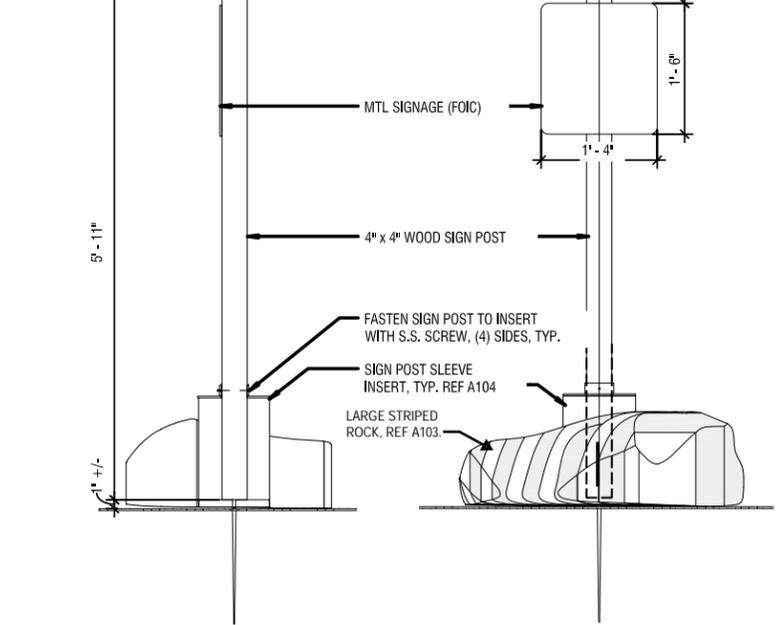
NOT IN CONTRACT



10 AXONOMETRIC // TRAIL SIGN IN ROCK



11 PLAN // TRAIL SIGN IN ROCK
1" = 1'-0"



17 SECTION // TRAIL SIGN IN ROCK
1" = 1'-0"

18 ELEVATION // TRAIL SIGN IN ROCK
1" = 1'-0"

GENERAL NOTES

1. TIMBER ASSEMBLIES AND TIMBER MILE MARKER SECURED TO METAL SLEEVE INSERT WITH STAINLESS STEEL LAG SCREWS. STEEL SLEEVES ARE SECURED WITHIN PRECAST CONCRETE BLOCK HOLES USING EPOXY.
2. MARKING SCULPTURE ANCHORED TO GROUND SURFACE USING METAL SPIKE DRIVEN THROUGH CENTER HOLE IN BASE OF METAL SLEEVE INSERT.
3. MARKING SCULPTURES TO BE INSTALLED ON FLAT, LEVEL COMPACTED BED OF 3/8" +/- CRUSHED GRAVEL BASE OR CONCRETE OR ASPHALT SURFACE.
4. GENERAL CONTRACTOR TO FABRICATE MILE MARKER PLATES USING "CUTFILE" PROVIDED BY ARTIST. MATCH NUMBER INDICATED ON MILE MARKER PLATE TO DISTANCE (IN MILES) FROM BEGINNING OF TRAIL.
5. REFER TO A105 FINISH LEGEND FOR PAINTED SURFACES.

MARKING SCULPTURE G

PROJ #	FILE #
DATE	REVISION
DRAWN	Author
CHECKED	Checker



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MARKING SCULPTURE H



HEISHMAN AND KIEFER, ARTISTS
 DEVELOPMENT FOR 4 CULTURE

MARKING SCULPTURE I

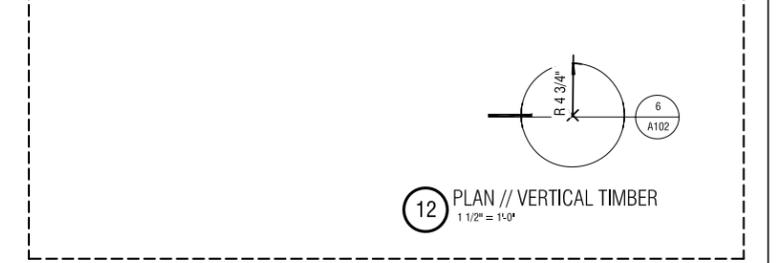
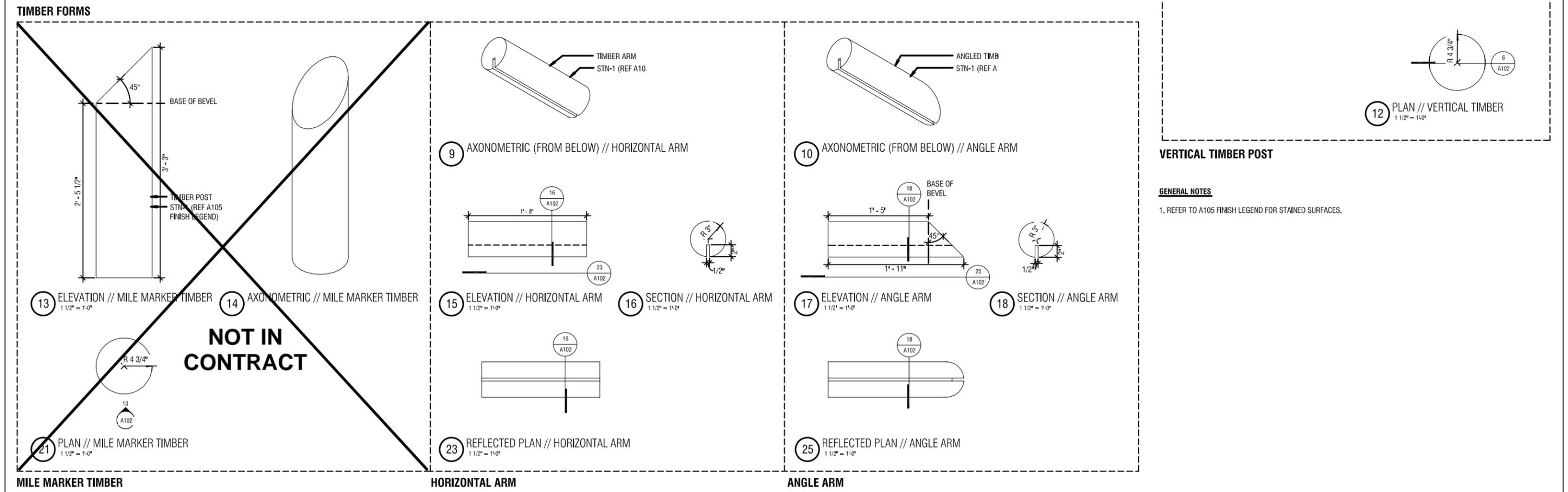
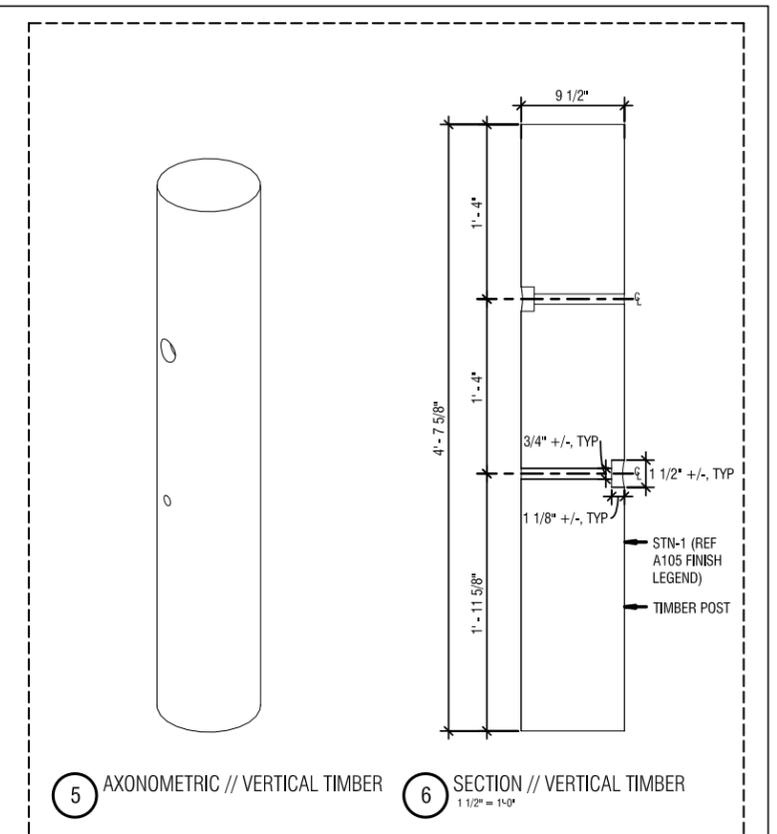
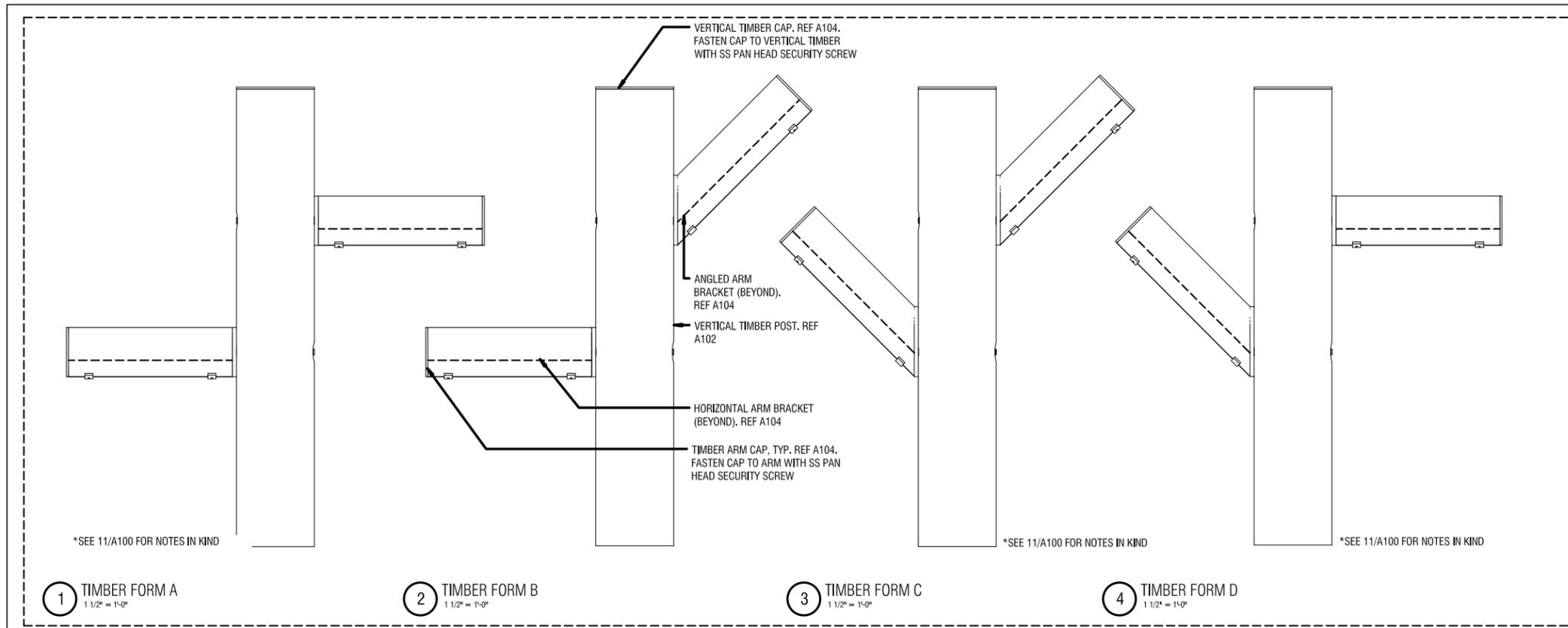
PROJECT NAME

