HWA GEOSCIENCES INC.

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

PROJECT MEMORANDUM

TO: Eric C. Evans / Shelter Holdings

PREPARED BY: Donald Huling, P.E. / HWA GeoSciences Inc.

SUBJECT: **Proposed Pile Foundation Types**
Everett Riverfront Development
Everett, WA

PROJECT NO.: 2015-061-21 Task 600

DATE: May 09, 2018

This memorandum provides a description of deep foundation types proposed to support development of the Riverfront property in Everett, Washington. The project site is located within the limits of the Everett Landfill/ Tire Fire Site as shown in the vicinity map, Figure 1. The deep foundation types outlined herein have been proposed to satisfy the intent of the Consent Decree (State of Washington v. Everett, 2001) both inside and outside of the identified Pile Restriction Zone. This memorandum is meant to provide information and facilitate approval of the proposed deep foundation types for development on the landfill property.

Project Understanding

It is our understanding that Shelter Holdings, LLC. proposes to develop the Everett Landfill/ Tire Fire Site with a mixed-use development. The approximate current geometry of the proposed development is shown in the site and exploration plan, Figure 2. As shown in Figure 2, access to the site would be provided by a newly constructed Riverfront Drive, bisecting the site and connecting the current 41st Street to the south to 36th Street to the north. A series of multistory structures are proposed along both sides of Riverfront Drive with retail and parking on the first floor and residential units above. All buildings will be supported on deep foundations bearing in the very dense sandy soils at depth to avoid settlement related damage over the life of the structures. Parking outside the buildings, roadways and plazas will be constructed at grade.

Existing Available Geotechnical Data

In support of past development concepts for the Everett Landfill/ Tire Fire Site, two main geotechnical exploration programs have been completed. Most recently, HWA drilled a series of geotechnical borings, designed BH-1 through BH-35, in support of Project Evergreen along the north side of the site (HWA, 2017). The approximate locations of these explorations are shown on the site and exploration plan, Figure 2. Copies of the logs of these borings are included in Appendix A. Earlier, GeoEngineers drilled a series of geotechnical borings, designated GEI-1 through GEI 47, in 2007 in support of Oliver McMillan's development concept (Geoengineers, 2008). The approximate locations of these

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explorations are shown on the site and exploration plan, Figure 2. Copies of the logs of these borings are included in Appendix B. It should be noted that Geoengineer's borings were drilled prior to preloading of the Everett Landfill/ Tire Fire Site. Therefore, the soil contacts presented in the Geoengineer's borings should be adjusted to account for observed preloading settlements.

Summary of Soil and Groundwater Conditions

The previous soil investigations at the project site have encountered a general soil sequence consisting of fill underlain by refuse, fine grained alluvium, coarse grained alluvium and glacially consolidated soils at depth. The thicknesses of each of these layers vary across the site but the general sequence is relatively consistent. The refuse and alluvial deposits are compressible in nature and are expected to undergo settlement over time, even after preloading. The dense glacial soils at depth will provide bearing for the proposed deep foundations.

Two groundwater aquifers have been observed across the site. The shallow aquifer consists of water perched on the top of the fine grained alluvial soils found below the refuse. The shallow aquifer flows east through the refuse and is intercepted by the leachate collection system along the eastern boundary of the landfill. The deeper aquifer flows under the entire site through the dense glacial soils. The deep aquifer is hydraulically connected to the Snohomish River located to the east. Where present, the fine grained alluvial soils act as a barrier between the shallow and deeper aquifer. As defined in previous reports, the aquitard separating the shallow and deeper aquifers is not present on the western portion of the Everett Landfill/ Tire Fire Site.

Regulatory Background

The Consent Decree for the site provides requirements for future development of the landfill property. Per the requirements of the Ecology Cleanup Action Plan, a Shallow Aquifer Characterization study was completed (HWA, 2005). This study defined a Pile Restriction Zone across portions of the landfill site and set restrictions for pile foundations installed within the zone. The geometry and extent of the pile restriction zone is shown in Figure 2 and was identified based on the presence or absence of an aquitard layer below the refuse and the presence or absence of observed contamination within the refuse.

The Shallow Aquifer Characterization report states with respect to the Pile Restriction Zone that "*Deep foundation systems in these areas should be restricted to augercast piles or other equivalent piling types that minimize the potential to create new groundwater flowpaths parallel to the pile. The rationale for using augercast piles instead of driven piles is that the likelihood of creating a hydraulic connection between the shallow and deep aquifer is higher with the use of driven piles. Driven pile systems employing some form of external grouting would also decrease the potential for cross-connection of shallow and deep zones." (HWA, 2005).* Therefore, deep foundations systems installed within the Pile Restriction Zone are required to consist of augercast piles or an equivalent piling system that minimize the potential to create new groundwater flowpaths between the shallow and deep aquifer.

Challenges Associated with Augercast Pile Foundations

Our explorations suggest that the refuse across the site is highly variable in composition and relatively porous. During our 2017 drilling operation, loss of drilling fluid into the refuse was documented at several boring locations across the site. This observed migration of drilling fluid suggests that grout from construction of augercast piles has a high potential for migration into the refuse layer if this foundation system is used. Given the variability in the composition of the refuse, it is impossible to estimate the volume, geometry and depth of potential grout migration. From a construction cost prospective, grout migration potential for augercast piles could be addressed through construction contingencies. However, from a design perspective, grout migration can influence anticipated downdrag loading and affect localized pile capacity, representing a significant design concern.

Downdrag loads are loads that develop on deep foundations when the compressible soils settle relative to the pile. Downdrag loads generally develop as friction along the pile surface. As long-term settlements are expected across the landfill site, downdrag loads are expected to develop on all pile foundations. However, grout migration into the refuse, associated with the use of augercast piles, would result in significant increases in the magnitude of the anticipated downdrag loads. We calculate that downdrag loads associated with grout migration into the refuse could be large enough to fail the piles in some areas. Due to potential downdrag induced augercast pile failures, we do not recommend the use of augercast piles at this site. We recommend that alternative deep foundation systems, which provide equivalent minimization of potential to create new groundwater flowpaths between the shallow and deep aquifer, be utilized.

Literature Review

To identify alternative deep foundation systems to be used within the pile restriction zone, HWA conducted a literature review with respect to pile foundations driven at Brownfield sites. Through this review HWA identified several research papers focused on evaluating contaminate transport along pile foundations driven through aquitards. Attempts were made to identify case histories that documented contaminate migration associated with various piles types driven through landfill refuse and penetrating underlaying aquitards. However, no such case histories were identified. The lack of available case histories is likely due to the relatively recent push for development of Brownfield sites. Due to the lack of relevant case histories, alternative deep foundation selection was based on guidance from available research on the topic.

Available research associated with contaminate migration due to deep foundations penetrating aquitard layers is focused on numerical modeling and scale testing of multiple pile types driven through a modeled aquitard (Satyamurthy, 2005). This research indicated that contamination migration through an aquitard layer, due to deep foundation penetrations, can be described by three mechanisms. These mechanisms include Direct transfer of soil at the pile tip (one-time event), flow along the perimeter of the pile, and flow through the pile. Each of these mechanisms is described below.

Direct transfer
Direct transfer is a mechanism of contaminate migration that is associated with the pushing of a plug of contaminated soils through the aquitard when driving displacement piles. Numerical modeling and conventional soil mechanics suggest that the volume of the plug pushed down with the pile is directly related to the shape of the tip of the pile. For driven displacement piles, a large plug is transported with flat ended piles and a significantly reduced plug is transported with piles installed with a conical tip. Therefore, driving displacement piles with a conical tip is preferred to limit the direct transfer mechanism.

Perimeter Flow
Perimeter flow is the mechanism wherby contamination migrates along the perimeter of the pile element through the aquitard layer. Numerical models and scale testing suggest that the magnitude of anticipated perimeter flow is dependent on the type of pile installed. Satyamurthy's research suggests that perimeter flow is greater for drilled pile systems, such as auger-cast piles and drilled shafts, than for driven displacement piles. The reduced perimeter flow for driven displacement piles is associated with the increased pressure developed during driving. Numerical models and scale testing suggest that the pressure caused by driving of the pile results in the soils within the aquitard squeezing the pile, helping to prevent perimeter flow. This increased pressure is not present for drilled deep foundation systems. Satyamurthy's research also suggests that perimeter flow is greater for low displacement driven piles such as H-piles or square and octagonal displacement piles, due to the increased surface area of the pile and reduced increase in pressure during driving. Therefore, driving circular displacement deep foundation systems will result in less perimeter flow of contaminates than drilled foundation elements.

Flow Through Foundation Element
Flow through the foundation element occurs when a foundation system is installed that is porous enough to allow for the flow of contaminates through the foundation element itself. Research suggests that this is only a consideration when using timber displacement piles. Therefore, timber piles should not be used as a foundation system for this site. Steel pile piles or grout piles do not experience flow through the foundation element.

Based on these three contaminate migration mechanisms, the ideal deep foundation system for use within the pile restriction zone would be steel or grout, driven, circular displacement piles, with conical tips.

Proposed Deep Foundation Systems
Based on available research, we propose to utilize two alternate deep foundation systems to support proposed structures within the Pile Restriction Zone. The first of these systems is driven steel pipe piles utilizing post grouting procedure to minimize the potential to create new groundwater flowpaths between the shallow and deep aquifer. The second system consists of driven grout piles with a sleeve installed through the refuse layer. Based on currently available

research, we believe that these deep foundation systems are superior to augercast piles in that they will minimize the potential for new groundwater flowpaths to develop between the shallow and deep aquifer. A detailed description of each proposed foundation system is provided below.

Steel Pipe Piles with Post Grouting

Driven steel pipe piles have been a widely accepted method of providing deep foundation support for structures over poor soils for decades. Steel pipe piles are generally driven into the ground with a diesel hammer affixed to a large crawler crane. The piles are driven into the underlying bearing soil until the desired load bearing capacity has been achieved. The advantage of steel pipe piles is that they are quick to install, do not generate spoils at the surface and their smooth surface limits downdrag loads with respect to other deep foundation systems. However, it is our understanding that there has been concern that driving steel pipe piles within the Pile Restriction Zone would increase the potential to create new groundwater flowpaths between the shallow and deep aquifer. As stated above, available research has shown that driven steel pipe piles are one of the best functioning deep foundation systems for preventing migration of contaminates when driven through an aquitard. However, to further minimize this potential, we recommend that any steel pipe piles to be driven within the Pile Restriction Zone be fabricated to allow for post grouting below the base of the refuse layer. Post grouting would force grout around the outside of the steel pile, providing a grout to soil seal around each pile below the bottom of the refuse layer.

To allow for post grouting, each pile would be fabricated with a conical tip and maximum half-inch diameter perforations through the side walls of the pile at all four quadrants of the pile. The perforations would be spaced a maximum of 2-feet apart from the tip of the pile to the point on the pile that corresponds to the base of the refuse layer. No perforations would be made above the point on the pile corresponding to the bottom of refuse at the pile location. The upper extent of perforations for each individual pile would be unique and determined based on the elevation of the base of the refuse and the required embedment depths; and, as determined by a test pile program for each structure.

The test pile program would consist of driving test piles at each proposed structure prior to starting production pile driving. The number and location of the test piles for each structure would be determined by the geometry of each structure and expected variability in the bearing soil. Each test pile would be driven to the desired vertical capacity. The first test pile at each building would be considered sacrificial and would be driven with perforations installed over the entire length of the pile. This pile would be pressure grouted after driving and be used to estimate the appropriate extent of perforations on the rest of the piles. The required embedment depth data obtained from each test pile program would be used to develop anticipated embedment depths for the remaining production piles. This data coupled with the soil geometry, obtained from the geotechnical explorations, would allow for reasonable design of the pile perforations to achieve grouting across the fine grained alluvial aquitard at all pile locations.

Pressure grouting of each pile would take place after pile driving is complete or once the piledriving equipment was a sufficient distance to allow for post grouting equipment to access the pile cap. Post grouting would be achieved by placing grout inside the pile. The grout would be tremied to the base of the pile to displace any water than entered the pile through the perforations. Once each pile is filled with grout, a packer will be applied at the top of the pile and pressure would be applied to the grout. Grout for each pile would be pressurized to a level greater than the overburden pressure at the midpoint of the fine grained alluvial aquitard. This pressure level would force the grout out of the perforations and into the surrounding soil unit. The grout extruded from the pile would form a seal around the pile that would minimize the potential to create new groundwater flowpaths between the shallow and deep aquifer. A schematic representation of the pile geometry and the steps involved in the use of a driven pipe pile system is shown in Figure 3.

Driven Grout Piles with Steel Sleeve Through Refuse

Driven Grout Piles are installed using a mandrel that is placed in a "boot". The mandrel is then charged with fluid grout. At this point the driving commences. Once bearing is achieved, grout is injected under pressure as the mandrel is extracted. The design of the mandrel keeps soil from entering the grout column. Upon completion, a grout pile, very similar to an augercast pile, is created. However, unlike a drilled auger cast pile, the driven grout piles will generate the increased pressure within the soil, reducing the potential for migration of contaminates along the perimeter of the foundation system. For use at this site, we recommend that the driven grout pile installation process be modified to include installation of a steel sleeve through the refuse. The sleeve would terminate at the base of the refuse and would be used to minimize grout migration into the refuse. Steel sleeves would be driven with a boot at each location to the base of the refuse. Once the sleeve was in place the mandrel would be installed through the center of the sleeve and driving of pile would continue. Much like augercast piles, driven grout piles could fail under downdrag loads if not sleeved through the refuse. The length of sleeve for each pile would be determined based on the depth of the base of the refuse, observed in the geotechnical borings. Below the sleeved portion of the pile the driven grout pile system would have the same soil to grout interface as an augercast pile system. This grout to soil interface would minimize the potential to create new groundwater flowpaths between the shallow and deep aquifer, as required within the pile restriction zone. A schematic representation of the pile geometry and the steps involved in the use of a driven grout pile system, with a sleeve through the refuse, is shown in Figure 4.

Summary

To avoid potential downdrag failure of deep foundations and reduce the potential for contaminate migration, we recommend that augercast piles not be used at this site. Although the intent of the Cleanup Action Plan with respect to pile types was to reduce cross-contamination from the shallow to deep aquifer, no geotechnical engineering analysis was done at that time; i.e., the infeasibility of auger cast piles in refuse was not considered. Additionally, the Cleanup Action Plan was developed prior to publishing of the most recent research on the topic

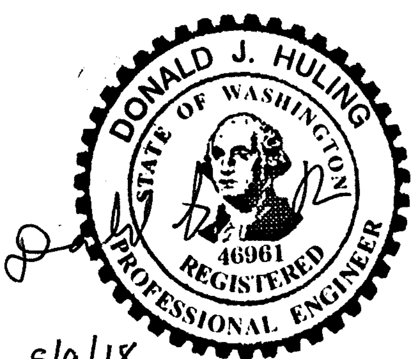
(Satyamurthy, 2005). The pile types proposed herein meet the environmental intent of the Cleanup Action Plan and also meet engineering criteria for successful foundation design.

We recommend that post grouted steel pipe piles and/or driven grout piles, sleeved though the refuse, be used as the preferred deep foundations system for development within the Pile Restriction Zone. Both proposed systems would provide equivalent or better minimization of the potential to create new groundwater flowpaths between the shallow and deep aquifer than auger cast piles. We believe that both of these proposed deep foundation systems satisfy the requirements of the consent decree and request that approval for their use be provided.

We appreciate this opportunity to be of service.

Sincerely,

HWA GEOSCIENCES INC.



5/9/18

Donald Huling, P.E.
Principal Geotechnical Engineer

LIST OF FIGURES (FOLLOWING TEXT)

APPENDICES

Appendix A: HWA Previous Explorations

Appendix B: GeoEngineers Previous Explorations

REFERENCES

Consent Decree, *State of Washington, Department of Ecology v. City of Everett* (CD-2696-2001-NCN), dated April 02, 2001.

GeoEngineers geotechnical report entitled *Geotechnical Engineering Services, Foundation Design Report, Everett Landfill Site, Everett Riverfront Redevelopment Project*, dated July 24, 2008.

HWA GeoSciences Inc. environmental report entitled *Shallow Aquifer Characterization Agency, Everett Landfill and Tire Fire Site, Everett, Washington*, dated June 27, 2005.

HWA GeoSciences Inc. geotechnical report entitled *Geotechnical Report, Project Evergreen, Everett, Washington,* dated August 18, 2017.

Satyamurthy, Ranjan, "Investigations of Pile Foundations in Brownfields" (2005). *University of New Orleans Theses and Dissertations*. 245.

Map not to scale. Excerpt from Google Maps Earth

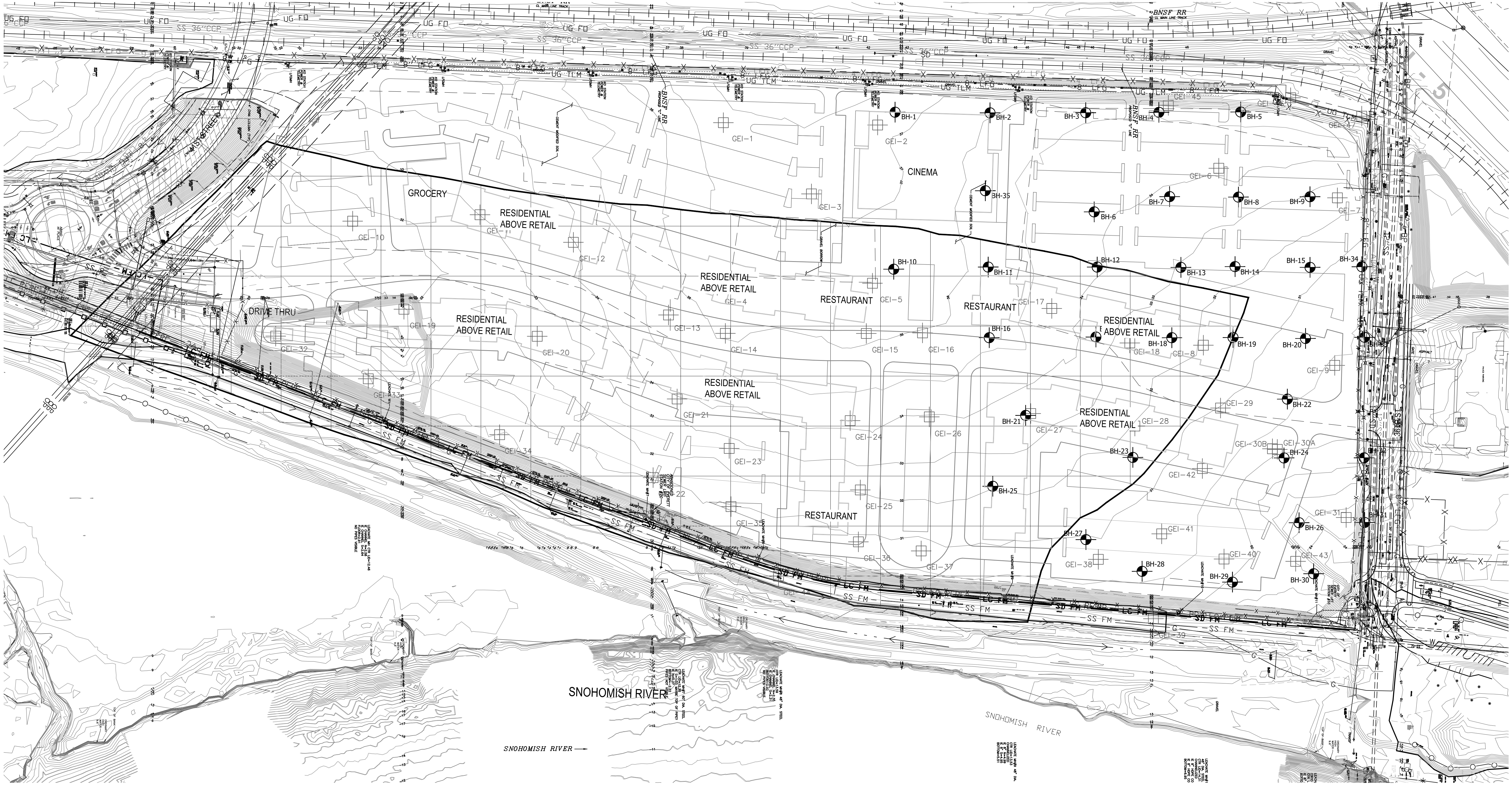
HWA GEOSCIENCES INC.