LAKE TO SOUND TRAIL SEGMENT A
 GREEN RIVER TRAIL TO NACHES AVENUE SW

TRAIL SIGN IN ROCK

ARTWORK DETAILS
 MARKING SCULPTURE ASSEMBLIES 2

A101



VERTICAL TIMBER POST

GENERAL NOTES
1. REFER TO A105 FINISH LEGEND FOR STAINED SURFACES.

PROJ #	FILE #
DATE	REVISION
DRAWN	Author
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4
CULTURE

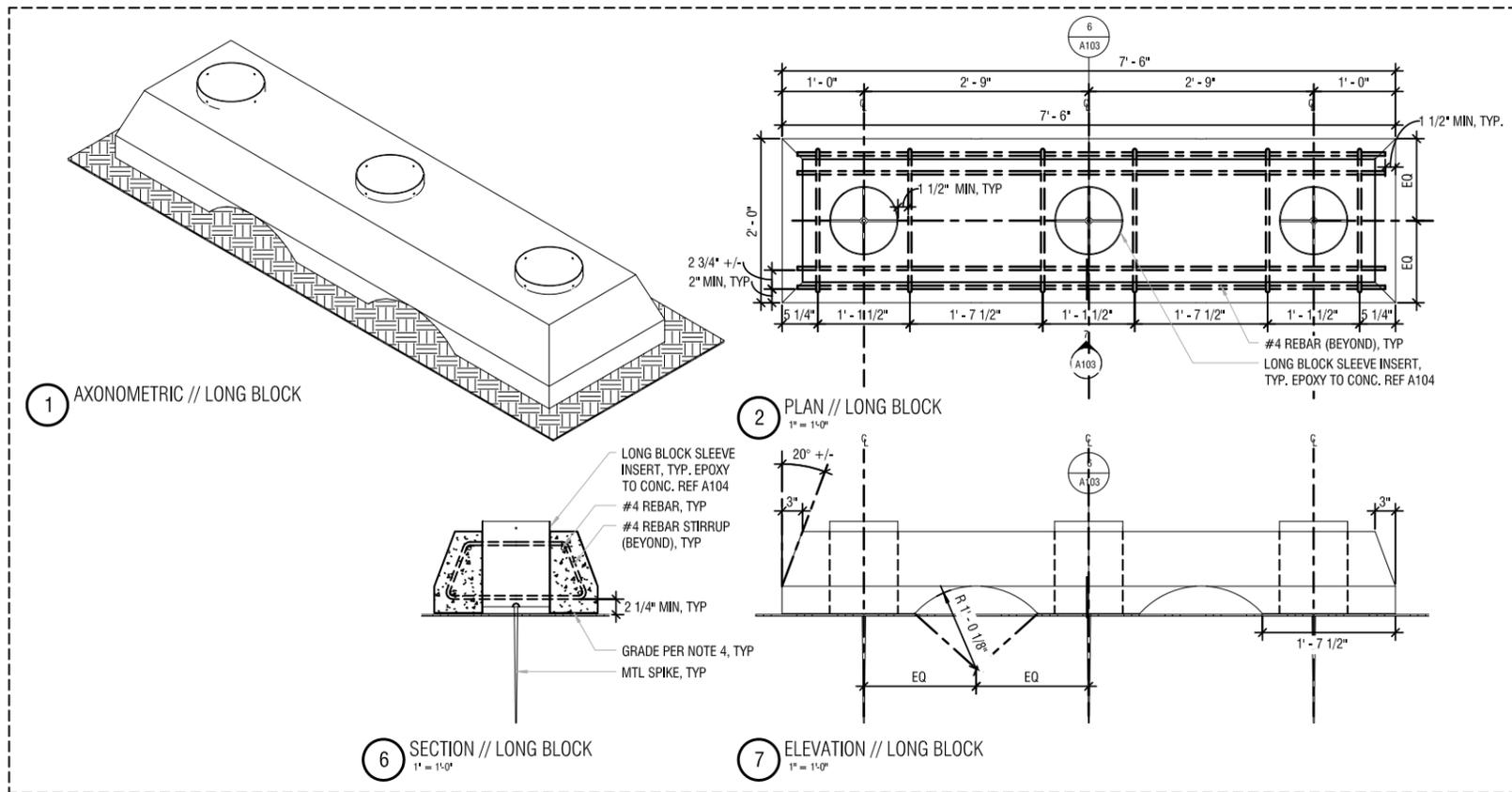
HEISHMAN AND KIEFER, ARTISTS
 DEVELOPMENT FOR 4 CULTURE

PROJECT NAME
 LAKE TO SOUND TRAIL SEGMENT A
 GREEN RIVER TRAIL TO NACHES AVENUE SW

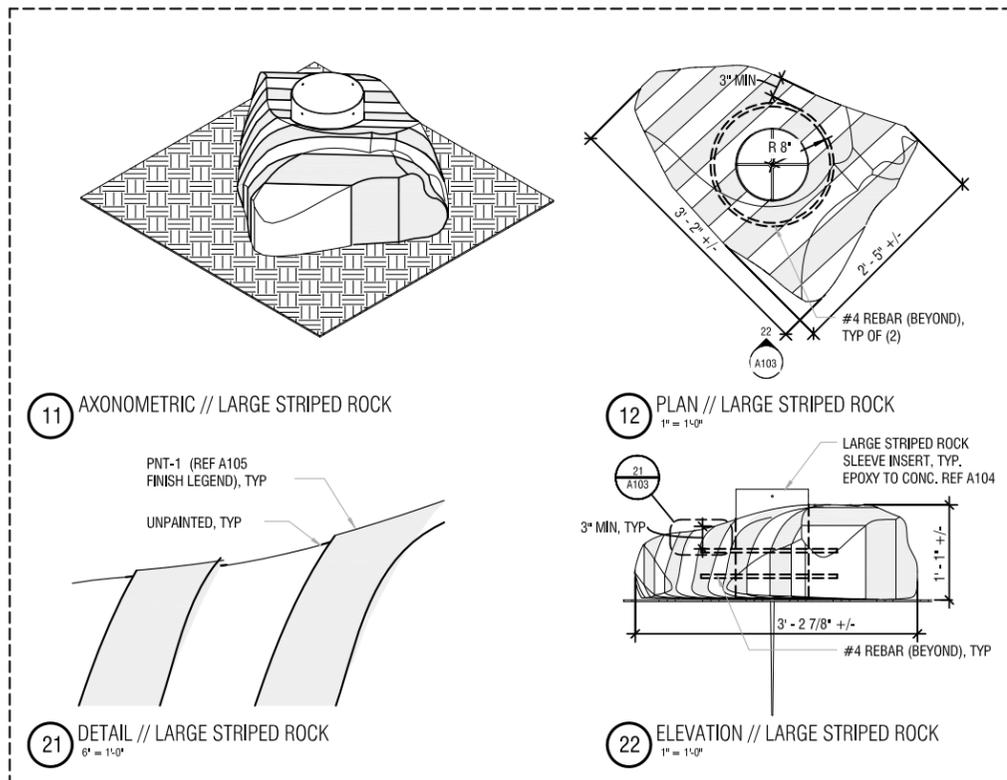
ARTWORK DETAILS
 TIMBER FORM COMPONENTS AND ASSEMBLIES

A102

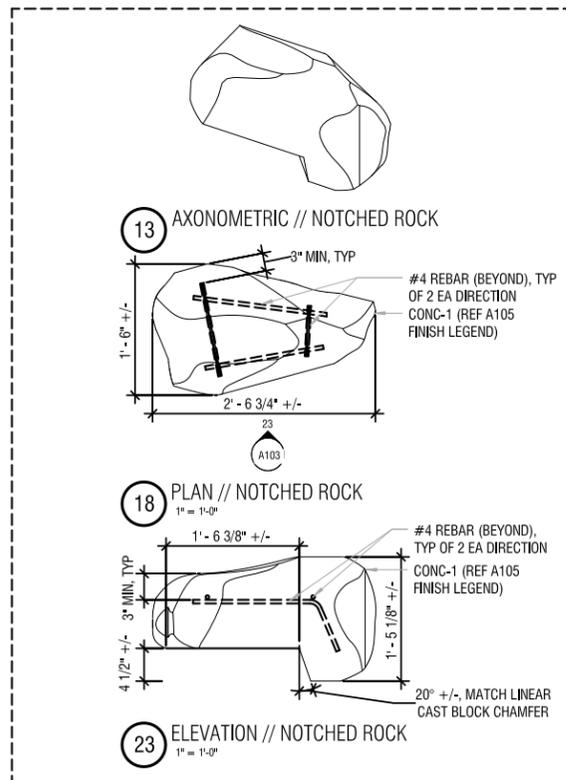
5/14/2015 8:46:32 AM



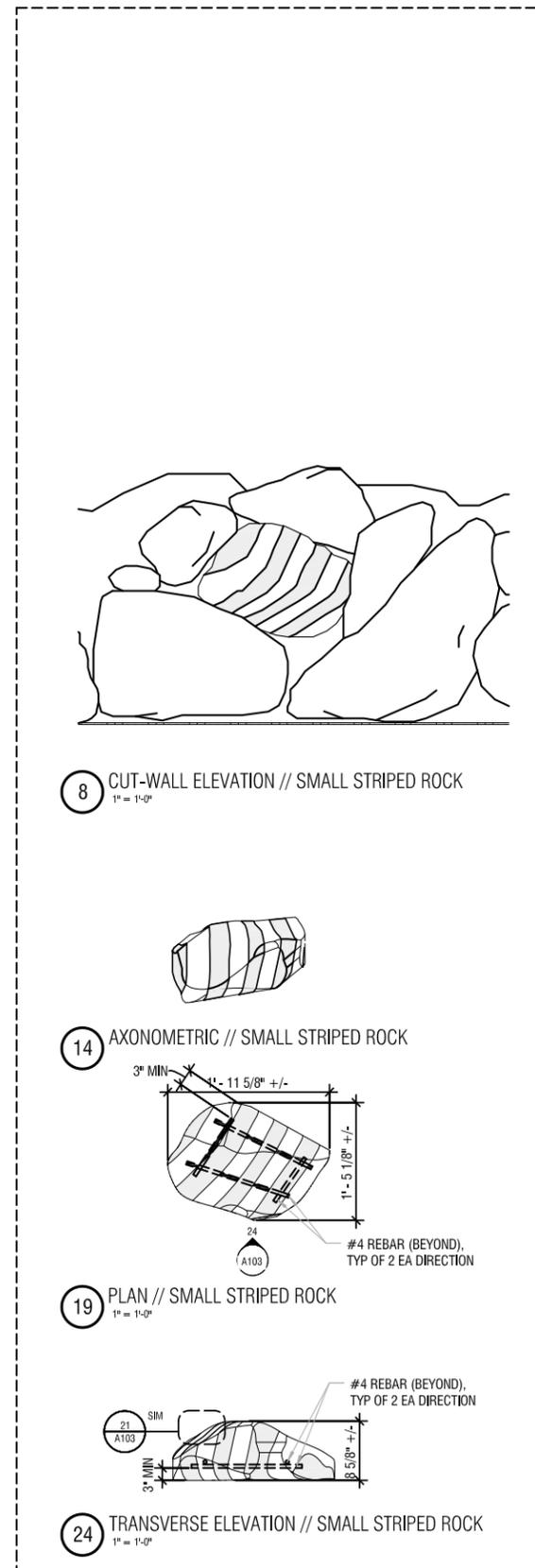
LONG BLOCK



LARGE STRIPED ROCK



NOTCHED ROCK



SMALL STRIPED ROCK

GENERAL NOTES

1. FORM FOR PRECAST CONCRETE ROCKS TO BE PROVIDED BY OTHERS. GC TO PROVIDE MATERIALS, FABRICATION, FINISH, AND INSTALLATION.
2. ROCK STRIPES FORMED BY KERFS IN OUTER SURFACE OF ROCK.
3. MARKING SCULPTURE ANCHORED TO GROUND SURFACE USING METAL SPIKE DRIVEN THROUGH CENTER HOLE IN BASE OF METAL SLEEVE INSERT.
4. MARKING SCULPTURES TO BE INSTALLED ON FLAT, LEVEL COMPACTED BED OF 3/8" +/- CRUSHED GRAVEL BASE OR CONCRETE OR ASPHALT SURFACE.
5. REFER TO A105 FINISH LEGEND FOR PIGMENTED CONCRETE AND PAINTED SURFACES.

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HEISHMAN AND KIEFER, ARTISTS
 Designer

PROJECT NAME

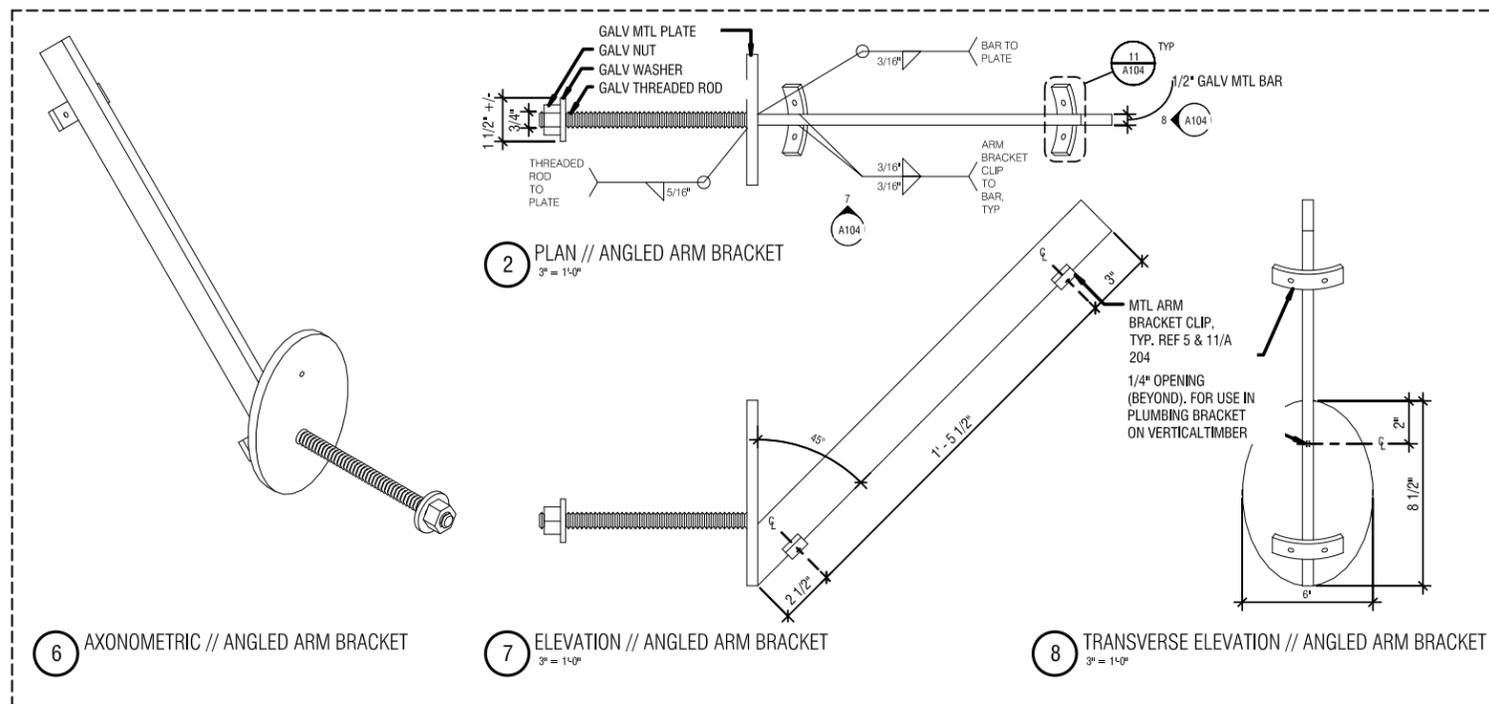
LAKE TO SOUND TRAIL SEGMENT A
 GREEN RIVER TRAIL TO NACHES AVENUE SW

ARTWORK DETAILS
 PRECAST CONCRETE COMPONENTS

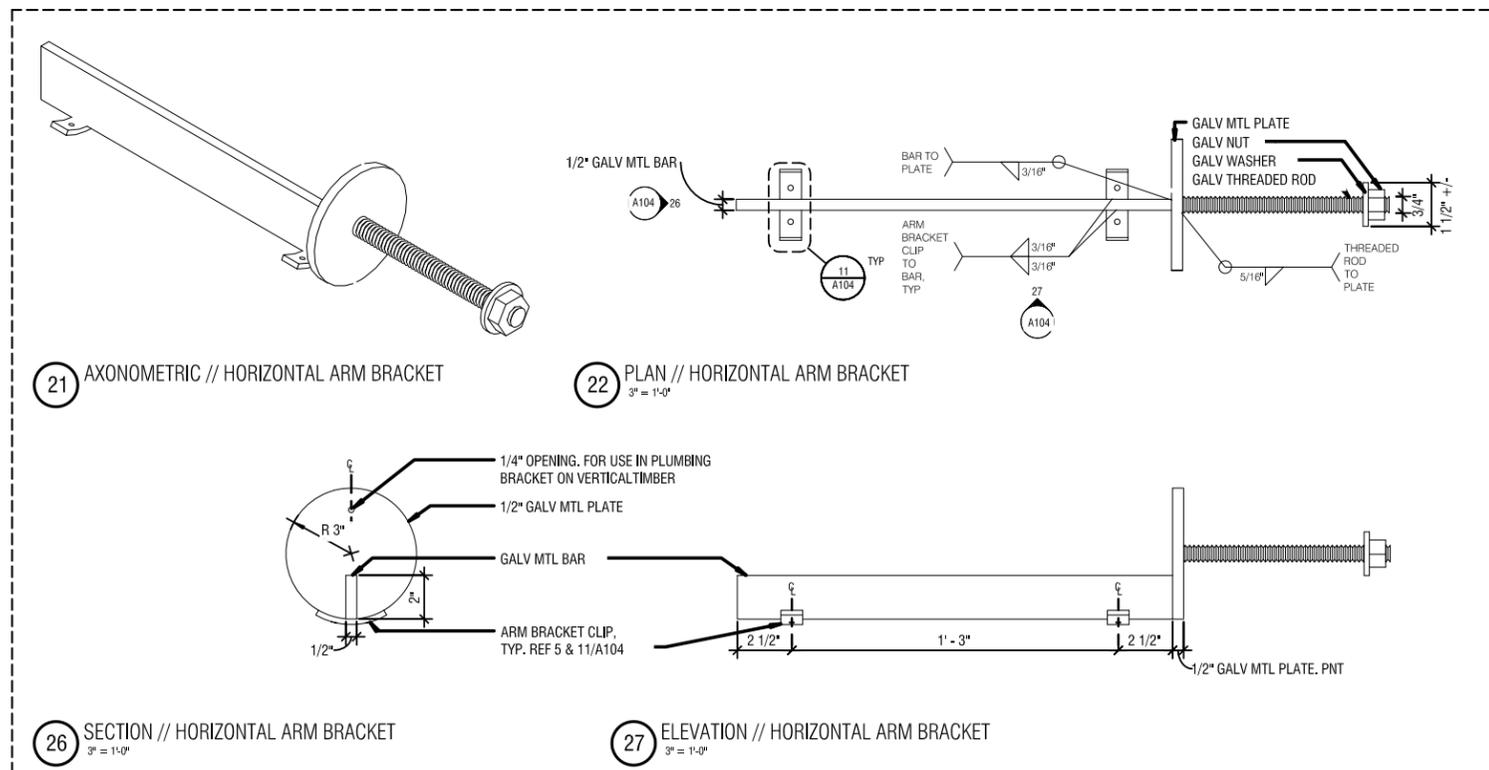
A103

GENERAL NOTES:

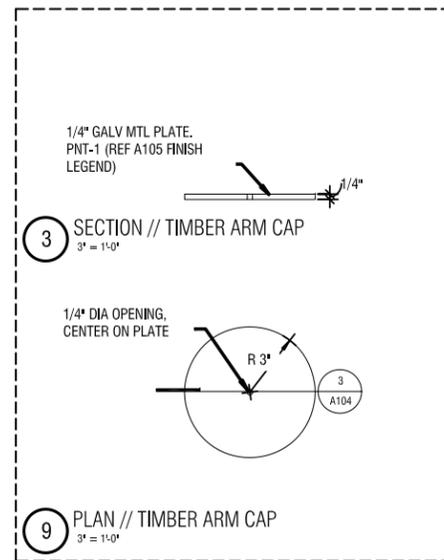
1. REFER TO A105 FINISH LEGEND FOR PAINTED SURFACES.