FIGURE NAME

SITE VICINITY MAP
EVERETT RIVERFRONT DEVELOPMENT
EVERETT, WA

FIGURE NO.
1

PROJECT NO.
2015-061



LEGEND

PILE RESTRICTION ZONE

BH-35 BORING DESIGNATION AND APPROXIMATE LOCATION (HWA - 2017)

GEI-30 BORING DESIGNATION AND APPROXIMATE LOCATION (GeoEngineers - 2007)

HWA GeoSciences Inc.	RIVERFRONT DEVELOPMENT EVERETT, WASHINGTON	SITE AND EXPLORATION PLAN	DRAWN BY: BFM CHECK BY: DH DATE: 12.27.2017	FIGURE #: 2 PROJECT #: 2015-061-21

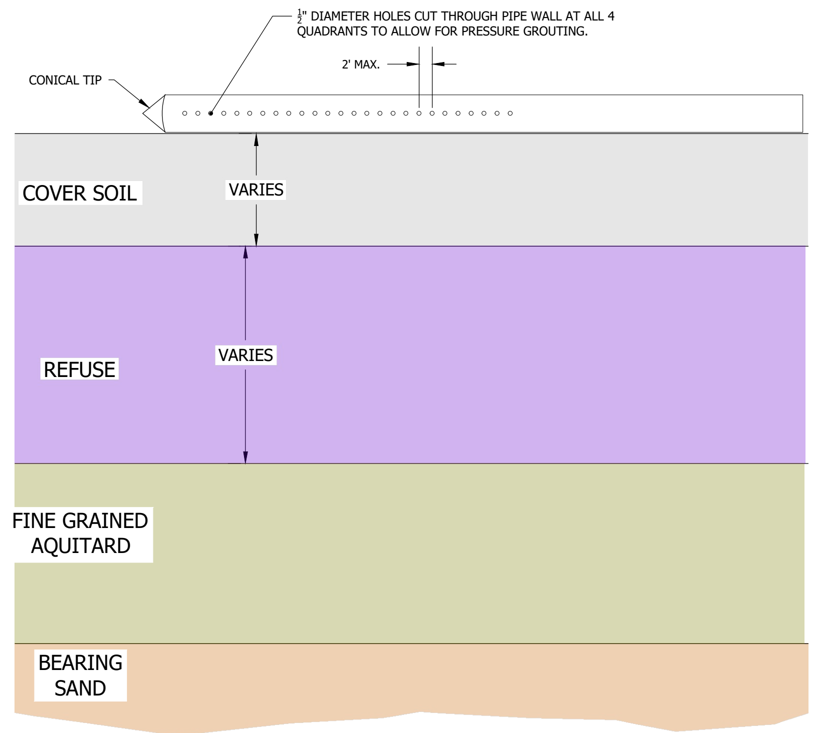
S:\2015 PROJECTS\2015-061-21 EVERETT RIVERFRONT SETTLEMENT CALCULATIONS\CAD 2015-061\HWA 2015-061 T200 EVERGREEN 12.11.2017 (FIG 1).DWG <Fig 2> Plotted: 1/26/2018 9:29 AM

STEP 1: CUTTING HOLES

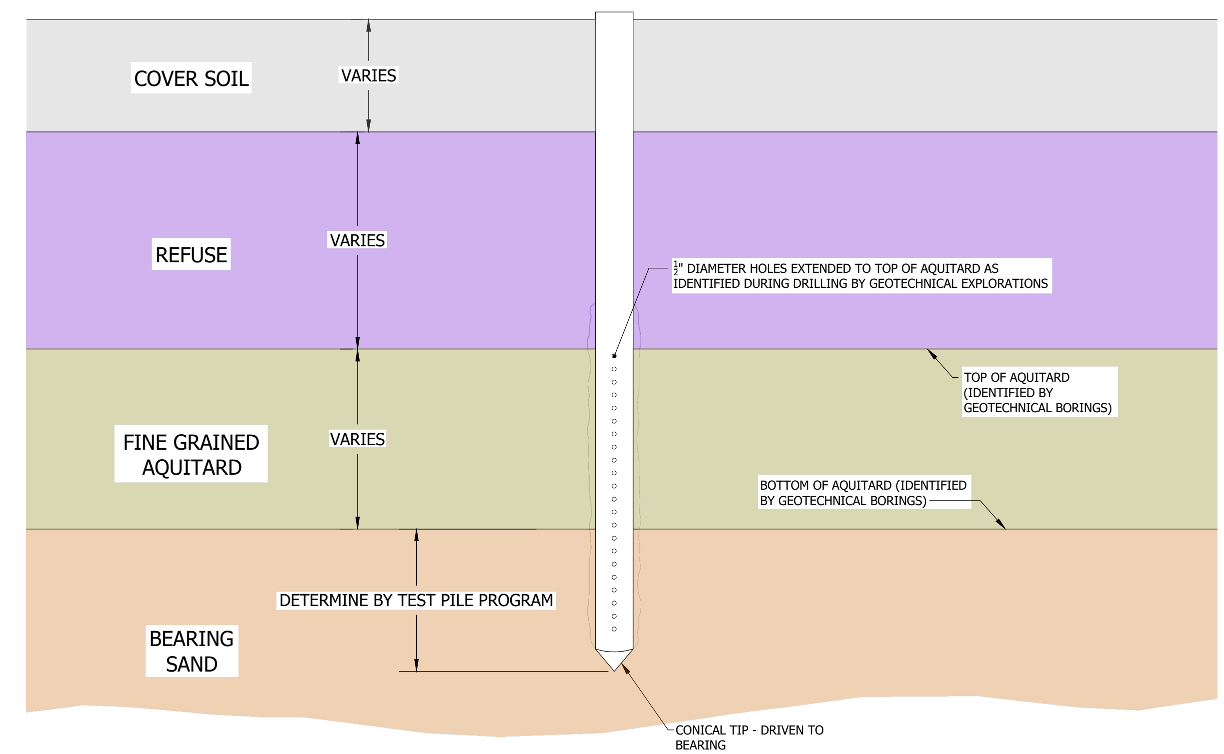
Notes:

1). ½" diameter holes cut through pile wall at all 4 quadrants at 2-foot vertical spacing to allow for pressure grouting into the fine-grained aquitard soils.

2). The vertical extent of the pile wall perforations are to extend from the tip of each pile to the top of the fine-grained aquitard at the location of the subject pile. The distance from the tip of each pile to the top of the fine-grained aquitard is to be determined based on soil geometry from geotechnical borings and from pile embedment depths determined from test pile programs for each building.



STEP 2: DRIVE PILES

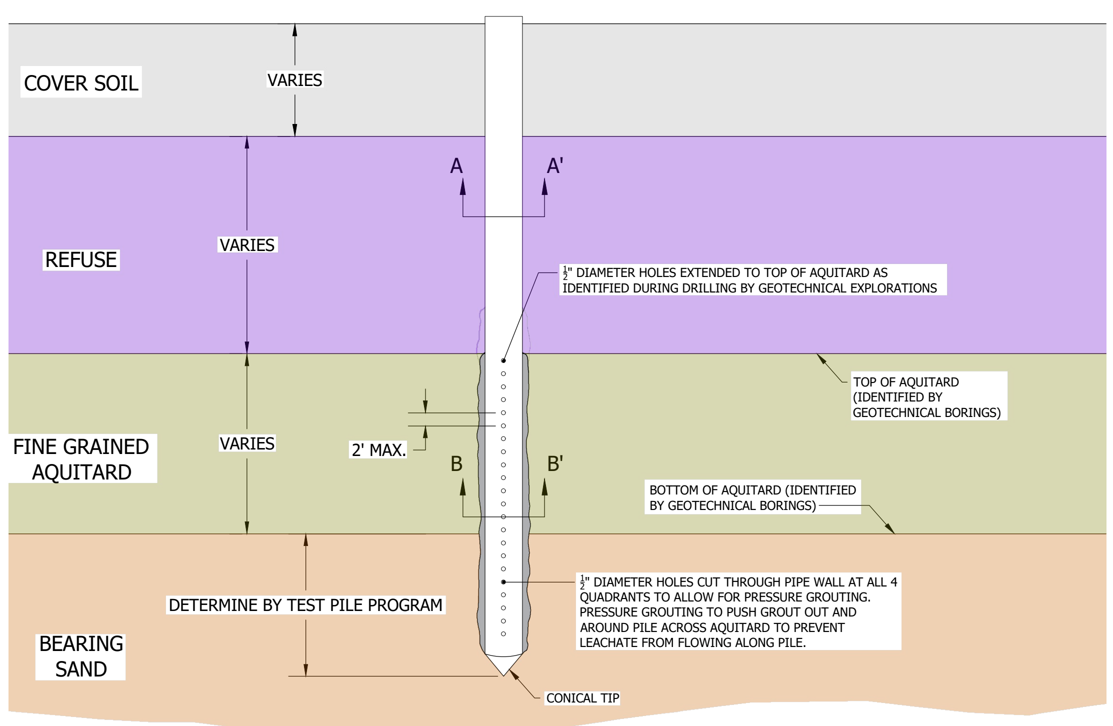


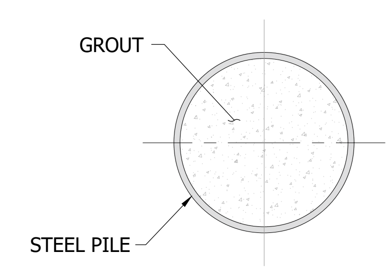
STEP 3: GROUTING PILES

Notes:

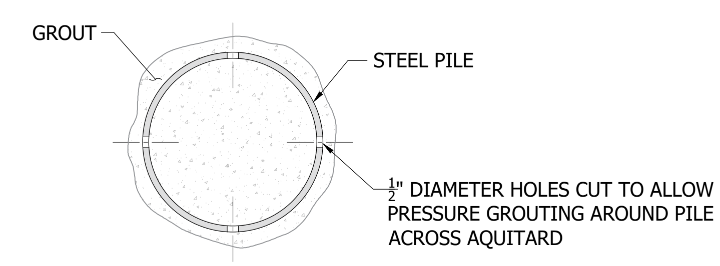
1) Pressure grouting of each pile to be completed after pile driving is complete.

2) Grout pressures, during pressure grouting, to exceed the overburden pressure at the midpoint of the fine-grained aquitard layer.





CROSS SECTION A-A'

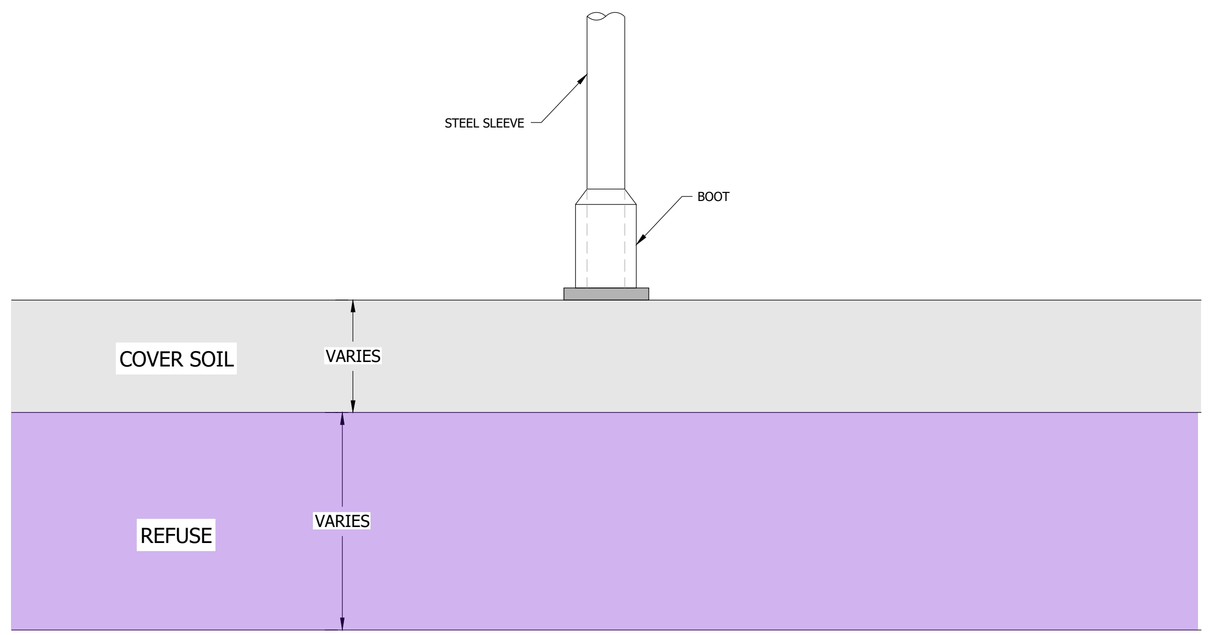


CROSS SECTION B-B'

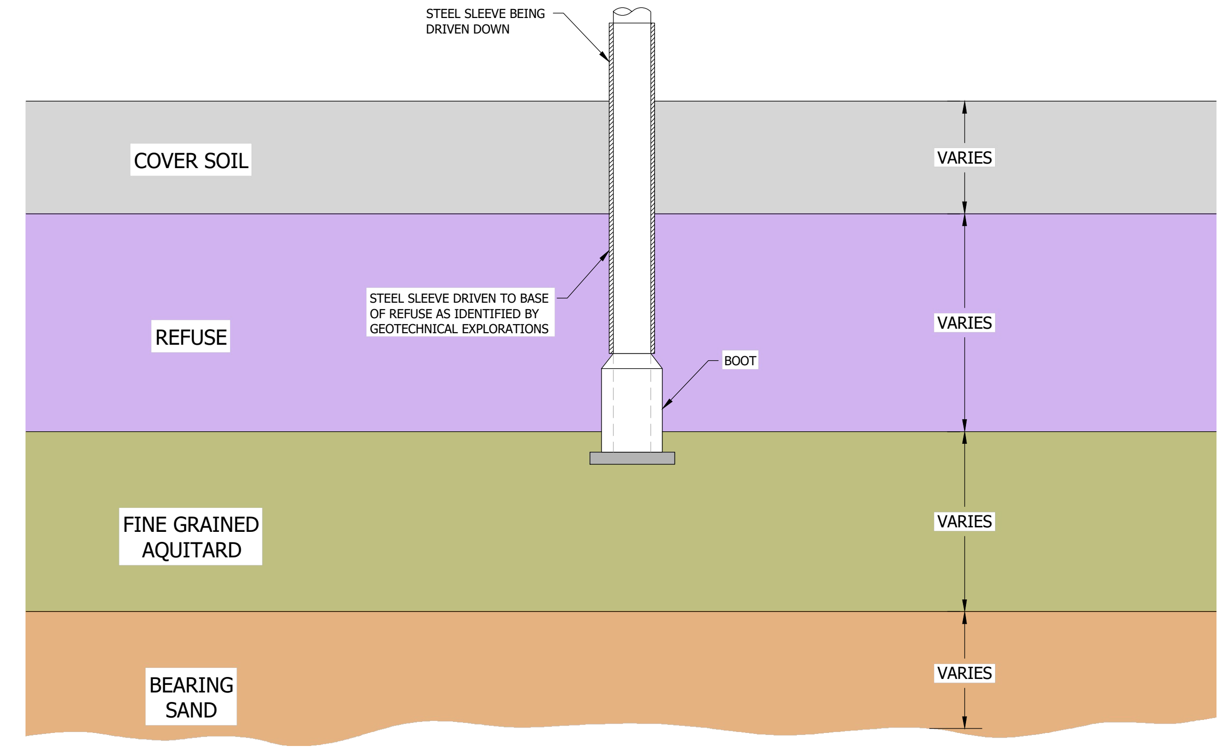
HWA GEOSCIENCES INC.	RIVERFRONT DEVELOPMENT EVERETT, WASHINGTON	STEEL PIPE PILE WITH POST GROUTING THROUGH AQUITARD	DRAWN BY BFM CHECK BY DH DATE: 12.04.2017	FIGURE # 3 PROJECT # 2015-061-21

S:\2015 PROJECTS\2015-061-21 EVERETT RIVERFRONT SETTLEMENT CALCULATIONS\CAD 2015-061\HWA 2015-061 T200 EVERGREEN 12.20.2017 PILING DETAILS.DWG <Fig 3> Plotted: 1/10/2018 10:57 AM