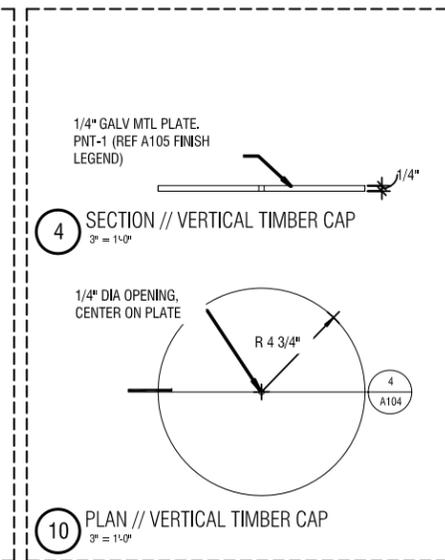
ANGLED ARM BRACKET



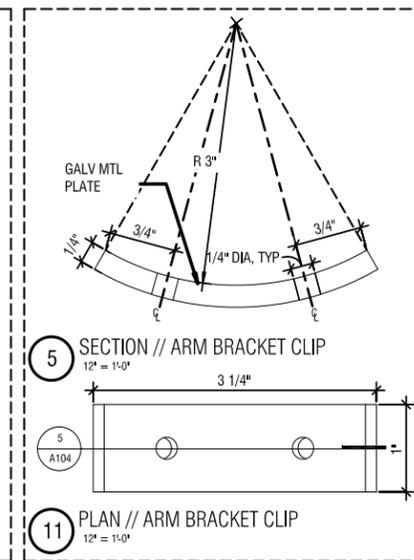
HORIZONTAL ARM BRACKET



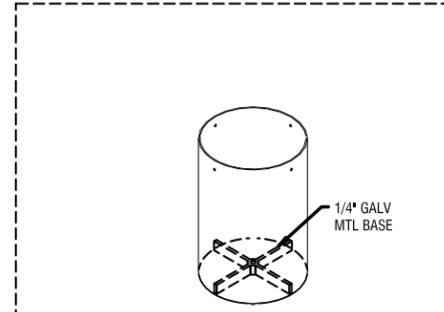
TIMBER ARM CAP



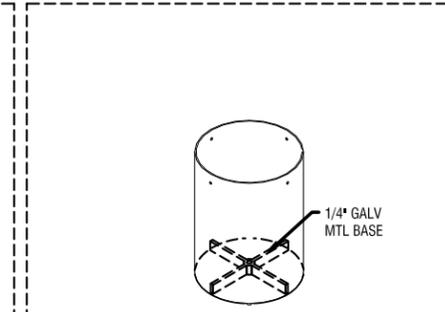
VERTICAL TIMBER CAP



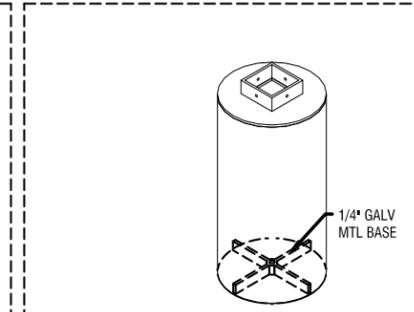
ARM BRACKET CLIP



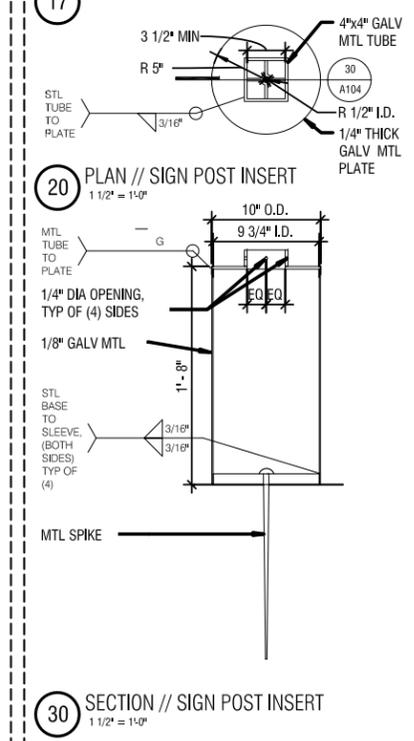
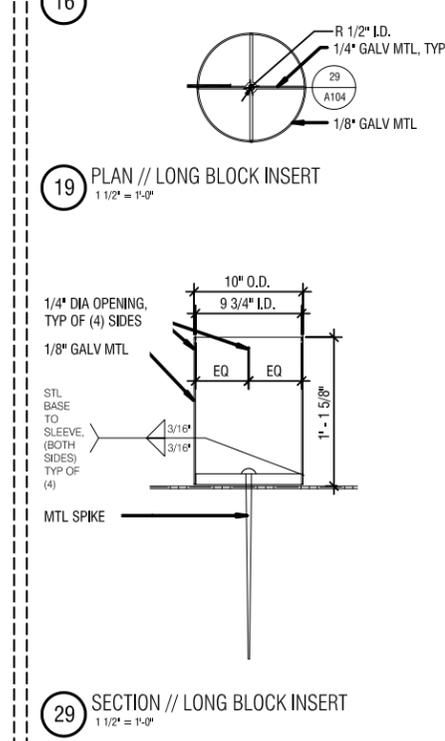
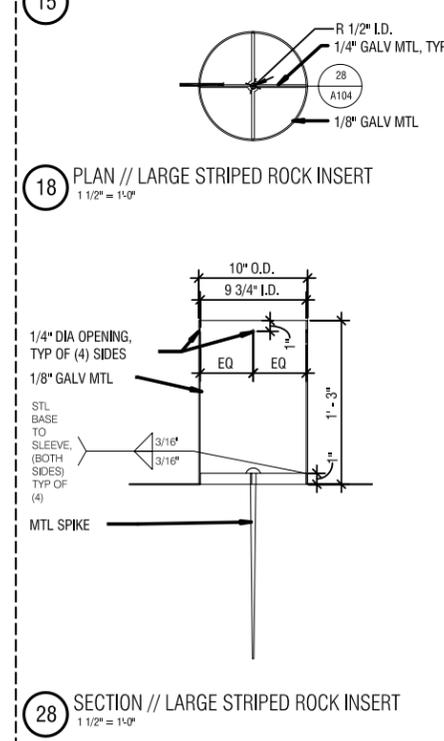
LARGE STRIPED ROCK SLEEVE INSERT



LONG BLOCK SLEEVE INSERT



SIGN POST SLEEVE INSERT



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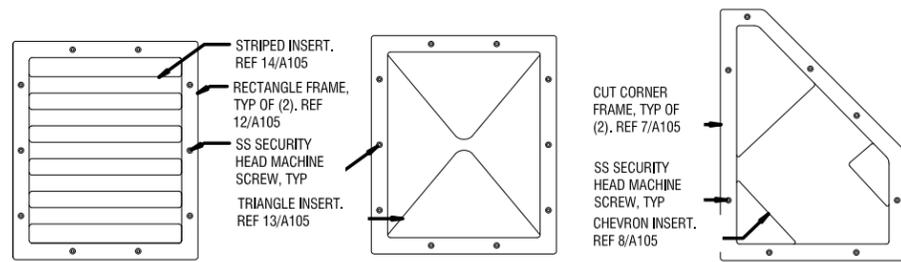
4
CULTURE
 HEISHMAN AND KIEFER, ARTISTS
 Designer

PROJECT NAME
 LAKE TO SOUND TRAIL SEGMENT A
 GREEN RIVER TRAIL TO NACHES AVENUE SW

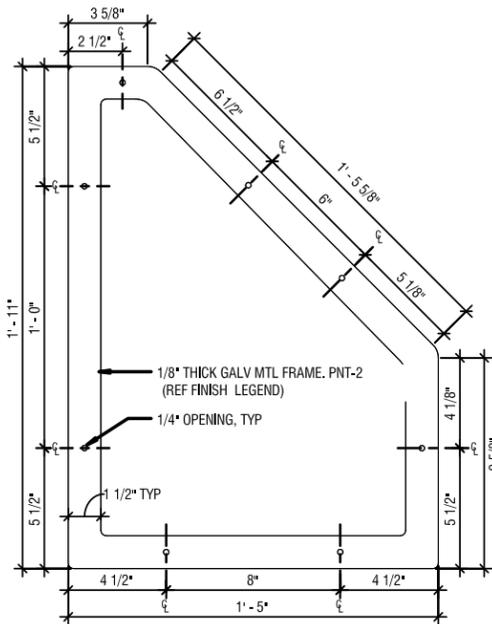
ARTWORK DETAILS
 METAL COMPONENTS 1

A104

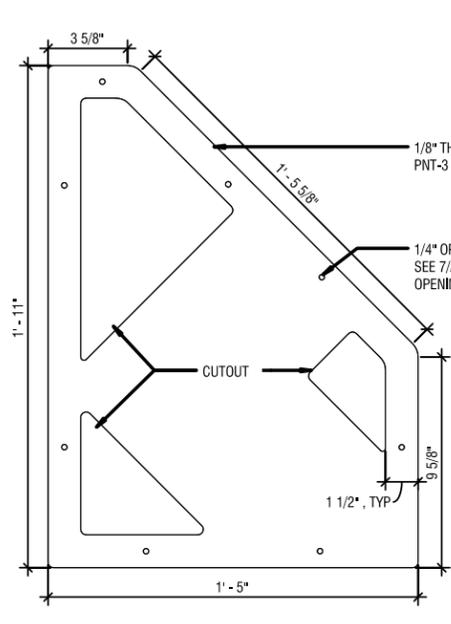
5/14/2015 8:46:51 AM



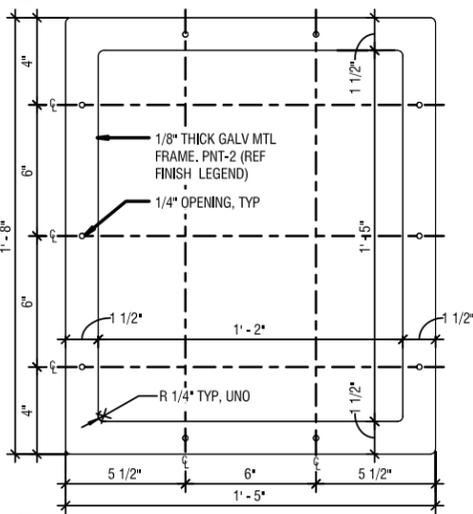
1 ELEVATION // STRIPED FRAMESET 1 1/2" = 1'-0"
 2 ELEVATION // TRIANGLE FRAMESET 1 1/2" = 1'-0"
 3 ELEVATION // CHEVRON FRAMESET 1 1/2" = 1'-0"