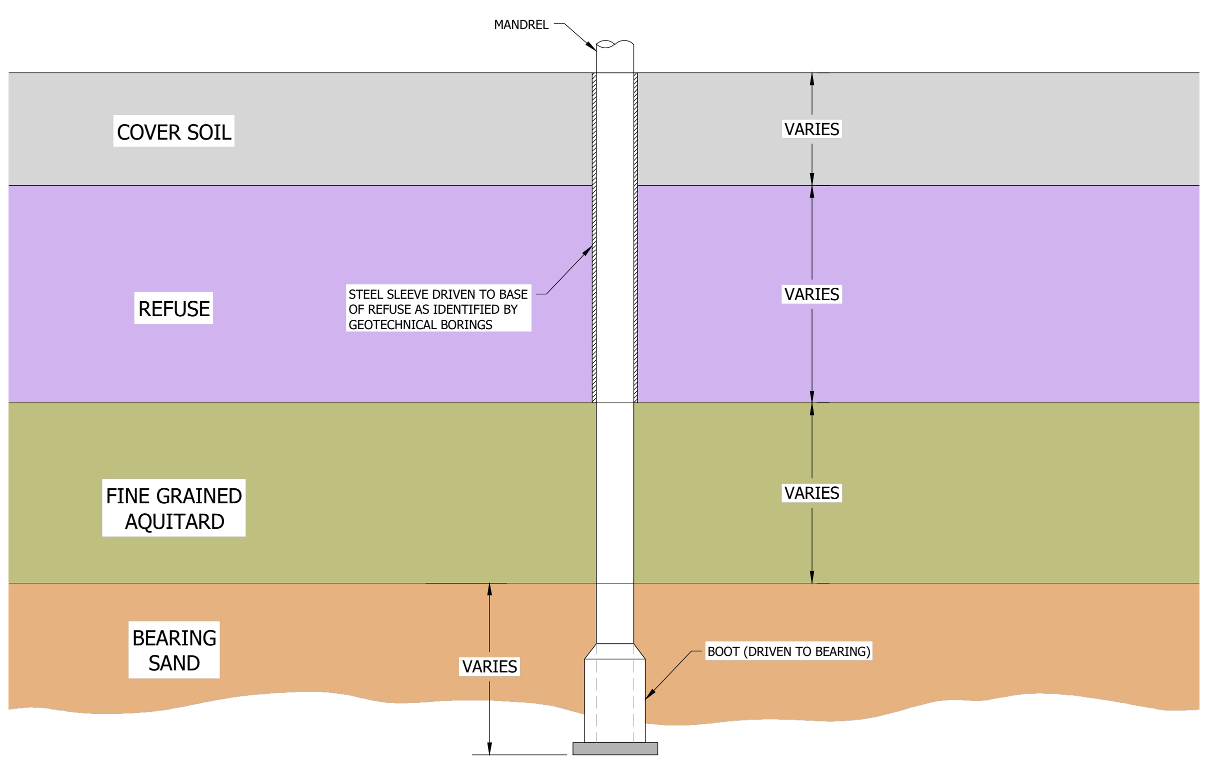
STEP 1: SET UP



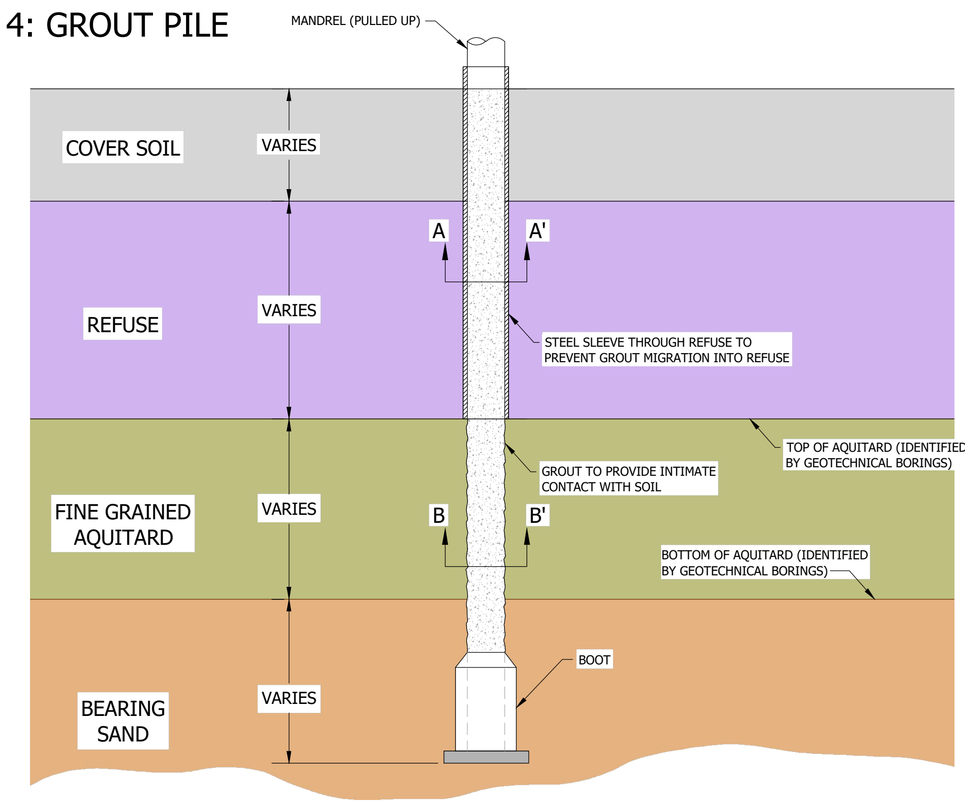
STEP 2: DRIVE STEEL SLEEVE

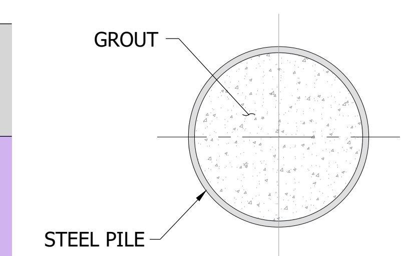


STEP 3: DRIVE MANDREL

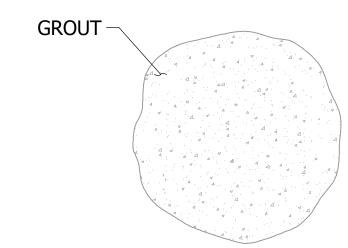


STEP 4: GROUT PILE





CROSS SECTION A-A'



CROSS SECTION B-B'

HWA GEOSCIENCES INC.	RIVERFRONT DEVELOPMENT EVERETT, WASHINGTON	DRIVEN GROUT PILE WITH SLEEVE THROUGH REFUSE	DRAWN BY: BFM CHECK BY: DH DATE: 12.04.2017	FIGURE #: 4 PROJECT #: 2015-061-21

S:\2015 PROJECTS\2015-061-21 EVERETT RIVERFRONT SETTLEMENT CALCULATIONS\CAD 2015-061\HWA 2015-061 T200 EVERGREEN 12.20.2017 PILING DETAILS.DWG <Fig 4> Plotted: 1/10/2018 10:56 AM

APPENDIX A

HWA PREVIOUS EXPLORATIONS

APPENDIX A

FIELD INVESTIGATION

The subsurface exploration program consisted of 35 boreholes, drilled to depths ranging from 40 to 141.5 feet below the existing ground surface. Drilling equipment was selected based on site access conditions, and included a truck-mounted drill rig and two track-mounted drill rigs.

Proposed exploration locations were staked in the field by HWA with GPS, per locations chosen and plotted on the site plan by HWA. Upon completion of the boreholes, the actual locations and elevations were subsequently plotted with GPS as some were moved to accommodate access conditions. The approximate exploration locations are shown on the Site and Exploration Plan, Figure 2.

Each of the explorations was completed under the full-time observation of an HWA geologist. HWA personnel recorded pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and ground water occurrence as the explorations were drilled. 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. Soil layers containing refuse are indicated with a dark mottled hatch pattern in the left-hand column for soil symbols. The summary logs of boreholes are presented on Figures A-2 through A-36. The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types. The actual transitions may be more gradual.

Under subcontract to HWA, Holocene Drilling, Inc. of Puyallup, Washington, drilled the borings in May and June, 2017. HWA sampled soils to depths of up to 141.5 feet in the borings. Holocene employed a truck-mounted Mobile B-58 drill rig, a track-mounted CME 850 drill rig, and a Diedrich D-50 tracked drill rig. The rigs employed eight-inch outer diameter hollow stem augers. QuikGel bentonite fluid was added to the inside of the auger once a depth of approximately 40 feet had been reached, to provide additional weight to reduce sand heave in the auger. Seven of the deeper borings were drilled using mud rotary methods, after augering to depths of approximately 40 to 45 feet. Mud rotary drilling consisted of advancing a tri-cone bit approximately 4.5 inches in diameter on rotating drill rods. Drilling "mud" consisting of bentonite grout was circulated through the tip and up the borehole into a settling and recirculating tub.

Soil samples were obtained from most of the borings using driven split spoon samplers as well as Shelby tubes pushed into soft soils by hydraulics. 1-inch ring samples were obtained at selected intervals and borings, inside a 3-inch O.D. California sampler driven with either a 140-lb. or 340-lb. hammer (depending on the drill rig).

Standard Penetration Test (SPT) samples were obtained by driving a two-inch split spoon sampler at the end of drilling rods (threaded heavy steel pipe). A 140-pound hammer with a 30-inch drop was used to drive the sampler into the subsurface. Soil samples were then retrieved from the sampler. Five of the borings utilized 3-inch diameter modified California sampler split-spoon equipment to collect soil samples. A 340-pound hammer with a 30-inch drop was used to drive the 3-inch O.D. a sampler. Soil samples were then retrieved from the sampler. Summary blow counts from the 340-pound hammer were subsequently converted to SPT-equivalent blows.

Soil samples were obtained every 2.5 feet in the upper 20 feet of each boring and then every five feet until boring completion. Extra samples between the five-foot intervals were obtained when necessary for Shelby tubes and 1-inch rings, or if the percent recovery of soil in a split spoon sampler at the regular five-foot interval was low.

Soil boring cuttings were placed in 1-cubic yard heavy cardboard boxes on pallets or in drums, and subsequently buried on site in the landfill by KLB Construction under contract to Shelter Holdings.

Upon completion, each borehole was abandoned in accordance with Department of Ecology requirements. Bentonite grout was mixed and pumped into each boring. Typically, the grout settled several feet, such that on a subsequent day each borehole was topped off to the ground surface with bentonite chips.

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	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

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

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

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.

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PROJECT EVERGREEN
EVERETT, WASHINGTON

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

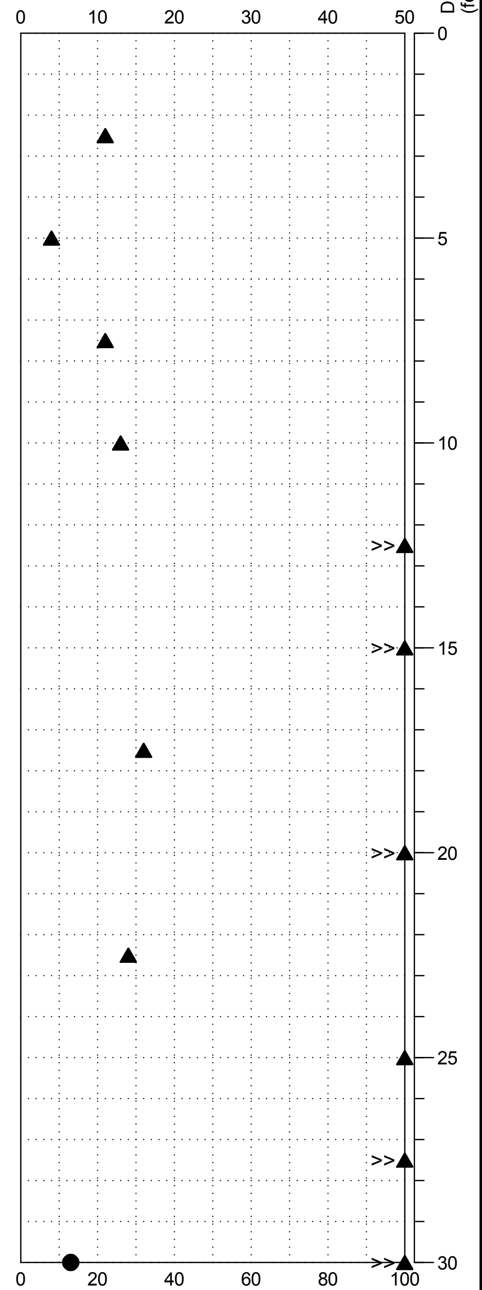
PROJECT NO.: 2015-061-21 FIGURE: A-1

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 37.32 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	ML SM	Soil cap.				
		Stiff, olive-gray and bluish-gray, fine sandy SILT, moist. **(FILL)**	S-1	3-6-5		
5		Loose, brownish-black, REFUSE and silty SAND, moist. Poor recovery. ~60% Refuse: paper, glass, plastic. ~30% Decomposable. **(REFUSE)**	S-2	2-2-2		
		Medium dense, grayish-black, REFUSE (wood, plastic, paper), with sandy SILT. ~90% Refuse, ~40% Decomposable.	S-3	3-4-7		
10		Dark gray, sandy SILT, moist, over REFUSE: wood. ~50% Refuse, ~50% Decomposable.	S-4	3-5-8		
		Drove wood; poor recovery. Wood, one piece green glass, ~100% Refuse, ~95% Decomposable.	S-5	50/6"		▽
15		Blow counts overstated. Dark brown, organic SILT with refuse: plastic, wood, copper wire, ~30% Refuse, ~15% Decomposable.	S-6	6-50/2"		
		REFUSE with gray, sandy SILT, ~70% refuse: paper, wood, plastic, aluminum, ~40% Decomposable.	S-7	20-9-7		
20		Pounding on log? No recovery.	NR	9-14-50/3"		
	SP SM	Mixed bentonite slurry and added to auger before drilling below 22.5'. Medium dense, gray, slightly silty, fine to coarse SAND, wet. **(ALLUVIUM)**	S-8	9-10-12		
25	SW SM	Very dense, olive-gray, slightly silty, fine gravelly, fine to coarse SAND, wet. With 1" layer of fine to medium SAND. **(ADVANCE OUTWASH)**	S-9	12-20-30		
		Very dense, olive-brown, clean to slightly silty, slightly fine gravelly, fine to coarse SAND, wet.	S-10A / S-10B	14-38-50/4"		
30						

Standard Penetration Resistance
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 1

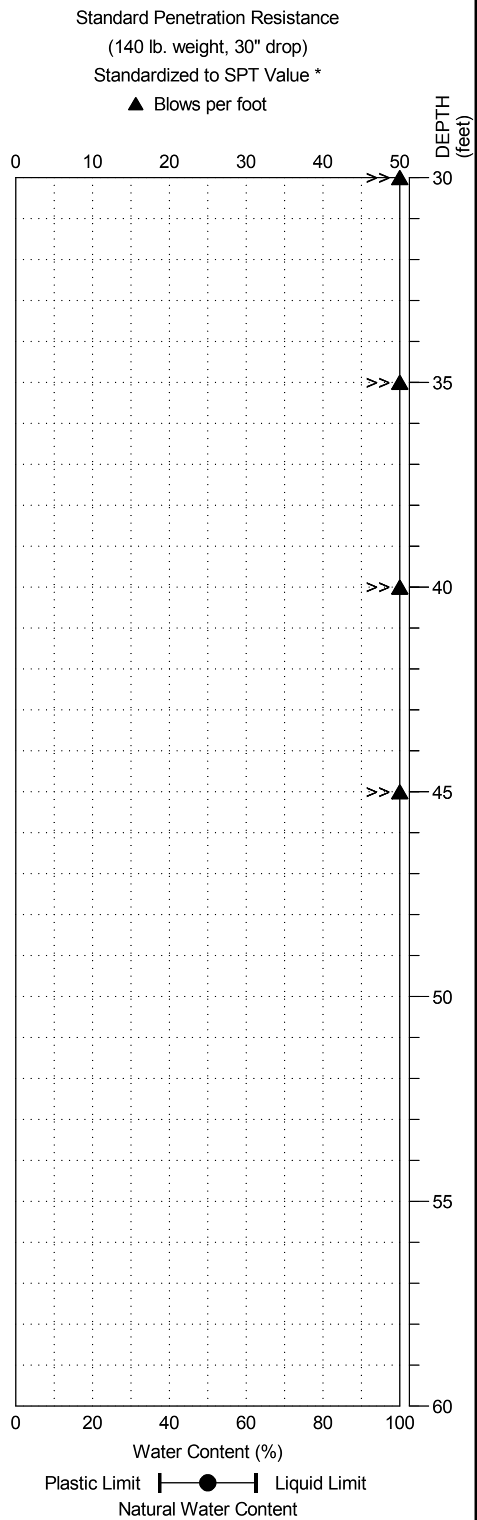
PROJECT NO.: 2015-061 FIGURE: A-2

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 37.32 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Very dense, olive-gray, slightly silty, fine gravelly, fine to coarse and fine to medium SAND, wet. Stratified: beds ~1/2" to 3" thick.	S-11	14-34-40	GS
	SP SM				
35		Very dense, olive-brown, clean to slightly silty, olive-brown with some rust-banding, fine to medium SAND, wet. Scattered coarse sand, stratified: 1/4-2" beds.	S-12	18-28-34	
40		Very dense, brown, clean to slightly silty, fine to medium SAND, wet to 41', then slightly fine gravelly, fine to coarse SAND, wet.	S-13A	14-30-39	
			S-13B		
45		Very dense, brown, clean to slightly silty, fine to medium SAND, wet. Stratified: 1/8" to 1" beds.	S-14	28-50/6"	

Borehole terminated at 46' below ground surface.
Ground water encountered at 12.5' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

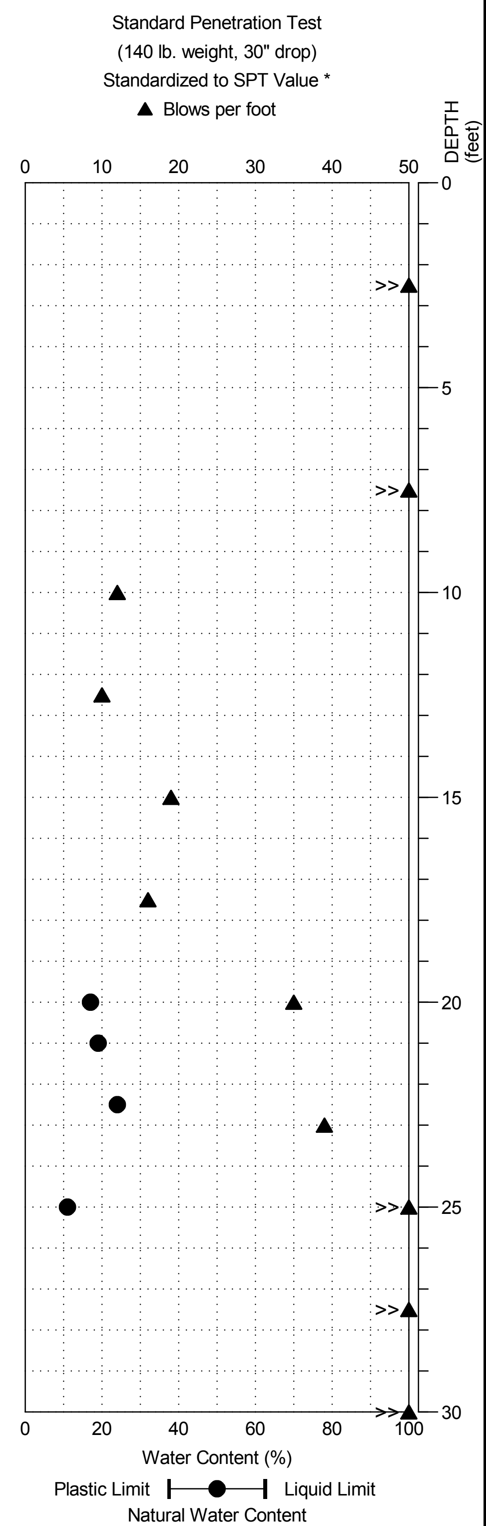
BORING:
BH- 1

PROJECT NO.: 2015-061 FIGURE: A-2

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.92 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/23/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Soil fill with weeds.				
		Very dense, brown, silty, fine SAND, moist, rootlets **(FILL)**	S-1	7-27-50/4"		
5		Very dense, black, wood fragments, with fine, sandy SILT, wet. ~75% Refuse, ~60% Decomposable. **(REFUSE)** Sampler refusal: bouncing off of Refuse (tire or wood?). Augered down to 7.5'.	NR			
		Hard, grayish-brown, fine, sandy SILT, wet. With wood fragments, paper and plastic pieces, scattered fine gravel. ~25% Refuse, ~15% Decomposable.	S-2	3-15-40		
10		Medium dense, dark grayish-brown coated, wood fragments, with small plastic piece of black liner. ~99% Refuse, ~98% Decomposable.	S-3	8-7-5		
		Little to no recovery; wood fragments in tip of sampler.	NR	28-10-6		
15		Little to no recovery; small clump of paper in sampler, metal fabric, vinyl. ~95% Refuse, <1% Decomposable.	S-4	9-6-13		
	SM	Medium dense, olive-gray, silty, fine SAND, wet, large (4"x1.5") wood fragment and paper pieces. ~10% Refuse, ~5% Decomposable.	S-5	8-13-12		
20	SM	Medium dense, olive-brown, silty, fine SAND, wet. **(ALLUVIUM)**	S-6A	6-12-23	GS	
	ML	Dense, dark, olive-gray, very silty, fine SAND, wet. Scattered fine to medium gravel. **(OUTWASH AND GLACIOLACUSTRINE)**	S-6B		GS	
	SW SM	Hard, olive-gray, with orange-mottling, SILT, moist. Scattered fine gravel.	S-7	Push	GS	∇
		Shelby tube pushed ~6".	S-8	7-19-20		
25		Dense, dark, olive-gray, slightly silty grading to clean, fine to coarse SAND, wet. **(ADVANCE OUTWASH)**	S-9	13-23-33	GS	
		Very dense, dark olive-gray, slightly silty, fine to coarse SAND, wet. Scattered fine gravel, gravelly sand in bottom 6". Driller started using QuikGel.				
	SP SM	No rings filled, bag sample only.	S-10	30-50/5"		
30		Very dense, olive-gray, slightly silty, fine to coarse SAND, wet. Scattered fine gravel.				



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 2

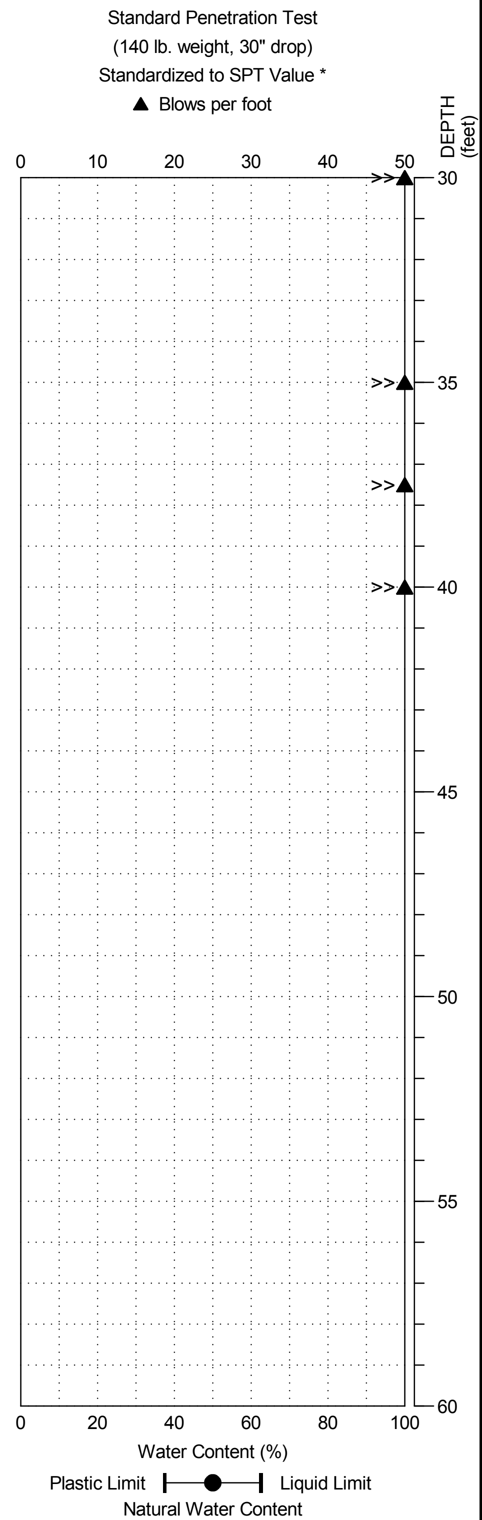
PROJECT NO.: 2015-061 FIGURE: A-3

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.92 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/23/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Very dense, olive-gray, clean to slightly silty, fine to medium SAND, wet. Scattered fine gravel.	S-11	10-19-34		
35	SP	~6" of slough (olive-gray, clean, fine to coarse SAND). Very dense, olive-gray, clean, very fine SAND, wet. Fine to medium SAND in bottom 3". **(PRE-VASHON ALLUVIUM)**	S-12	22-36-35		
	SP SM	Sample S-13A likely slough (olive-brown, slightly silty, fine to coarse SAND). Very dense, olive-brown, slightly silty, very fine SAND, wet.	S-13	32-50/6"		
40		Very dense, olive-gray, slightly silty, SAND, wet.	S-14	10-20-34		
	SM	Very dense, black, organic-stained, silty, fine to medium SAND, wet.				

Borehole terminated at 41.5' below ground surface.
Ground water encountered below 22.5' during drilling.
Borehole abandoned with ~40 gallons of bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

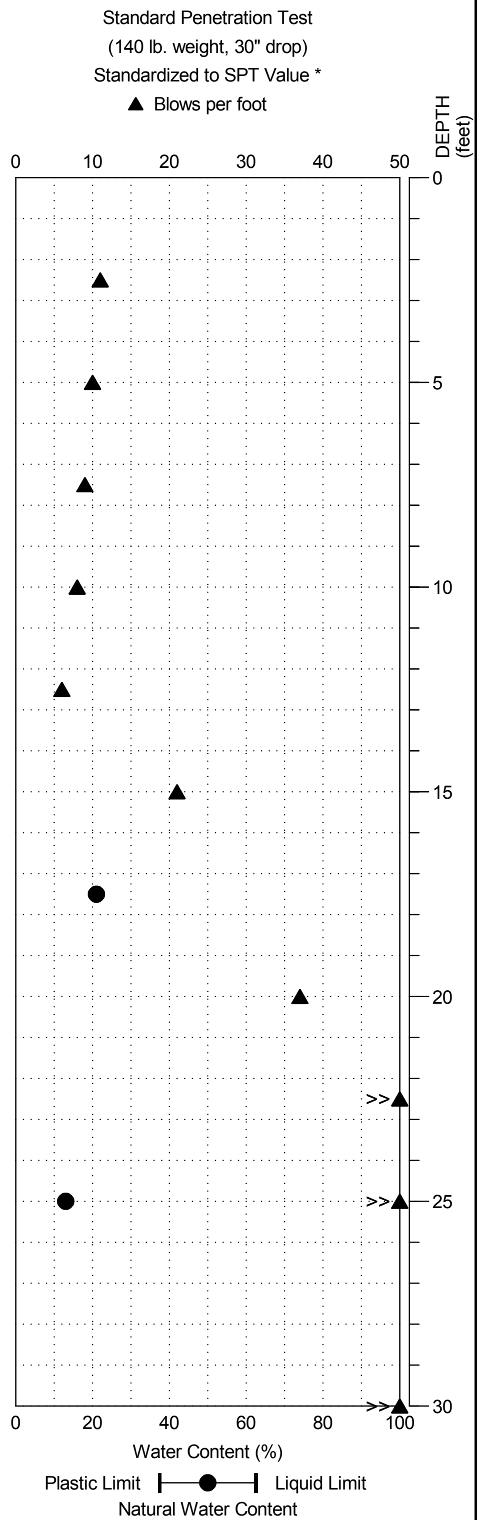
BORING:
BH- 2

PROJECT NO.: 2015-061 FIGURE: A-3

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.18 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/23/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Soil fill/cap with weeds. **(FILL)**				
		Medium dense, dark gray, silty, fine SAND, moist. Scattered fine to medium gravel, large rock, paper pieces and wood fragment in tip of sampler. ~10% Refuse, ~5% Decomposable. **(REFUSE)**	S-1	1-4-7		
5		Medium dense, dark brown, silty, fine SAND, moist, rootlets. <5% Refuse, <5% Decomposable.	S-2	3-3-7		
		Loose, dark grayish brown, WOOD fragments, with some silty, fine SAND, plastic and soft foam fiber-glass type material in the sampler tip. ~95% Refuse, ~90% Decomposable.	S-3	9-6-3		
10		Loose, dark gray, silty, fine to medium SAND, wet, with wood fragments and plastic pieces. ~55% Refuse, ~50% Decomposable.	S-4	5-4-4		
		Loose, dark gray to black, wood fragments (~80%), with some silty, fine to medium SAND, wet. With glass, plastic and rubber pieces. ~90% Refuse, ~80% Decomposable.	S-5	4-3-3		
15		Dark gray, coated wood chips and fragments in upper 6". ~95% Refuse, ~95% Decomposable.	S-6	5-8-13		▽
	SM	Medium dense, dark gray, silty, fine to medium SAND, wet. **(ALLUVIUM)**				
		12" of push and recovery with Shelby tube, bottom of Shelby tube crushed. Becomes slightly gravelly.	S-7	Push	GS	
20		Dense, olive-gray, fine to medium SAND, wet. Scattered fine gravel.	S-8	9-18-19		
	ML	Hard, olive-brown, SILT, moist, in top of ring sample.	S-9	28-50/4"		
	SW SM	Dense, dark olive-gray, clean, fine to coarse SAND, moist. In bottom of ring sample.				
25		Driller started using QuikGel. Very dense, dark olive-gray, slightly silty, fine to coarse SAND, wet, trace fine gravel. **(ADVANCE OUTWASH)**	S-10	10-24-43	GS	
30						



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HWA GEOSCIENCES INC.

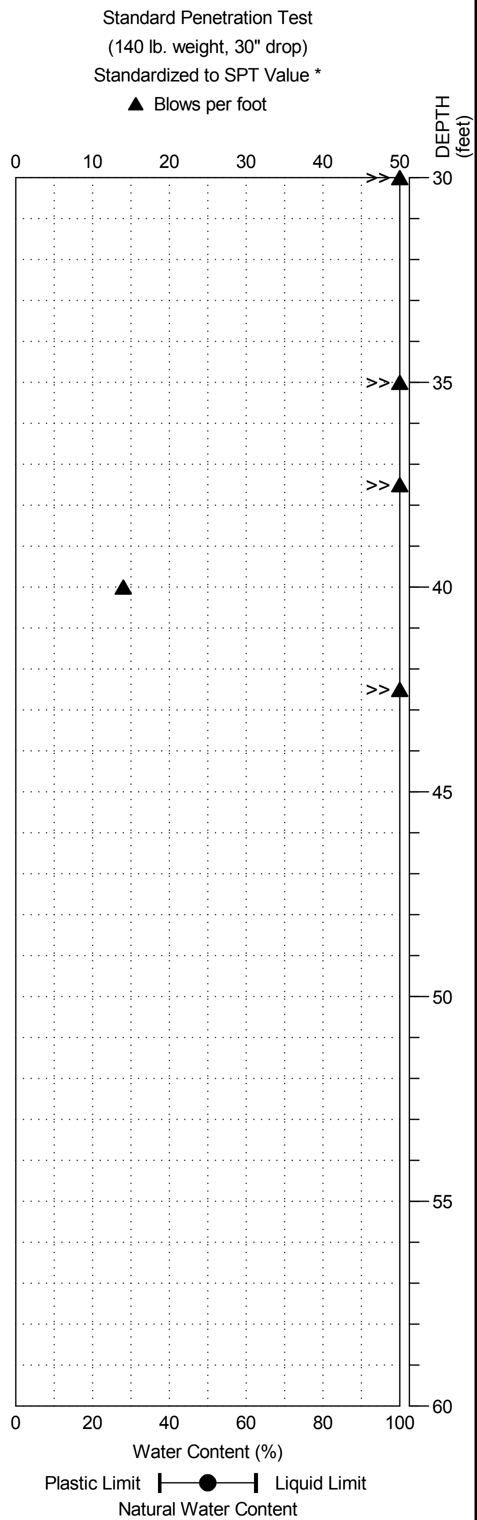
PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 3

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.18 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/23/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30			Very dense, dark olive-gray, clean, fine to medium SAND, wet, scattered fine gravel, grades to fine to coarse SAND in bottom 6".		S-11	18-30-42		
35			Very dense, dark olive-gray, clean, fine to medium SAND, wet.		S-12	19-28-34		
			Only 3 rings recovered. Very dense, dark olive-gray, slightly silty, fine to coarse SAND, wet.		S-13	50/5"		
40			Sand heave washed out. Likely not true SPT #s. Driller noted he may have flushed out too much and compromised the sample.		NR	4-6-8		
			Very dense, dark olive-gray, clean, fine to medium SAND, wet, lens of gravelly sand at 43.7-44'.		S-14	12-38-42		
45			Borehole terminated at 44' below ground surface. Ground water encountered below ~15.5' during drillng. Borehole abandoned with 45 gallons of bentonite grout.					
50								
55								
60								



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

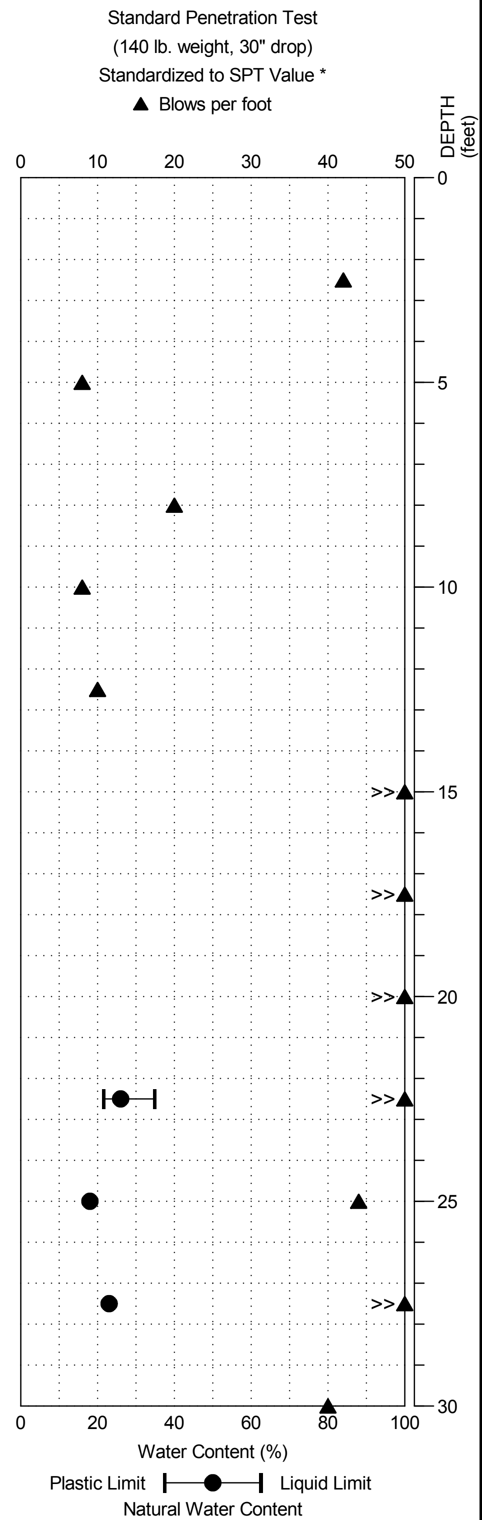
BORING:
BH- 3

PROJECT NO.: 2015-061 FIGURE: A-4

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.46 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/22/2017
DATE COMPLETED: 5/22/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Cap fill.				
		Dense, brown, silty, fine SAND, moist. Scattered fine gravel, wood fragments and rootlets, ~1% decomposable. **(FILL)**	S-1	14-24-18		
5		Loose, olive-gray to brown, silty fine SAND, moist. Pieces of glass and wood fragments in tip of sampler. ~35% Refuse, ~30% Decomposable. **(REFUSE)**	S-2	4-5-3		
		Medium dense, gray-coated brown, WOOD fragments, wet. With paper, glass and metal pieces, with some silty SAND, no recovery. ~95% Refuse, ~90% Decomposable.	S-3	8-8-12		
10		No recovery.	NR	12-6-2		
		Medium dense, gray-coated brown, wood fragments, wet. With metal, paper and glass pieces, ~95% Refuse, ~90% decomposable.	S-4	9-9-6		
15		Very dense, gray-coated brown, wood fragments, wet. With glass pieces, poor recovery. ~99% Refuse. ~95% decomposable.	S-5	50/6"		
	CL	Hard, olive-brown with rust mottling, CLAY, moist. Rust mottled areas are silty, fine to medium SAND pockets. **(PRE-VASHON ALLUVIUM)**	S-6	30-31-31		
20		Hard, brown, SILT, wet.	S-7	18-22-50/5"		
		Hard, dark olive-gray, CLAY, moist. Rust mottling in top 4".	S-8A	18-24-48	GS AL	
	SM	Very dense, olive-brown, silty fine to medium SAND, wet.	S-8B			
25		Dense, brown, slightly gravelly, silty, fine to medium to fine SAND, wet.	S-9	8-20-24	GS	∇
	ML	Hard, brown with rust mottling, SILT, moist. Plastic. Over very dense, brown, fine gravelly, silty, fine to coarse SAND, wet.	S-10A S-10B	12-50/5"	DS	
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING: BH- 4