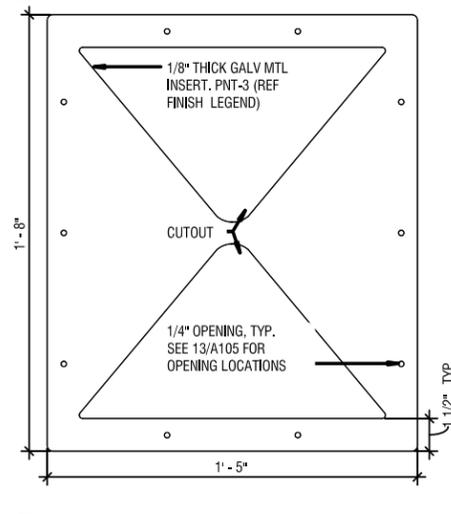
7 ELEVATION // CUT CORNER FRAME 3" = 1'-0"



8 ELEVATION // CHEVRON INSERT 3" = 1'-0"

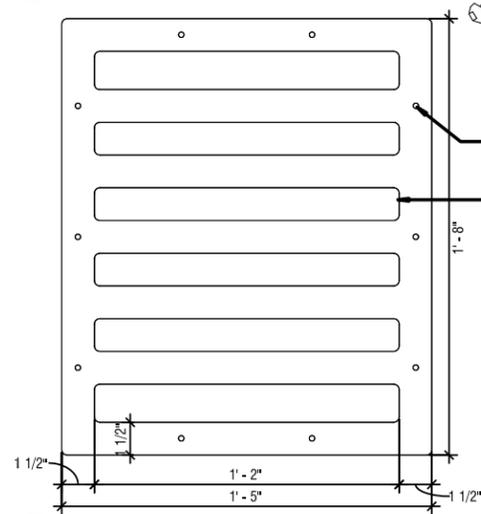


12 ELEVATION // RECTANGLE FRAME 3" = 1'-0"

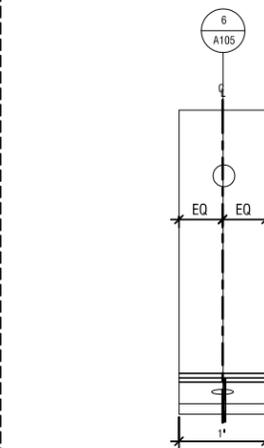
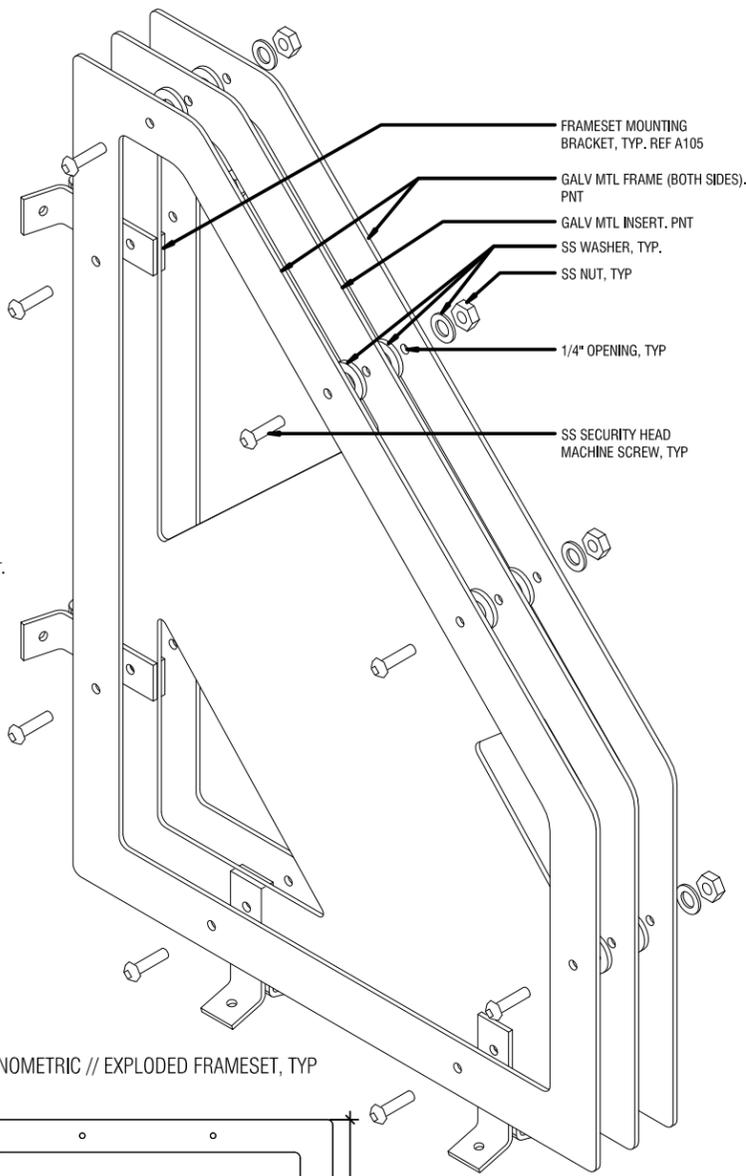


13 ELEVATION // TRIANGLE INSERT 3" = 1'-0"

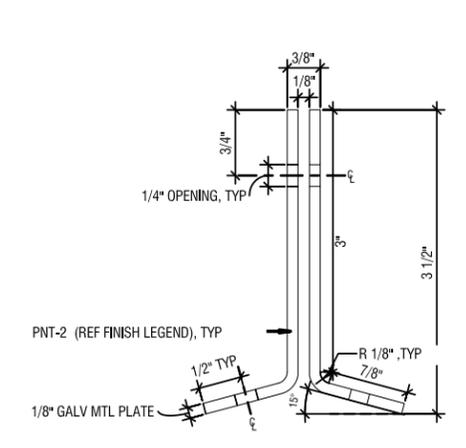
9 AXONOMETRIC // EXPLODED FRAMESET, TYP



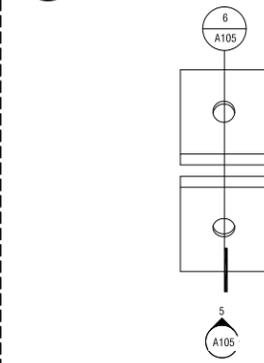
14 ELEVATION // STRIPED INSERT 3" = 1'-0"



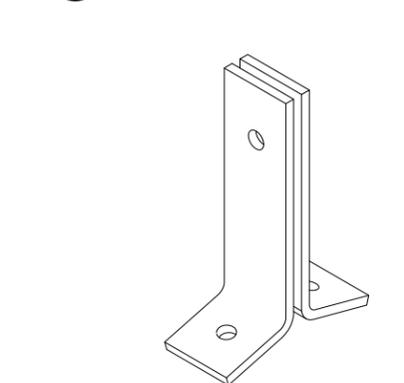
5 ELEVATION // FRAMESET MOUNTING BRACKET 1/2" = 1'-0"



6 SECTION // FRAMESET MOUNTING BRACKET 1/2" = 1'-0"



10 PLAN // FRAMESET MOUNTING BRACKET 1/2" = 1'-0"



11 AXONOMETRIC // FRAMESET MOUNTING BRACKET

FRAMESET MOUNTING BRACKET

GENERAL NOTES:

- FRAMESETS ARE COMPOSED OF ONE INSERT PLACED BETWEEN TWO EXTERIOR FRAMES. SS SECURITY SCREWS, WASHERS AND BOLTS SECURE FRAMESETS BETWEEN METAL MOUNTING BRACKETS AND SS WASHER SPACERS.
- GENERAL CONTRACTOR TO FABRICATE FRAMES AND INSERTS USING "CUTFILE" PROVIDED BY ARTIST.