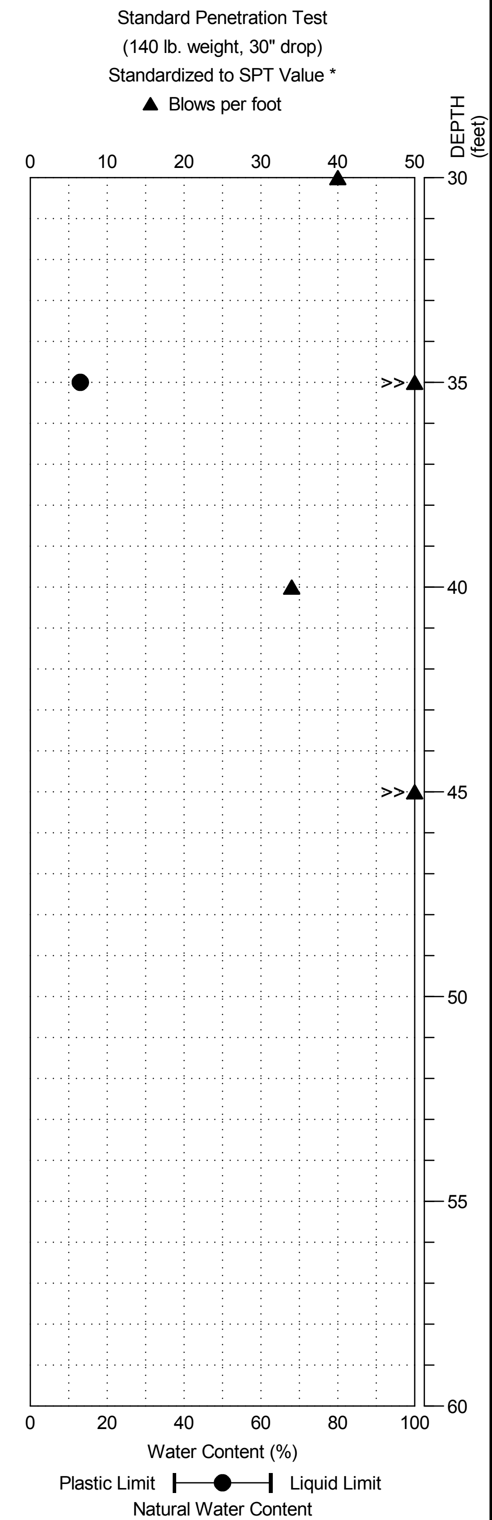
PROJECT NO.: 2015-061 FIGURE: A-5

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.46 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/22/2017
DATE COMPLETED: 5/22/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		SP	Dense, olive grayish-brown, clean, fine to medium SAND, wet. Scattered fine gravel.		S-11	10-16-24		
35			Very dense, olive gray, clean, fine to coarse SAND, wet. Scattered fine gravel.		S-12	12-28-34		
40			Dense, olive-gray, clean, fine to medium SAND, wet.		S-13	8-10-24		
45			Very dense, olive-gray, clean, fine to medium SAND, wet.		S-14	17-22-34		
50								
55								
60								

Borehole terminated at 45' below ground surface.
Ground water encountered below ~25' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

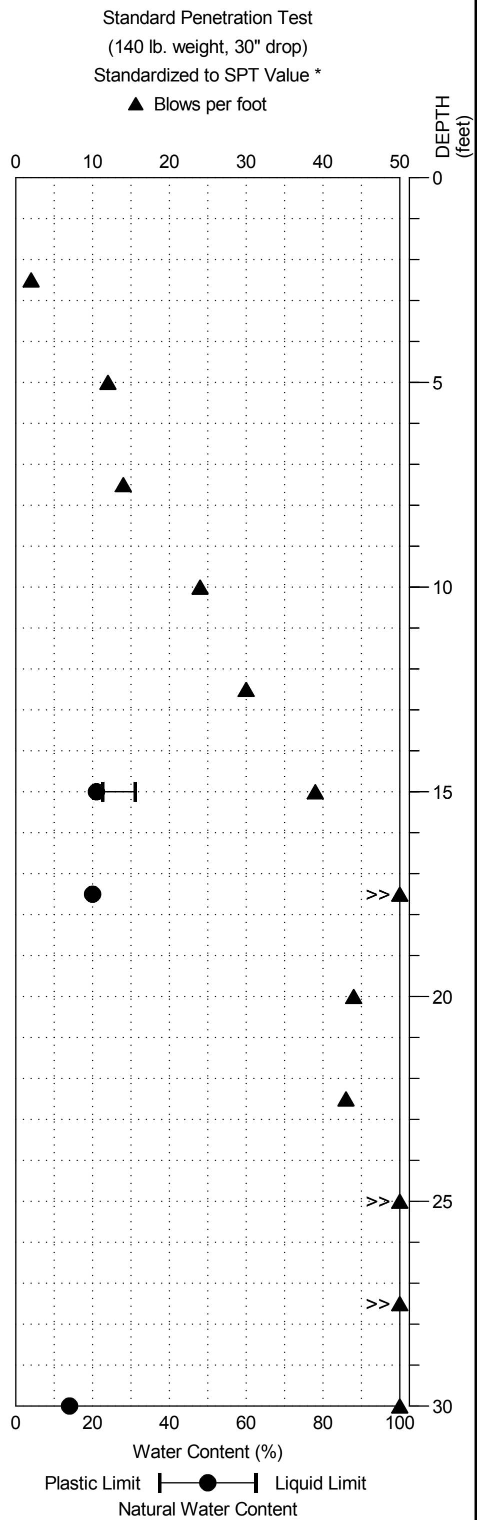
BORING:
BH- 4

PROJECT NO.: 2015-061 FIGURE: A-5

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.36 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/22/2017
DATE COMPLETED: 5/22/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		SILT, moist. Weeds.				
	ML SM	Soft, dark brown, sandy, SILT, moist. ~2" wood fragments, ~5% decomposable. **(FILL)**	S-1	3-1-1		
5	ML	Very stiff, olive-gray, SILT, moist. Non-plastic. **(ALLUVIUM)**	S-2	4-5-7		
	ML SM	Very stiff, olive-gray, fine sandy, SILT, grading to silty fine SAND, wet. Wood fragments, ~1% Decomposable.	S-3	7-6-8		
10	SM	Medium dense, olive-gray, silty, fine to coarse SAND, wet. Scattered fine gravel.	S-4A	4-8-16		
	CL	Very stiff, brown, CLAY, moist. Small lens of silty sand at 10.8'.	S-4B			
		Hard, olive-gray with orange-mottling, CLAY, moist.	S-5	5-11-19		
15		Hard, olive-brown, CLAY, moist, interbedded lenses (<1") of medium sand, trace fine gravel. Driller notes gravelly drilling at 17'.	S-6	9-19-20	AL GS	
	SM	Very dense, olive-brown, silty, fine SAND, moist. **(ADVANCE OUTWASH)**	S-7	14-24-30		
20	SP SM	Dense, olive-brown, slightly silty, fine to medium SAND, wet. 3" clean, fine to coarse sandy, gravel lens at 20.5', scattered fine gravel.	S-8	14-20-24		∇
	SP	Dense, olive-brown, clean, fine to medium SAND, wet. Grading to silty, fine to medium, gravelly, fine to coarse SAND, wet. Heaving.	S-9	6-12-31		
25		Very dense, olive-gray, clean, fine to coarse, SAND, wet (0.5'); over orange-brown, fine to coarse, sandy, fine to medium GRAVEL (0.3'), wet; over olive-brown, silty, fine to medium SAND, wet (0.7'). Driller using QuikGel at 27.5'.	S-10	28-30-42		
	SM	Very dense, brown, fine to coarse gravelly, silty, fine to coarse SAND, wet.	S-11A S-11B S-11C	18-34-50/5"	DS	
30	SP					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
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PAGE: 1 of 2

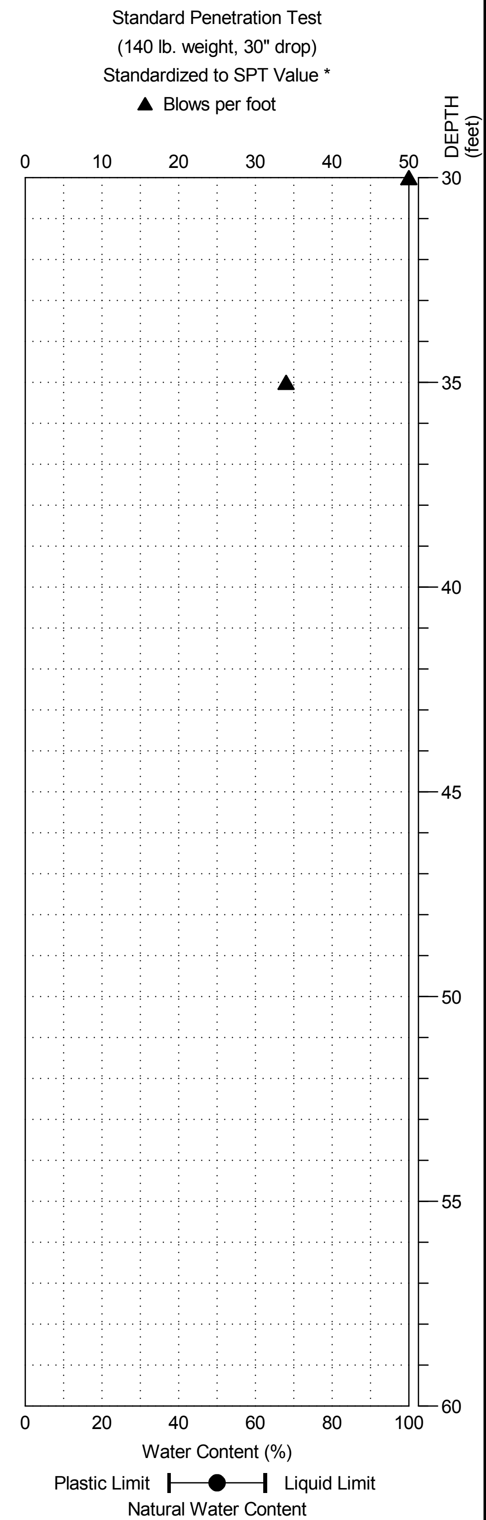
PROJECT NO.: 2015-061 FIGURE: A-6

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Diedrich D-50 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.36 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/22/2017
DATE COMPLETED: 5/22/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		SM	Very dense, olive-brown, fine gravelly, slightly silty, fine to coarse SAND, wet.		S-12	18-24-26	GS	
		SM	Dense, olive-brown, slightly silty to silty, fine to coarse to fine to medium SAND, wet. Scattered fine gravel. ~2' of heave in auger. No CA sample recovery.		S-13	7-15-19		
40			Drilled to 40', attempted 3x to remove heave from the bottom of the borehole by flushing it out with QuikGel. ~2' of heave left in borehole each time. No SPT sample taken.					

Borehole terminated at 40 feet.
Ground water encountered below ~20' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 5

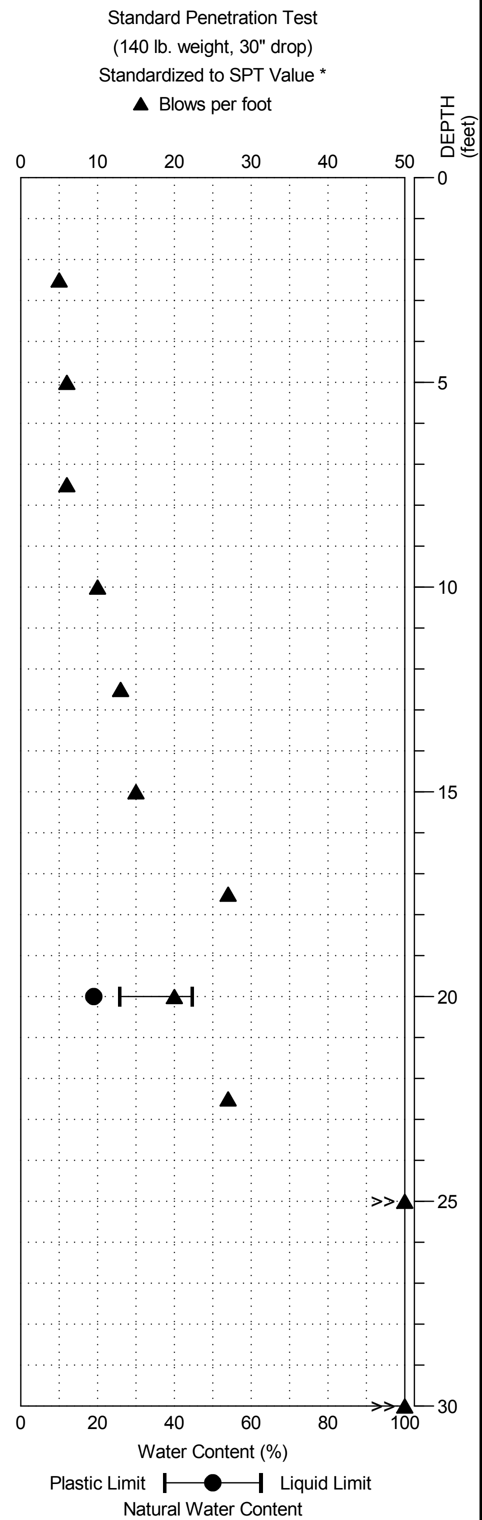
PAGE: 2 of 2

PROJECT NO.: 2015-061 FIGURE: A-6

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 34.10 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Medium dense, olive-brown, gravelly, silty SAND, moist. **(FILL)**				
		Loose, olive-brown, gravelly, silty SAND over dark, olive-gray to brown, silty SAND, moist. With Refuse (blackened): Paper, plastic, glass, wood. ~40% Refuse, ~20% Decomposable.	S-1	3-2-3		
5		Poor recovery. Loose, dark, olive-brown, silty SAND and REFUSE: Glass, plastic, ~50% Refuse, ~<5% Decomposable.	S-2	4-3-3		
		Loose, black to dark olive-brown, silty SAND, wet. With REFUSE: Plastic sheeting, wood, paper, glass, ~50% Refuse, ~30% Decomposable.	S-3	4-3-3		
10		Loose to medium dense, brownish-black, silty, sandy, REFUSE, wet. Refuse: Glass, wood, plastic sheeting, metal (aluminum), ~80% Refuse, ~20% Decomposable.	S-4	3-4-6		▽
		Medium dense, dark gray to brown, slightly fine gravelly, silty SAND, moist, with REFUSE: wood, glass, plastic, ~30% Refuse, ~10% Decomposable.	S-5	12-10-10		
15		Poor recovery. REFUSE: ~90% Refuse, ~60% Decomposable. Wood, plastic, glass, concrete.	S-6	12-11-12		
		Poor recovery: Shredded wood piece, 1/2" thick.	NR	10-11-16		
20		4" partly decomposed wood (slough).	S-7A	6-7-13	AL	
	SC	Stiff to very stiff, olive brown to gray, clayey SAND, moist. Plastic. **(ALLUVIUM)**	S-7B		GS	
	SP SM	Medium dense, olive-gray, slightly silty, fine to medium SAND, wet, trace fine gravel.	S-8	12-13-14		
25	SP SM	Very dense, gray, slightly silty, fine to medium SAND, wet. With lenses (<1/4") of silty, fine SAND. Mixed bentonite grout, maintained inside auger while drilling below 25'. **(ADVANCE OUTWASH)**	S-9	23-25-28		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 6

PAGE: 1 of 2

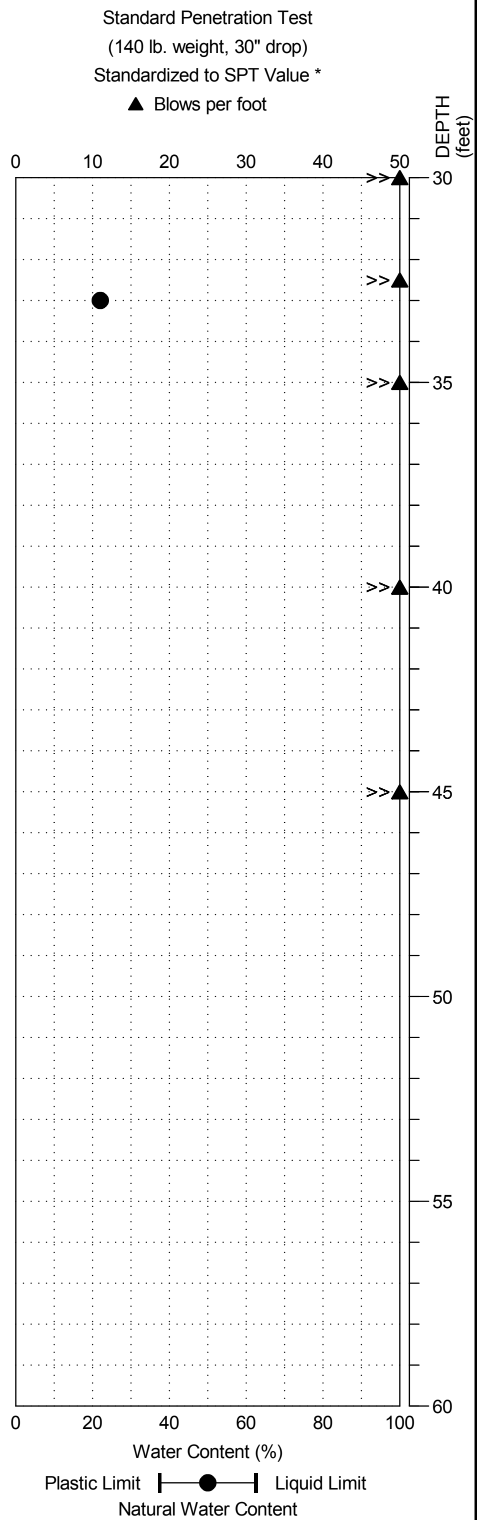
PROJECT NO.: 2015-061 FIGURE: A-7

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 34.10 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30	Very dense, bluish-gray to 30.25' then light brownish-gray to bluish-brown, slightly silty, fine to medium and fine to coarse SAND, wet. Trace fine gravel. Stratified, ~2-3" beds.	S-10	12-21-30	
	Very dense, gray, slightly silty, fine to medium SAND, wet.	S-11A S-11B	32-50/6"	GS UW DS
35	(Same)	S-12	20-22-32	
40	Very dense, gray, slightly silty, fine to medium to fine to coarse SAND, wet. Scattered fine gravel. Vaguely stratified.	S-13	20-34-38	
45	Very dense, gray, clean to slightly silty, fine to medium to fine to coarse SAND, wet. 1" lens, fine, gravelly at 46'.	S-14	20-34-36	

Borehole terminated at 46.5' below ground surface.
Ground water encountered below ~7' during drilling.
Borehole abandoned with bentonite grout, chips in upper 2'.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

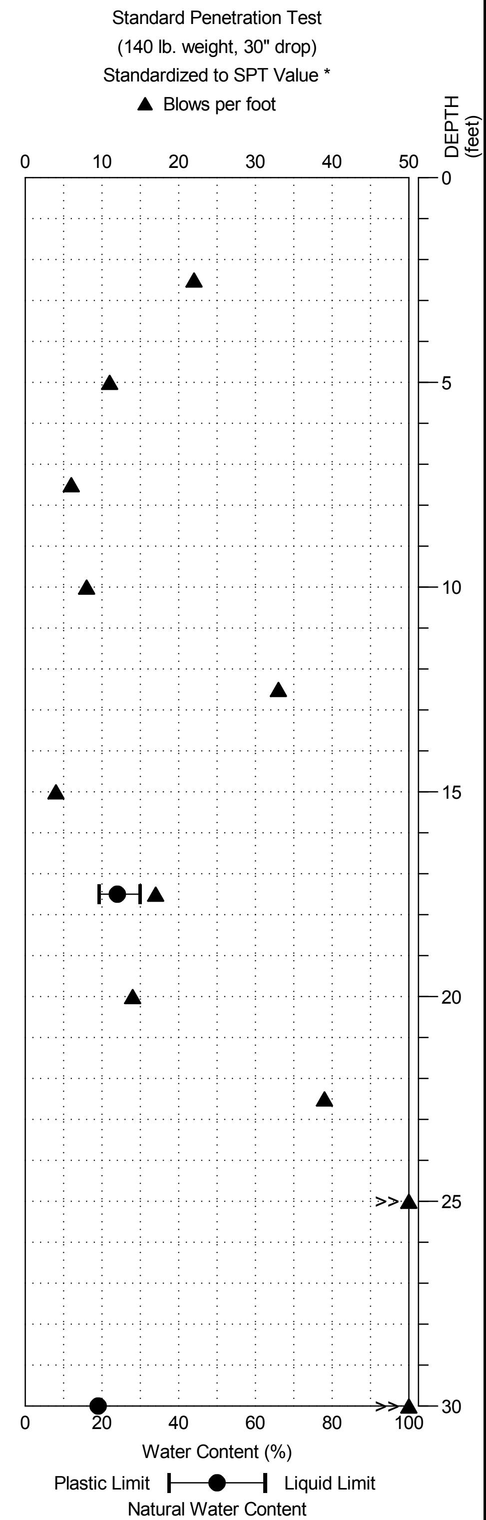
BORING:
BH- 6

PROJECT NO.: 2015-061 FIGURE: A-7

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.85 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	1.5' of silty SAND soil cover. **(FILL)**				
		Thin cuttings become dark gray with Refuse. Medium dense, brown to olive-gray, gravelly, silty SAND, moist. Trace asphalt, <5% Refuse, 0% Decomposable.	S-1	6-9-13		
5		Medium dense, olive-gray, gravelly, silty SAND, moist, with paper. ~15% Refuse, ~15% Decomposable. **(REFUSE)**	S-2	4-5-6		
						∇
		No recovery.	NR	3-3-3		
10		Poor recovery. REFUSE with silty sand: Black foam rubber, paper, aluminum can fragments. ~80% Refuse, ~30% Decomposable.	S-3	3-3-5		
		Brown, angular rock (stuck in tip). Poor recovery. REFUSE: Paper, aluminum can piece; brown, silty SAND, wet, ~70% Refuse, ~30% Decomposable.	S-4	27-32-19		
15		Loose, black, silty, sandy, REFUSE, wet. Refuse = blackened wood, aluminum, 50% Refuse, 50% Decomposable, slight creosote sheen.	S-5	2-2-2		
	ML	Stiff, bluish-gray, SILT in tip.				
	CL	Stiff, olive-gray, slightly sandy CLAY, moist. Becomes brown below ~18 ft. Black slurry coating, no odor. **(ALLUVIUM)**	S-6	7-8-9	AL	
20	SM	Medium dense, olive-gray to brown, silty, fine to coarse and fine to medium, SAND, wet.	S-7	3-5-9		
	SP	Dense, gray, clean, slightly fine gravelly, fine to coarse, fine to medium, SAND, wet. Slightly silty below ~23.5'. **(ADVANCE OUTWASH)**	S-8	3-12-27		
25	SP SM	Very dense, olive-gray to gray, with 1" olive-brown, slightly silty, fine to coarse, SAND, wet. With scattered gravel, to 26'. Below 26': Gray, slightly silty, fine to medium SAND, wet. Rust-banded brown is silty, fine to medium SAND.	S-9	12-25-26		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 7

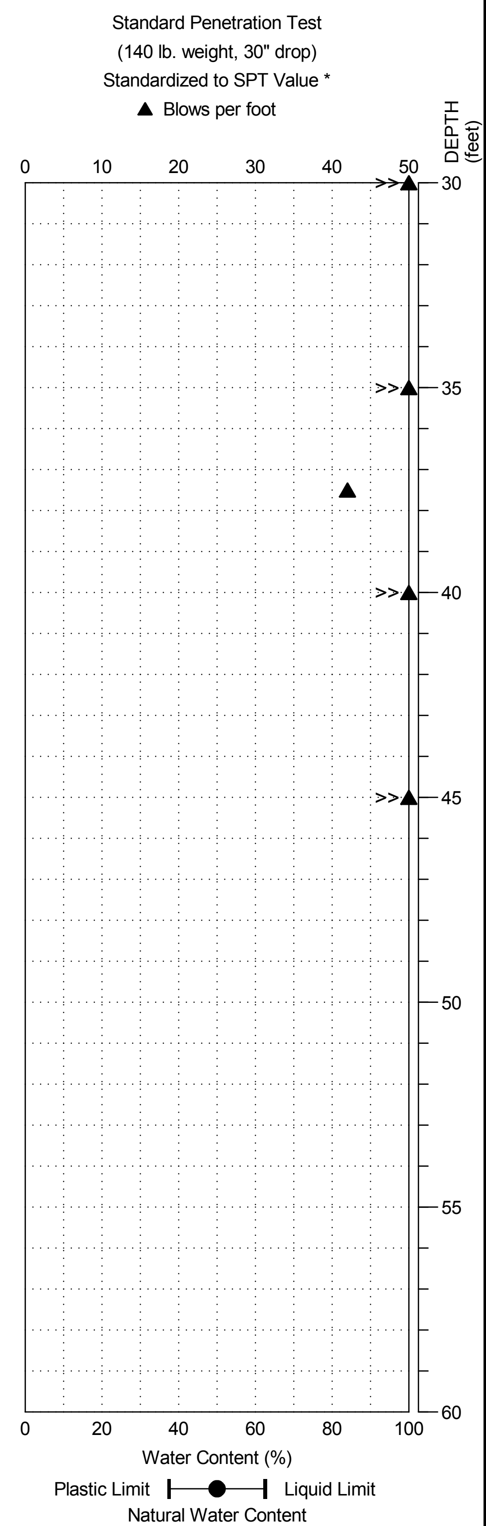
PROJECT NO.: 2015-061 FIGURE: A-8

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.85 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30			Very dense, bluish-gray over rust-banded brown (3" each) then olive-brown, slightly silty, fine to medium to fine to coarse SAND, wet. Rust-banded brown is silty, fine to medium SAND.		S-10	12-28-35		
35			Very dense, olive-gray, with some rust-banding, slightly silty, fine to medium SAND, wet. Fine to coarse below 36'.		S-11	18-36-39		
			Very dense, olive-gray, clean to slightly silty, fine to medium SAND, wet. Trace fine gravel in tip.		S-12A	20-29-35		
					S-21B			
40			Very dense, olive-gray, slightly silty, stratified, slightly fine gravelly, fine to medium SAND, wet. Beds ~1-3" thick.		S-13	18-36-39		
45			Very dense, gray, clean to slightly silty, fine to medium SAND, wet.		S-14	21-32-37		

Borehole terminated at 46.5' below ground surface.
Ground water encountered below ~7' during drilling.
Borehole abandoned with bentonite grout, 2 batches x 40-45 gallons.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

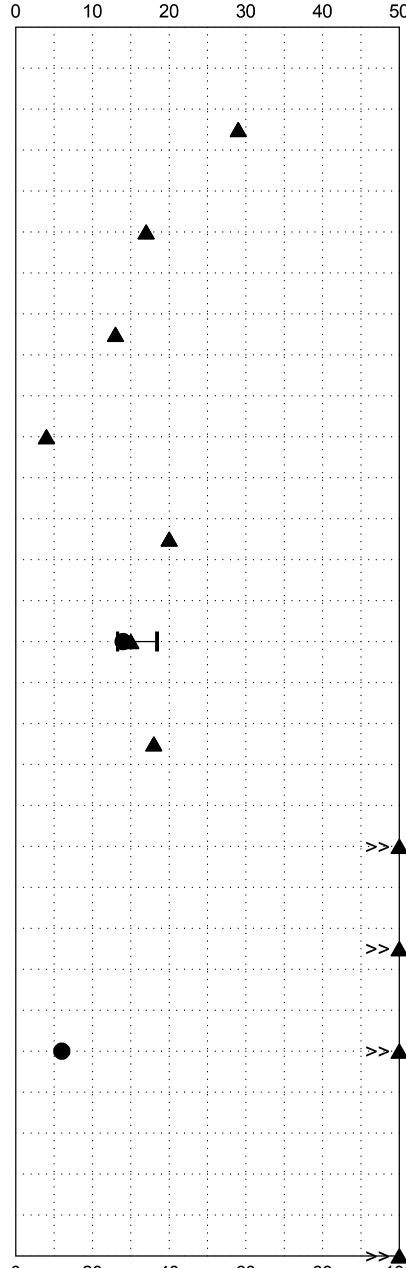
BORING:
BH- 7

PROJECT NO.: 2015-061 FIGURE: A-8

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.49 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	6" of soil cover (brown, gravelly, silty SAND).				
		Cuttings: Blackish-gray, silty SAND.	S-1	3-2-27		
		Loose to medium dense, grayish-black, silty SAND, moist. Scattered glass. ~10% Refuse, 5% decomposable. **(FILL AND REFUSE)**				
5		No recovery (just 1" carry-down of "sod"); medium dense.	NR	3-7-10		
		Medium dense, brownish-black, silty SAND, moist. Scattered glass and burnt wood, 1 fine wire. ~15% Refuse, ~5% decomposable.	S-2	6-7-6		
10	OH	Soft, blackish-brown, organic, sandy SILT, moist to wet, poor recovery. **(ALLUVIUM)**	S-3	2-2-2		
	ML	Very stiff, light brownish-gray to light olive-brown and gray, SILT, moist. Plastic and nonplastic.	S-4	4-8-12		
15		Stiff, olive-gray, SILT, moist. Plastic and nonplastic.	S-5	6-7-8	AL GS	∇
	ML SM	Medium dense, light olive-brown, sandy SILT, moist.	S-6	7-7-11		
20	SM	Olive-gray, silty SAND at tip. **(ADVANCE OUTWASH)** Very dense, olive-gray, slightly silty, fine to medium SAND, wet. with broken piece of gravel (one rock) at ~21', then silty, fine to medium SAND. Mixed bentonite slurry, and maintained in auger while drilling below 20'.	S-7	7-20-32		
	GM	Very dense, olive-gray, silty, sandy, fine to coarse GRAVEL, wet. Broken coarse gravel. Becomes brown at ~23.25'.	S-8	26-29-22		
25	SM	Very dense, olive-gray, and olive-brown, gravelly, silty, fine to coarse SAND, moist, over silty, fine to medium SAND, moist. Hard drilling below 27'.	S-9	13-22-32	GS	
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 8

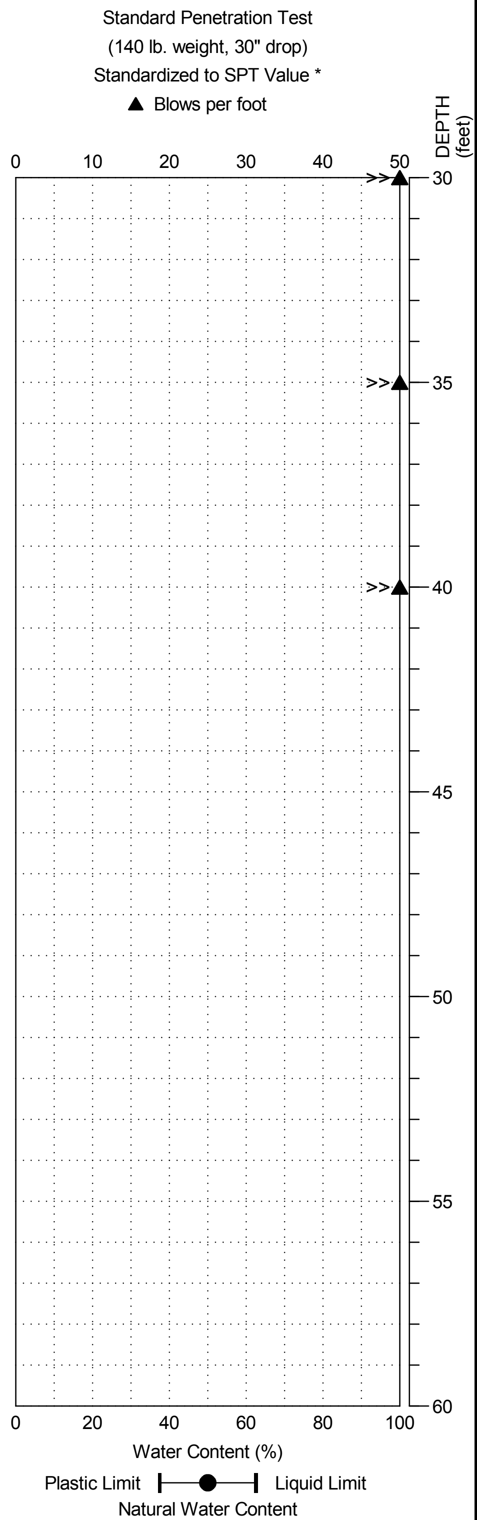
PROJECT NO.: 2015-061 FIGURE: A-9

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.49 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Poor recovery. Very dense, light-brown, gravelly, silty, fine to medium SAND, wet.	S-10	50/5"		
35		Drove rock with SPT. Switched to California Sampler. Hammer bouncing on rock. No recovery.	NR	50/1"		
		Drilled out large rock.				
40	SP SM	Very dense, olive-brown, with fine rust banding, clean to slightly silty, fine to medium to fine to coarse SAND, wet. Trace fine gravel. Stratified; lies from ~1-3" thick.	S-11	7-12-40		

Borehole terminated at 41.5' below ground surface.
Ground water encountered at ~17' during drilling.
Borehole abandoned with bentonite slurry; 80-90 gallons total including slurry in auger during drilling.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

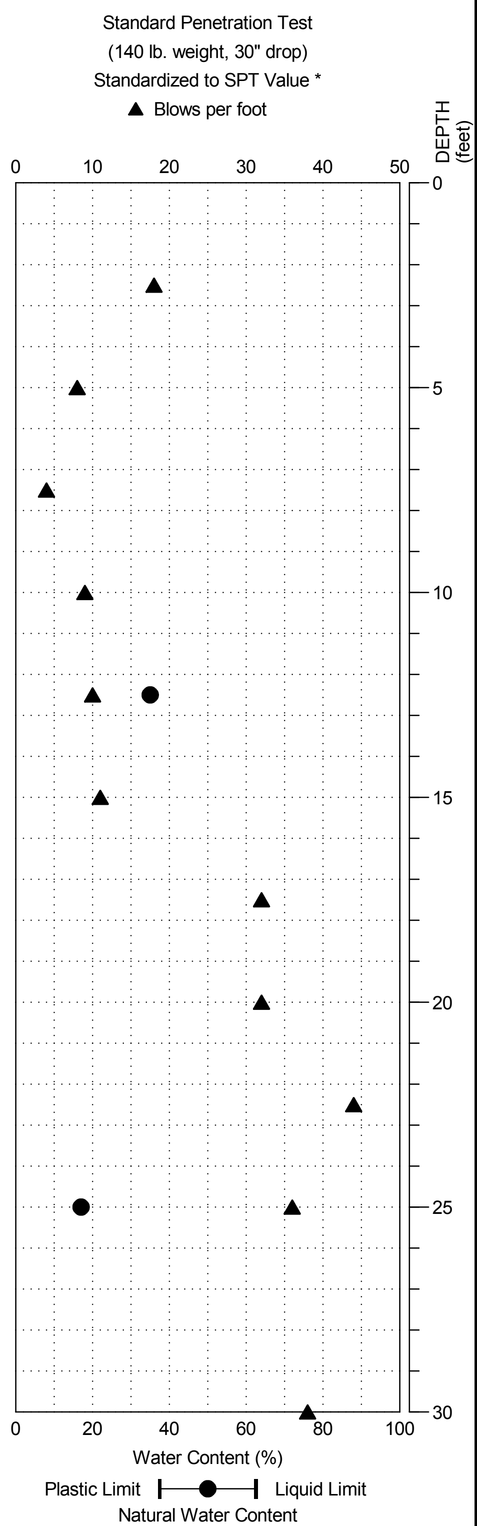
BORING:
BH- 8

PROJECT NO.: 2015-061 FIGURE: A-9

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.63 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Cement-treated surface soil.				
		Medium dense, olive-brown, slightly gravelly, silty SAND, moist **(FILL)**	S-1	8-8-10		
5		Medium dense, blackish-brown, slightly gravelly, sandy SILT, moist, with wood, glass. ~30% Refuse, ~10% decomposable. **(REFUSE)**	S-2	4-4-4		
		Loose, brownish-black, slightly gravelly, sandy SILT, moist. With newspaper and glass. ~20% Refuse, ~10% decomposable.	S-3A	3-1-3		
	ML SM	Soft, light olive-brown, sandy SILT, wet. Scattered, partly decomposed wood **(ALLUVIUM)**	S-3B			
10	CL	Stiff, rust-mottled, olive-brown and bluish-gray, CLAY, moist.	S-4	3-4-5		
		Harder drilling at 12'.				
		Stiff, yellow-brown, CLAY, moist.	S-5	3-5-5		
15		Stiff, yellow-brown, CLAY, moist, with brown sand partings. Adding bentonite slurry to auger when drilling below 15'.	S-6	4-5-6		
	ML	Hard, yellow-brown, SILT (nonplastic), moist. With sand partings. **(OUTWASH AND GLACIOLACUSTRINE)**	S-7A	8-12-20		
	GM	Sandy, silty, GRAVEL at 18.5-19'.	S-7B			
20	ML	Hard, rust-banded, light olive-brown, slightly sandy, slightly fine gravelly SILT, moist. Sample fractured in twisting pattern.	S-8	5-11-21		
			S-9	10-21-23		∇
	SM	Dense, olive-brown, slightly gravelly, silty, fine to coarse SAND, wet.				
25	SP SM	Dense, brown, slightly silty, fine to coarse SAND, wet. Scattered fine gravel. Dense, brown, slightly silty to silty, fine to medium SAND, wet.	S-10	5-16-20		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