FINISH LEGEND

- | | |
|---------|---|
| JNC - 1 | CONCRETE PIGMENTATION: DAVIS COLOR; "WILLOW GREEN" 5376 |
| VT - 1 | PRIME COAT: TNEMEC; *SERIES 66: HI-BUILD EPOXYLINE,* ONE-COAT. COLOR: TANGERINE ORANGE/SAFETY 04SF
FINISH COATS: TNEMEC; *SERIES 750: UVX,* TWO-COATS. COLOR: TANGERINE ORANGE/SAFETY 04SF |
| PNT - 2 | PRIME COAT: TNEMEC; *SERIES 66: HI-BUILD EPOXYLINE,* ONE-COAT. COLOR: DAFFODIL 11YW
FINISH COATS: TNEMEC; *SERIES 750: UVX,* TWO-COATS. COLOR: FRESH LEMON 13YW |
| PNT - 3 | PRIME COAT: TNEMEC; *SERIES 66: HI-BUILD EPOXYLINE,* ONE-COAT. COLOR: LEMONWATER 08YW
FINISH COATS: TNEMEC; *SERIES 750: UVX,* TWO-COATS. COLOR: DAFFODIL 11YW |
| STN - 1 | FINISH COAT: VALHALLA WOOD PRESERVATIVES; *LIFETIME WOOD TREATMENT,* ONE-COAT |

FRAMESETS	
PROJ #	FILE #
DATE	REVISION
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	Checker

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HEISHMAN AND KIEFER, ARTISTS
 DEVELOPMENT FOR 4 CULTURE

PROJECT NAME
 LAKE TO SOUND TRAIL SEGMENT A
 GREEN RIVER TRAIL TO NACHES AVENUE SW

ARTWORK DETAILS
 METAL COMPONENTS 2

A105

5/14/2015 8:46:54 AM

APPENDIX H

**ESCROW BID
DOCUMENTATION AGREEMENT**

ESCROW BID DOCUMENTATION AGREEMENT

This Agreement is for the retention and use of Escrow Bid Documentation (“EBD”) submitted in accordance with Escrow Bid Documentation, for **Lake To Sound Trail – Segment A, Contract C01119C17** by @Contractor, the Contractor hired by King County (“County”) to perform all the work associated with this Contract.

Pursuant to Contract Documents, King County and the Contractor agree to the following:

A. DURATION OF ESCROW FOR BID DOCUMENTATION

The EBD and the EBD certificate shall remain in escrow in a secured location under the control of King County during the life of the Contract and will be returned to the Contractor by King County, Procurement & Payables Section (P&P), thirty (30) days after whichever event occurs later: (1) the payment of Contract retainage, or (2) the issuance of Final Acceptance and resolution of all claims, disputes and/or litigation.

B. ACCESS TO ESCROW BID DOCUMENTATION

1. For purposes of protecting the EBD maintained within P&P, the County and the Contractor shall each designate a maximum of three (3) Authorized Representatives who may access the EBD maintained at P&P.

2. Authorized Representatives

For Contractor are:

1. _____
2. _____
3. _____

For King County are:

1. _____
2. _____
3. _____

3. The Contractor and/or the County may change the Authorized Representatives with written notice to P&P and a copy of the notice to the other party. Unless P&P receives a letter from one of the Contractor’s Authorized Representatives authorizing access to the County without the presence of a Contractor’s Authorized Representative, the presence of both an Authorized Representative from the County and the Contractor shall be required to gain access to the EBD located at P&P. At no time shall the Contractor have access to the EBD and EBD certificate located at P&P without the presence of a County Authorized Representative.

C. REMEDIES FOR REFUSAL OR FAILURE TO PROVIDE OR ALLOW ACCESS TO BID DOCUMENTATION

If the Contractor fails or refuses to allow the County to access examine, copy, and/or maintain a copy of the Escrow Bid Documentation, the County and the Contractor agree that:

1. P&P shall provide access to the EBD to the County’s Authorized Representative(s) if the County provides a declaration and supporting documentation showing that:

- a. the County provided the Contractor with a minimum of 24-hour written notice of its intent to access and/or copy the EBD; and
 - b. it has been more than two days (48 hours) since the County provided notice of its intent to access the Escrow Bid Documents and the Contractor has either failed to acknowledge notice of the County's request or is refusing to allow the County to access the EBD.
2. An employee from P&P shall be present when the County accesses the EBD to observe that nothing occurs in the process of accessing the EBD to affect the authenticity and integrity of the Escrow Bid Documents.

D. USE OF ESCROW BID DOCUMENTATION

The EBD may be used to determine the Contractor's bid concept; to evaluate the Contractor's breakdown of Contract Price; to negotiate price adjustments under the Contract; evaluate Requests For Information, Requests For Change Order, Change Proposals and Claims; or for any other reason related to or arising out of this Contract. Pursuant to the Special Provisions, the County may copy the Escrow Bid Documents and utilize such copies. Paragraph B above does not apply each time the County or Contractor accesses their previously accessed working copies of the Escrow Bid Documentation.

SIGNED by authorized representatives of:

Contractor

King County

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

APPENDIX I

RECYCLED MATERIALS REPORTING



Contract Number		Contract Title					
Contractor			Engineer				
		Reclaimed Hot Mix Asphalt	Recycled Concrete Aggregate	Recycled Glass	Steel Furnace Slag	Other Recycled Aggregates	Contract Total Quantity
Fine Aggregate for Portland Cement Concrete	9-03.1(2)						
Coarse Aggregate for Portland Cement Concrete	9-03.1(4)						
Coarse Aggregate for Commercial Concrete	9-03.1(4)						
Aggregates for Hot Mix Asphalt	9-03.8	see below					
Ballast	9-03.9(1)						
Permeable Ballast	9-03.9(2)						
Crushed Surfacing	9-03.9(3)						
Aggregate for Gravel Base	9-03.10						
Gravel Backfill for Foundations	9-03.12(1)						
Gravel Backfill for Walls	9-03.12(2)						
Gravel Backfill for Pipe Zone Bedding	9-03.12(3)						
Gravel Backfill for Drains	9-03.12(4)						
Gravel Backfill for Drywells	9-03.12(5)						
Backfill for Sand Drains	9-03.13						
Sand Drainage Blanket	9-03.13(1)						
Gravel Borrow	9-03.14(1)						
Select Borrow	9-03.14(2)						
Common Borrow	9-03.14(3)						
Foundation Material Class A and Class B	9-03.17						
Foundation Material Class C	9-03.18						
Bank Run Gravel for Trench Backfill	9-03.19						
Other Aggregate Materials (total quantity not required)	9-03						
TOTAL (recycled materials and contract total quantity)							
		Reclaimed Hot Mix Asphalt	Reclaimed Asphalt Shingles		Steel Furnace Slag	Other Recycled Materials	Total Quantity
Hot Mix Asphalt	5-04.2						

I declare that the statements made in this document, including attachments, are complete, true and accurate.
Signed by an authorized representative of the Contractor

Contractor Representative Name	Signature	Title	Date
--------------------------------	-----------	-------	------

INSTRUCTIONS:

The Contractor shall report the quantity in **tons** for each type of recycled material that was used for each of the listed materials. If the Contract did not include the listed material or recycled materials were not used for this material a "0" shall be entered in the box. The Standard Specifications in Section 9-03.21 do not allow the use of recycled materials in the boxes that are shaded. If the Contract Provisions allowed and the Contractor utilized recycled materials for any of these items the amount of recycled material shall be entered in the box. The contract total quantity for each aggregate material (e.g., Fine Aggregate for Portland Cement Concrete) is the total weight in tons and includes both recycled and natural occurring materials. The total quantity for hot mix asphalt (HMA) is the total HMA weight in tons and includes recycled asphalt pavement (RAP) and new HMA materials.

Other recycled aggregates include other material sources that are utilized on a project. These sources include on-site recycling and aggregates from returned (uncured) concrete. Roadway excavation and embankment are not allowed in the quantity for other aggregate materials or other recycled aggregates.

Attach cost estimates as required in Section 1-06.6 of the Standard Specifications when the total percentage of recycled aggregate and concrete is less than 25 percent of the required amount for the entire Contract.

APPENDIX J

RESPONSIBILITY DETAIL FORM

RESPONSIBILITY DETAIL FORM

The low responsive Bidder and the second low Bidder, upon request, shall be required to complete this Responsibility Detail Form and the Responsibility Attestation as specified in Sections 1-02.14(1) and 1-02.15(1). **This completed Responsibility Detail Form and Responsibility Attestation shall be submitted electronically (pdf) via email to the Contract Specialist identified in the Invitation to Bid.**

Bidder's Company Name: _____

For the below Mandatory Bidder Responsibility Criteria, please check the appropriate box.

1.0 MANDATORY BIDDER RESPONSIBILITY CRITERIA

A. The County will verify that the Bidder meets the following mandatory responsibility criteria as described in RCW 39.04.350(1). The Bidder may be rejected as not responsible if any answer to questions 2 through 4 is "No" or if the appropriate currently active number is not provided for questions 2 through 4. If the answer to questions 2 through 4 is "No" the Bidder is required to attach an explanation and acknowledge that they will be required to provide the requisite information, in 2 through 4 below, prior to Notice of Selection. If the Bidder fails to meet the criteria 2 through 4 prior to Notice of Selection the Bidder will be rejected as not responsible. The Bidder shall be rejected as not responsible if the answer to question 1 is "No" or the answer to questions 5 or 6 is "Yes".