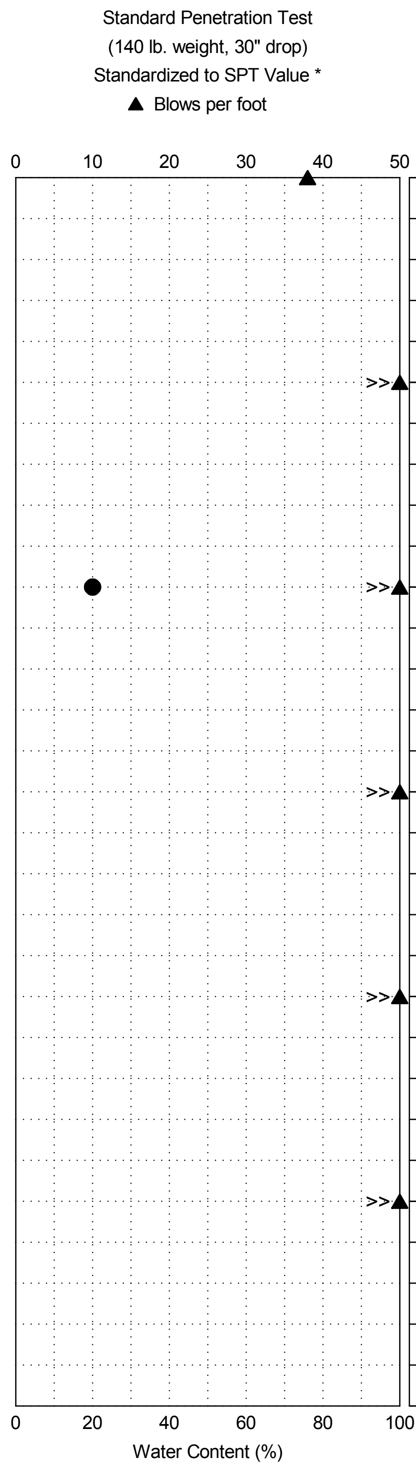
BORING:
BH- 9

PROJECT NO.: 2015-061 FIGURE: A-10

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.63 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30	ML	Hard, rust-mottled, light brown, SILT, moist.	S-11	10-16-22		
	SP SM	Dense, rust-mottled, olive-brown, slightly silty, fine to medium SAND, wet. With nonplastic SILT lenses at 31-31.3'.				
	ML	Hard, rust-mottled, olive-brown, SILT, moist, grading to fine sandy SILT, moist.	S-12A			
	SP SM	Dense, brown, slightly silty, fine and fine to medium SAND, wet, grading to gray, clean, fine to medium SAND, wet.	S-12B			
35	SP	Very dense, olive-brown, clean, fine to medium SAND, wet. **(ADVANCE OUTWASH)**	S-13	11-30-35		
40		Very dense, olive-brown, clean, fine to medium SAND, wet.	S-14	24-35-44		
45		Very dense, olive-brown, clean, fine to medium and fine to coarse (lower 3") SAND, wet.	S-15	20-50/6"		
50		Very dense, dark olive-brown, clean, fine to medium SAND, wet.	S-16	36-50/6"		
	SP SM	Very dense, dark olive-gray, slightly silty, fine to medium SAND, wet.				
55		Very dense, olive-brown, with yellow-brown, clean, fine to coarse SAND, wet.	S-17	38-50/6"		
		Borehole terminated at 56' below ground surface. Ground water encountered below 23' during drilling. Borehole abandoned with bentonite grout.				
60						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH- 9

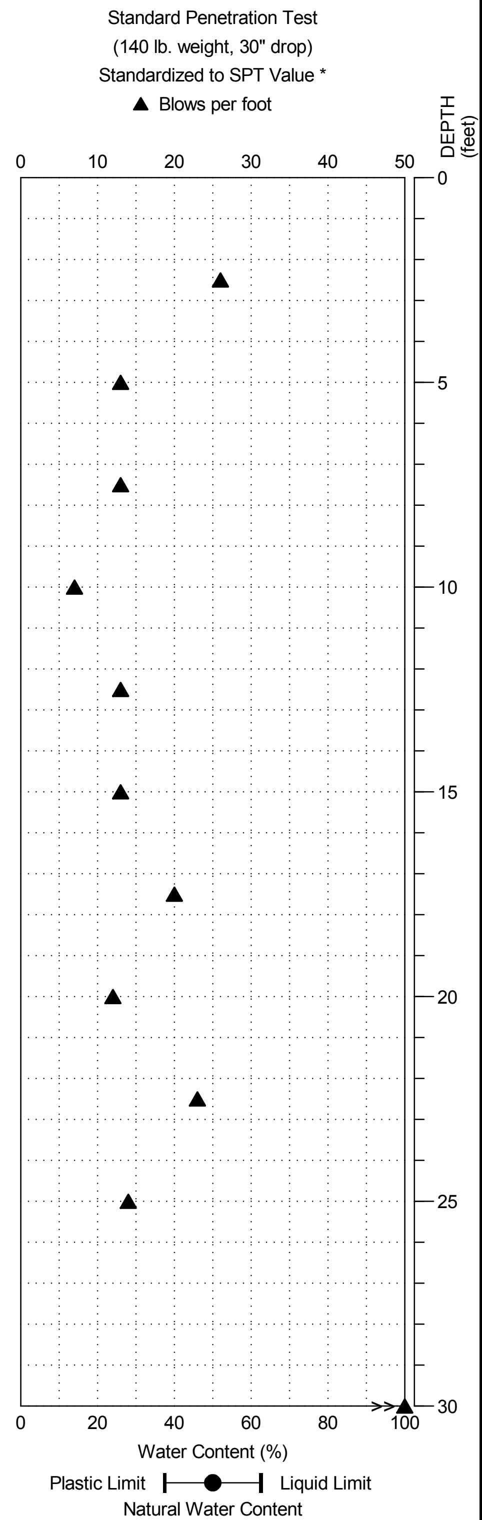
PAGE: 2 of 2

PROJECT NO.: 2015-061 FIGURE: A-10

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 36.25 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Cement-treated soil.				
		Medium dense, olive-brown, gray and bluish-gray, sandy SILT, moist. 1 piece of plastic sheeting. **(FILL)**	S-1	8-12-14		
		Brownish-black, silty SAND with REFUSE, moist. ~30% Refuse (plastic, burnt wood), ~10% Decomposable. **(REFUSE)**				
5		Medium dense, grayish-brown, silty SAND, moist, and REFUSE (plastic sheeting, fabric, glass). ~40% Refuse, ~10% Decomposable.	S-2	20-7-6		
		Medium dense, REFUSE, with olive-brown, silty SAND, moist. paper (1" thick), plastic, fabric, glass, wood, aluminum sheeting. ~80% Refuse, ~50% Decomposable.	S-3	3-4-9		
10		Poor recovery.	S-4	5-3-4		
		Medium dense, REFUSE: Paper, plastic, glass, fabric. Trace silty SAND, ~95% Refuse, ~40-45% Decomposable.	S-5	10-7-6		
15		Poor recovery; drove wood. ~90% REFUSE: Wood, glass, plastic. ~10% dark brown, sandy SILT, moist. ~70% Decomposable.	S-6	9-6-7		
		Medium dense, REFUSE with brown and gray-brown soil (sandy SILT), ~95% Refuse (wood, plastic, glass, metal), ~40% Decomposable. Gray, silty SAND at tip (<1/2" thick).	S-7	6-10-20		
20		Medium dense, olive-brown and grayish dark brown, slightly gravelly, silty SAND, moist, with wood and burnt wood. ~25% Refuse, ~25% Decomposable. Black-coated (wet), REFUSE: Paper, plastic, glass. ~100% Refuse, ~30% Decomposable.	S-8	3-4-8		∇
		Medium dense, black grading to dark brown, burnt wood in sandy SILT grading to silty SAND, moist, wood in lower 4". ~40% Refuse, ~40% Decomposable.	S-9	7-10-13		
25		Medium dense, black and dark brownish gray, blackened wood, sandy SILT, metal, wood fragments, wet. ~80% refuse, ~70% Decomposable.	S-10	5-6-8		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-10

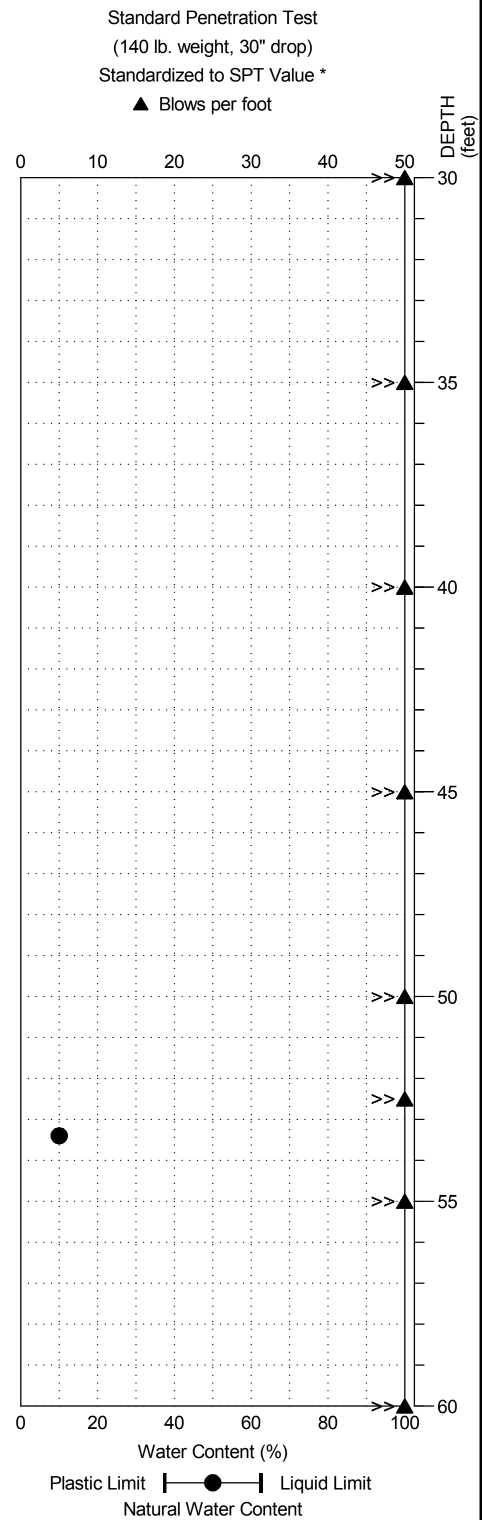
PAGE: 1 of 3

PROJECT NO.: 2015-061 FIGURE: A-11

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 36.25 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		WOOD, wet. Partly decomposed in top 4".	S-11	14-23-46	
35		Medium dense, REFUSE: Wood, plastic, fabric. ~95% Refuse, ~50% Decomposable.	S-12	14-36-20	
	SM				
40		Very dense, yellow-brown and light yellow-brown, silty, fine to medium SAND, wet. **(ADVANCE OUTWASH)**	S-13	10-26-46	
45		4" hard, rust-banded, brown, SILT (Plastic), moist. Very dense, brown with a rust band, slightly silty, fine to medium SAND, moist. Silty, fine to medium SAND below 46.25'.	S-14	10-23-32	
	SP SM	Wood pushed into upper portion. Very dense, yellow-brown, clean to slightly silty, slightly fine gravelly and coarse sandy, fine to medium SAND, moist to wet.			
50		Very dense, yellow-brown, slightly silty, slightly fine to medium and fine to coarse SAND, wet.	S-16	26-31-34	
			S-15A	14-36-50/5"	
			S-15B		UW DS
55		Very dense, dark gray, slightly silty, fine to medium SAND, wet, with fine lenses, with coarse SAND, finely stratified.	S-17	21-32-38	
60					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-10

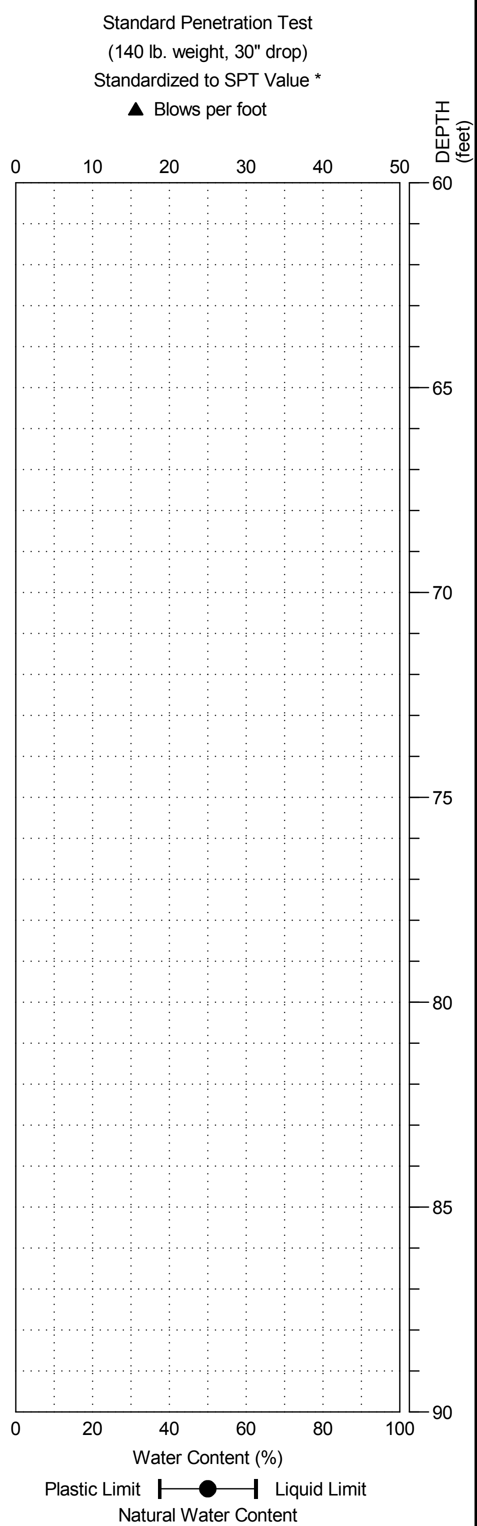
PROJECT NO.: 2015-061 FIGURE: A-11

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 36.25 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: B. Thurber

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60			Very dense, dark gray, slightly silty, fine to medium SAND, wet, fine to coarse below 61.2', stratified: 1-4" beds.		S-18	21-42-46		

Borehole terminated at 61.5' below ground surface.
Ground water encountered at 20' below during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

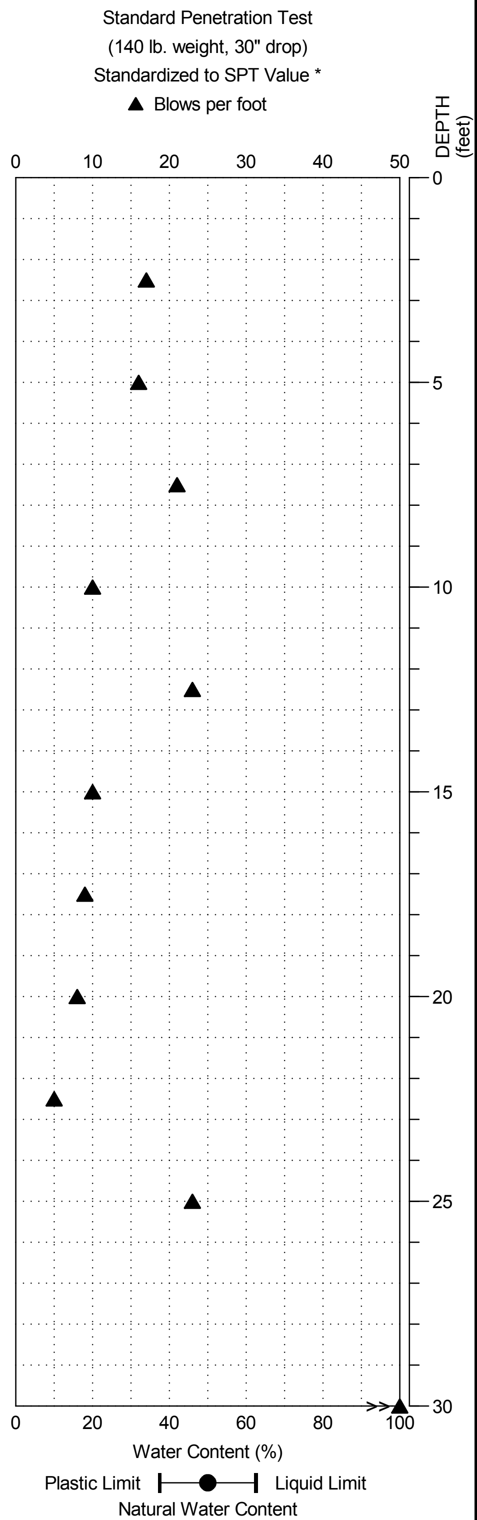
PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-10

PROJECT NO.: 2015-061 FIGURE: A-11

DRILLING COMPANY: Holocene Drilling	LOCATION: See Figure 2
DRILLING METHOD: CME 850 Tracked Rig, HSA	DATE STARTED: 5/31/2017
SAMPLING METHOD: SPT with Autohammer	DATE COMPLETED: 5/31/2017
SURFACE ELEVATION: 35.49 ± feet	LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Cement-treated soil.				
		Medium dense, olive-brown grading to gray and to dark grayish-brown, slightly gravelly, silty SAND, moist. **(FILL)**	S-1	3-7-10		
5		Medium dense, dark grayish-brown, gravelly, silty SAND, moist. With Refuse: Plastic sheeting, glass, wood. ~20% Refuse, ~10% Decomposable. **(REFUSE)**	S-2	6-6-10		
		Medium dense, dark grayish-brown, sandy SILT, moist, with Refuse: Wood, rubber, plastic. ~20% Refuse, ~10%, Decomposable.	S-3	8-16-5		
10		REFUSE with dark brown, sandy SILT, moist, wood, paper, plastic, glass, ~90% Refuse, ~25% Decomposable.	S-4	8-6-4		
		Medium dense, REFUSE: Wood, plastic, glass, ~90% Refuse, ~50% Decomposable.	S-5	6-10-13		
15		Medium dense, REFUSE with dark brown sandy SILT: Wood, plastic, glass, metal. ~80% Refuse, ~40% Decomposable.	S-6	4-5-5		
		REFUSE with black, sandy SILT, moist: Wood, paper, plastic. ~70% Refuse, ~40% Decomposable.	S-7	5-4-5		
20		Poor recovery: drove wood. REFUSE with dark brown, sandy SILT, moist: Wood, papper, glass, plastic. ~90% Refuse, ~70% Decomposable.	S-8	5-4-4		▽
		Soft, brownish-black, partly decomposed WOOD and burnt wood, strong odor (rotten eggs). Hydrogen sulfide lit off meter	S-9	4-3-2		
	ML	when pounding 22.5' sample; rotten egg odor. ~80% Refuse, ~80% Decomposable.				
25	PT	Soft, olive-gray, SILT with partly decomposed wood, moist. **(ALLUVIUM)**	S-10	7-10-13		
		Drove wood, stuck in tip. 8" of good recovery: Soft, dark brown, woody PEAT, moist.				
	SM					
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-11