1. Did the Bidder have a Certificate of Registration in compliance with Chapter 18.27 RCW that was in effect at the time of bid submittal?

Yes No

2. Does the Bidder have a current Washington State Unified Business Identifier number/Washington State Excise Tax Registration number as required in Title 82 RCW?

Yes, *Number is:* _____ No (if No, attach explanation)

3. Does the Bidder have Industrial Insurance Coverage for the Bidder's employees working in Washington State as required in Title 51 RCW?

Yes, *Number is:* _____ No (if No, attach explanation)

4. Does the Bidder have an Employment Security Department number as required in Title 50 RCW?

Yes, *Number is:* _____ No (if No, attach explanation)

5. Is the Bidder disqualified for bidding on any public works project under RCW 39.06.010 or 39.12.065(3)?

Yes No

6. For public works projects subject to the apprenticeship utilization requirements of RCW 39.04.320, has the Bidder been found to be out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW within the one year period immediately preceding advertisement of this project?

Yes No

If the answer to question 1 above is "No" or the answer to questions 5 or 6 above is "Yes" **STOP HERE** and notify the Contract Specialist. The Bidder is not responsible for this Project. Otherwise proceed to 1.1.

For remaining criteria below, check or fill-out the appropriate box. Based upon the answer provided by the Bidder, the County may request additional information or seek further explanation.

1.1 CONTRACT AND REGULATORY HISTORY

A. The County will evaluate whether the Bidder's and its subcontractors contract and regulatory history demonstrates an acceptable record of past project performance and consistent responsibility. The Bidder shall answer the following questions. The Bidder may be rejected as not responsible if any answer to questions 1 through 10 below is "Yes".

1. Has the Bidder or its subcontractors had a contract terminated for cause or default, in the last 5 years?

Yes No

If Yes, explain: _____

2. Has the Bidder or its subcontractors been found to have violated a state or federal prevailing wage law while working on a public works project, or had a civil judgment entered against it for violating a state or federal prevailing wage law, in the last 5 years?

Yes No

If Yes, explain: _____

3. Has the Bidder or its subcontractors failed to comply with commitments to, and contractual requirements for, Disadvantaged Business Enterprise ("DBE") Utilization Requirements or Women/Minority Owned Business Enterprise ("WMBE") Utilization Requirements on any public works project, in the last 5 years?

Yes No

If Yes, explain: _____

4. Has the Bidder or its subcontractors failed to meet mandatory King County Small Contractors and Suppliers ("SCS") Utilization Requirements on any public works project, in the last 5 years?

Yes No

If Yes, explain: _____

5. Has the Bidder or its subcontractors been found to have violated ethical standards set forth in King County contracts (KCC 3.04), in the last 5 years?

Yes No

If Yes, explain: _____

6. Has the Bidder or its subcontractors been in bankruptcy, reorganization and/or receivership on any public works project, in the last 5 years?

Yes No

If Yes, explain: _____

7. Has the Bidder or its subcontractors been disqualified by any federal, state or local agency from being awarded and/or participating on any public works project, in the last 5 years?

Yes No

If Yes, explain: _____

8. Has the Bidder or its subcontractors required a Surety to take over all, or a portion of, a project to cure or respond to an asserted default or material breach of contract on the part of the Bidder on any public works project, in the last 5 years?

Yes No

If Yes, explain: _____

9. Has the Bidder or its subcontractors been terminated by a government or private entity prior to contract completion within the last 3 years?

Yes No

If Yes, explain: _____

10. Has the Bidder or its subcontractors failed to meet apprenticeship utilization requirements on any public works project, in the last 5 years?

Yes No

If Yes, explain: _____

1.2 CRIMINAL HISTORY

- A. The County will evaluate whether the Bidder's, or any of its corporate officers, and/or its subcontractors criminal history demonstrates a lack of business integrity or business honesty. The Bidder shall answer the following questions. The Bidder may be rejected as not responsible if any answer to questions 1 through 4 below is "Yes".

1. Has the Bidder, or any of its corporate officers, and/or its subcontractors been convicted of a criminal offense related to obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of the contract or subcontract, in the last 5 years?

Yes No

If Yes, explain: _____

2. Has the Bidder, or any of its corporate officers, and/or its subcontractors been convicted under federal or state law of a crime relating to wage payment, embezzlement, theft, forgery, bribery, antitrust, falsification or destruction of records, receiving stolen property, making false claims while working on a project, in the last 5 years?

Yes No

If Yes, explain: _____

3. Has the Bidder, or any of its corporate officers, and/or its subcontractors been convicted of a crime involving willful violation of a federal or state environmental law or regulation while working on a project, in the last 5 years?

Yes No

If Yes, explain: _____

4. Has the Bidder been found in violation of the Trafficking Victims Violence Prevention Act of 2000, within the last 3 years?

Yes No

If Yes, explain: _____

1.3 ACCIDENT/INJURY EXPERIENCE

- A. The County will evaluate the Bidder's accident/injury Experience Modification Factor ("EMF") from the Washington State Department of Labor and Industries, or similar organization with jurisdiction in the United States, to assess whether the Bidder has an acceptable safety record preventing personal injuries on projects.
- B. List the Bidder's accident/injury EMF for the last five (5) years. An experience factor is calculated annually by the Washington State Department of Labor and Industries.

Year	Effective Year	Experience Factor
1		
2		
3		
4		
5		

If the Bidder has received an EMF of greater than 1.0 for any year, explain the cause(s) of the designation and what remedial steps were taken to correct the EMF. The Bidder may be rejected as not responsible if the Bidder's EMF is greater than 1.0 and sufficient remedial steps have not been implemented.

1.4 FORMER COUNTY EMPLOYEES – CONFLICT OF INTEREST

A. Did the Bidder or its subcontractors have any employees who, for one (1) year after leaving County employment, were involved in the preparation of the bid submitted for this contract?

Yes No

If Yes, identify who and their role in bidding this project: _____

1.5 WORK PERFORMED BY BIDDER

A. The Bidder shall demonstrate on the Responsibility Detail Form how, with its own forces, it shall perform work equivalent to at least 30% of the Contract Price, excluding taxes, insurance and bonding. The Bidder shall demonstrate this by identifying the work using the specification divisions, or sections within a division, it intends to perform with its own forces and the estimated dollar amount and percentage of its overall bid amount this itemized work constitutes.

Division # / Section #	Dollar Amount for Contract Work Performed with Own Forces	Percent of Total Proposal Price
	\$	%
	\$	%
	\$	%
	\$	%
	\$	%
	\$	%
	\$	%
	\$	%

1.6 ACCIDENT PREVENTION PLAN

The Bidder shall submit with the Responsibility Detail Form, a copy of the Bidder's Accident Prevention Program "APP" that meets the requirements stated in the Special Provisions, Washington Administrative Code (WAC) 296-155-110, and the applicable portions of WAC 296-24, WAC 296-62, WAC 296-67, WAC 296-155 and WAC 296-800. The County will review the APP. Should the County have concerns about the information contained in the APP, the County may request additional information and/or a submission of a revised APP.

1. Pursuant to the WAC, the APP is to be tailored to the Contractor's type of construction business.
2. Specific types of hazards related to the work under this Project shall be addressed in the site-specific Health and Safety Plan (HASP) which shall be submitted after Notice to Proceed.

The following website provides additional information regarding the APP:

<http://www.lni.wa.gov/Safety/Rules/Chapter/800/helpfultools/APPCoreRuleGuide.pdf>

- A. Did the Bidder include an Accident Prevention Plan, which meets the criteria above, with this submittal?

Yes No

If No, explain: _____

RESPONSIBILITY ATTESTATION

Attestation Requirement: By completing and signing this Responsibility Attestation, the Bidder is certifying that the information contained within Attachment, Responsibility Detail Form, and any additional information requested by the County, is true and complete. The Bidder's failure to disclose the required information or the submittal of false or misleading information may result in the rejection of the Bidder's bid, revocation of award, or contract termination, and/or may impact the Bidder's ability to bid on future projects with King County.

In addition; the undersigned Bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date, the bidder is not a "willful" violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

Project: Lake to Sound Trail - Segment A, C01119C17

I certify (or declare) under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

Signature of Authorized Representative

Date

Location or place executed (City, State): _____

Print Name and Title: _____

Bidder General Information

Bidder's Legal
Name: _____

Contact Name and
Title: _____

Address: _____

Contact Phone
Number: _____

Contact Email: _____