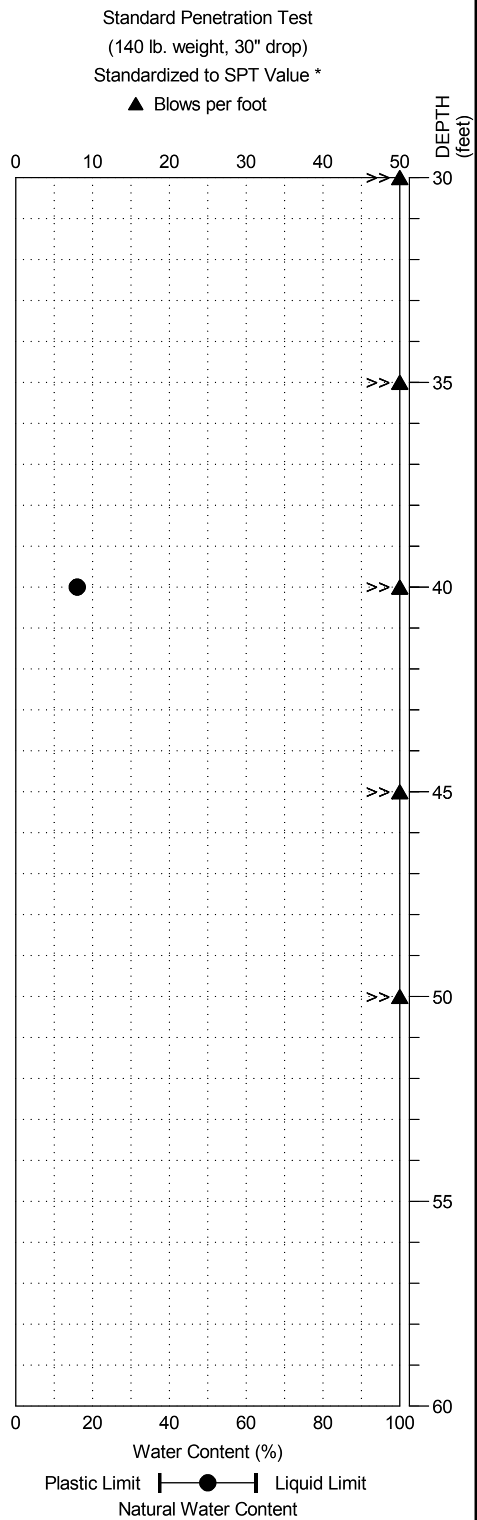
PROJECT NO.: 2015-061 FIGURE: A-12

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.49 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Very dense, yellow-brown with rust-banding grading to olive-brown, slightly silty to silty, slightly fine gravelly, fine to medium and fine to coarse SAND, wet. Mixed bentonite slurry and put inside auger before drilling below 30'. **(ADVANCE OUTWASH)**	S-11	12-25-27	
35	SP SM	Very dense, yellow-brown, slightly silty grading to clean, fine to medium SAND, wet. Lens of fine gravel at 36.5'.	S-12	10-24-29	
40		Very dense, yellow-brown, slightly gravelly, silty grading to clean, fine to medium SAND, wet.	S-13	18-24-30	GS
	SP	Rust-banded, yellow-brown, clean, fine to medium SAND grading to silty, fine SAND, wet.			
45	SP SM	Very dense, light olive-brown, clean to slightly slity, fine to coarse SAND, wet. Scattered fine gravel, </= 1/4".	S-14	22-30-34	
50	SM	Very dense, reddish-brown, silty, fine SAND, wet, grading to dark, yellow-brown, slightly silty, fine to medium SAND, wet. Olive-brown at lower 2". Lens with fine gravel at 50.9'.	S-15	18-25-48	

Borehole terminated at 51.5' below ground surface.
Ground water encountered below 20' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

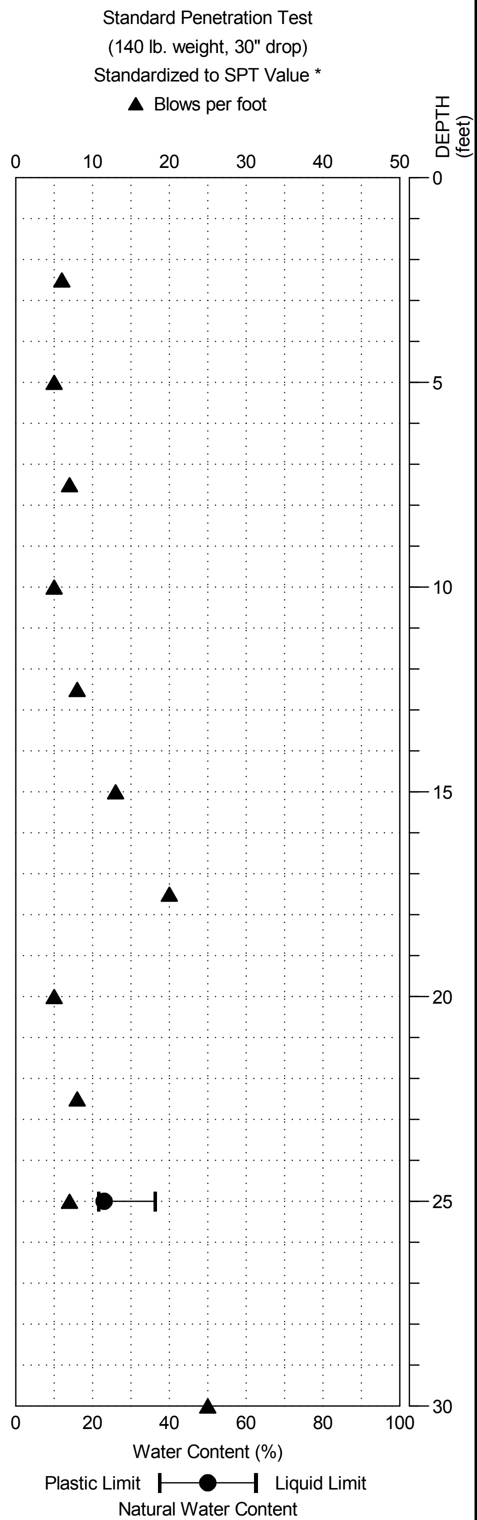
BORING:
BH-11

PROJECT NO.: 2015-061 FIGURE: A-12

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.96 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/2/2017
DATE COMPLETED: 6/2/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Silty SAND with grass. **(FILL)**				
		Loose, grayish-brown, silty, fine to medium SAND, moist. Plastic bag, cloth, aluminum can pieces, scattered fine gravel. ~25% Refuse, <5% Decomposable. **(REFUSE)**	S-1	2-4-2		
5		Loose, dark brown, silty, fine to medium SAND, moist. Decomposed paper, glass, plastic bag pieces, ~10% Refuse, <5% Decomposable.	S-2	4-3-2		
		Loose, dark gray, silty, fine to medium SAND, moist. Decomposed paper, glass, plastic bag pieces, ~40% Refuse, <10% Decomposable.	S-3	2-3-4		
10		Loose, dark brown to black, silty, fine to medium SAND, wet. Large plastic trash bag piece, glass and decomposed paper, scattered fine gravel. ~40% Refuse, ~10% Decomposable.	S-4	2-2-3		
		Loose, dark brown, silty, fine to medium SAND, wet. Plastic bag, rubber and decomposed paper pieces, trace rootlets. ~30% Refuse, ~10% Decomposable.	S-5	4-4-4		
15		Very soft, dark brown, fine to medium, sandy SILT, moist. Decomposed paper, hard plastic, metal pieces, wood fragments. ~50-60% Refuse, ~10% Decomposable.	S-6	5-6-7		
		Medium dense, dark brown to black, silty, fine SAND, moist. Wood fragments, plastic bag pieces. ~35% Refuse, ~30% decomposable.	S-7	11-9-11		
20		Loose, black, burnt WOOD fragments, wet. Some silty, fine SAND. ~95% Refuse, ~90% Decomposable.	S-8	7-3-2		∇
		Loose, dark brown to black, silty, fine SAND, wet. 6" layer of partially decomposed wood, burnt wood pieces throughout, scattered fine gravel. ~95% Refuse, ~90% Decomposable.	S-9	1-1-7		
25	CL	Stiff, dark brown grading to light brown, fine sandy, CLAY, moist. Scattered fine gravel, black organics, wood chips. **(ALLUVIUM)**	S-10	4-4-3	AL	
	CL ML	Stiff, light orange-brown, silty CLAY, moist. Plastic, laminated.				
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-12

PAGE: 1 of 2

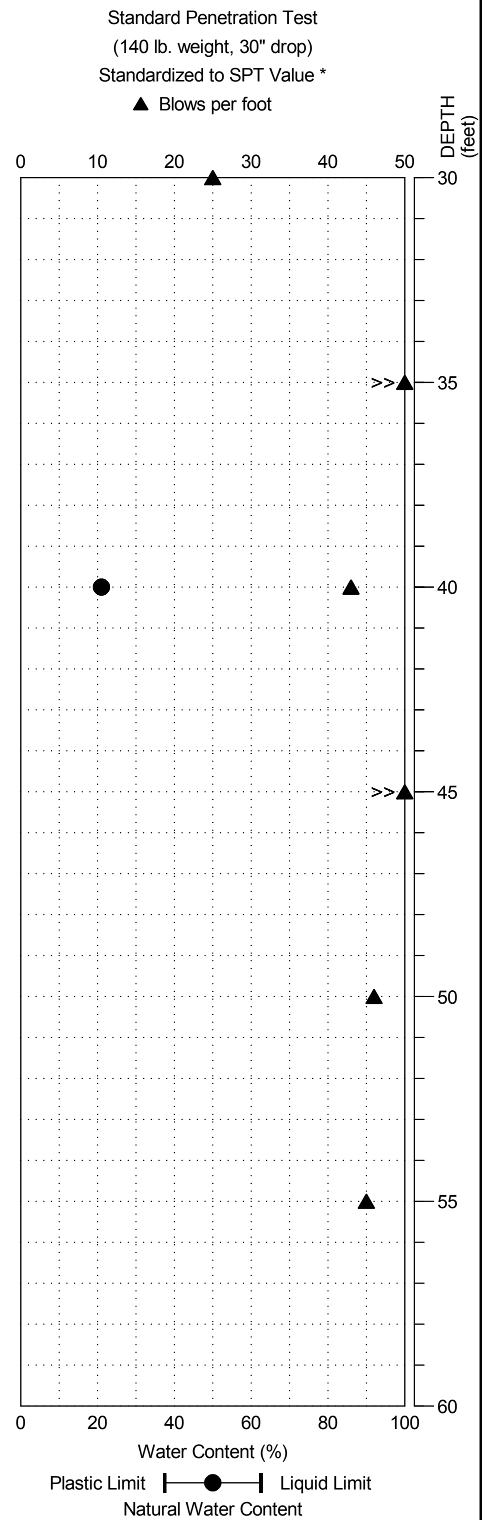
PROJECT NO.: 2015-061 FIGURE: A-13

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.96 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/2/2017
DATE COMPLETED: 6/2/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30	SM	Medium dense, orange to olive-brown, silty, fine to medium SAND, moist. Layers of iron oxide staining, fine, sandy silt, scattered fine to medium gravel, some wood fragments.	S-11	8-11-14	
34	SM				
35		Very dense, light orange to olive-brown, silty, fine to medium gravelly, fine to coarse SAND, moist to wet. Small lens (1-2") of SILT 35.1'. **(ADVANCE OUTWASH)**	S-12	7-24-39	
40		Dense, olive-brown, silty, fine to medium SAND, wet. Iron oxide bands in lower 6", grades to silty, fine SAND in lower 4".	S-13	12-21-22	GS
45		Very dense, light olive-brown, silty, fine to medium SAND, wet. Scattered fine gravel, iron oxide bands in lower 4".	S-14	12-20-38	
50		Dense, olive-gray, silty, fine to coarse SAND, wet. Scattered fine gravel.	S-15	14-19-27	
55		Dense, light olive-brown, silty, fine to coarse SAND, wet. Scattered fine gravel.	S-16	13-20-25	

Borehole terminated at 56.5' below ground surface.
Ground water encountered at ~20' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-12

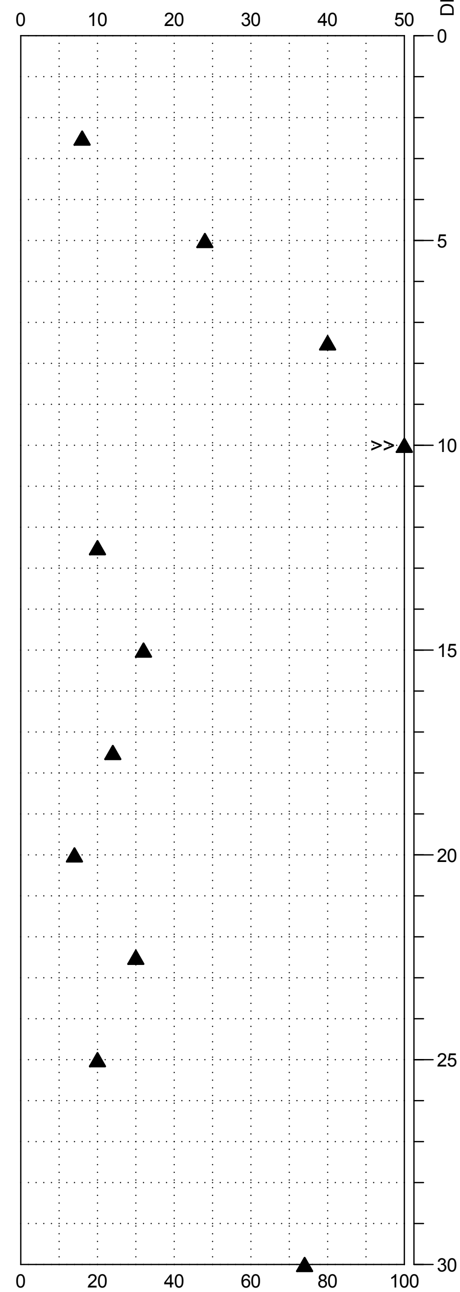
PROJECT NO.: 2015-061 FIGURE: A-13

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.70 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/2/2017
DATE COMPLETED: 6/2/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Fill Cap (silty sand with grass). **(FILL)**				
		Loose brown, silty, fine to medium SAND, moist. Scattered fine gravel. With roots, plastic and metal pieces. ~25% Refuse, ~15% Decomposable. **(REFUSE)**	S-1	2-6-2		
5		Medium dense, dark grayish-brown to black, silty, fine SAND, moist. Scattered fine gravel. With partially decomposed paper, plastic, some wood fragments. Netting material caught in lead auger. ~20% Refuse, ~5% Decomposable.	S-2	4-8-16		
		Medium dense, brownish-gray, silty, fine SAND, wet. Large piece of cloth netting stuck in sampler tip. ~80% Refuse, ~80% Decomposable.	S-3	9-15-25		
10		Very dense, dark brown to red, cloth netting, large brick fragments. Silty, fine to coarse, sandy fine gravel, dry, in bottom 6". ~70% Refuse, ~5% Decomposable. Hard drilling at 11.5'.	S-4	23-26-28		
		Medium dense, dark brown to black, silty, fine to medium SAND, moist. Scattered fine gravel, red brick fragments, glass pieces, fabric. ~80% Refuse, <5% Decomposable.	S-5	5-6-4		
15		Medium dense, black to dark brown, silty, fine gravelly, fine to coarse SAND, moist to wet. Glass pieces, wood fragments. Strong creosote odor. ~60% Refuse, <5% Decomposable.	S-6	8-6-10		
		Medium dense, black to dark brown, silty, fine to coarse SAND, moist. With scattered fine gravel, copper wire, light brown brick fragments, glass and aluminum metal pieces, wood fragments. ~30% Refuse, ~5% Decomposable.	S-7	1-5-7		
20	PT	Stiff, dark brown, PEAT, grading to light brown, fine sandy, organic SILT, moist. Plastic. Scattered fine gravel. **(ALLUVIUM)**	S-8	4-3-4		
	SM	Medium dense, gray, silty, fine SAND, moist. Scattered gravel grading to gray, fine sandy, SILT, wet, grading to orange brown, silty, fine to medium SAND, moist. Scattered fine gravel.	S-9	4-6-9		▽
25		Drillers added QuikGel to auger. Medium dense, rust-mottled olive-brown, silty, fine SAND, moist. Scattered fine gravel.	S-10	1-4-6		
30						

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

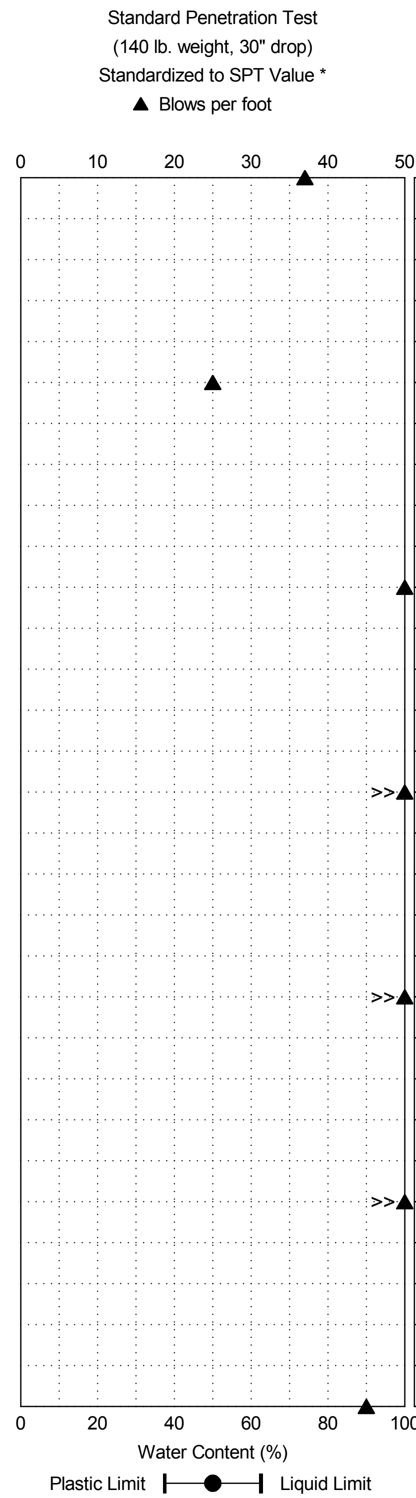
BORING:
BH-13

PROJECT NO.: 2015-061 FIGURE: A-14

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.70 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/2/2017
DATE COMPLETED: 6/2/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Dense, light olive-brown, rust mottling, silty, fine SAND, wet. Scattered coarse sand. Stratified layers of orange, silty, fine to medium sand.	S-11	15-18-19		
35		Medium dense, olive-gray, silty, fine SAND grading to fine to medium SAND, wet. Stratified layers of rust-mottled, olive-gray, fine to medium SAND.	S-12	7-9-16		
40	SM	Very dense, olive-gray, silty, fine to medium SAND, wet. Trace fine gravel, scattered coarse sand, red bands of iron oxidation. **(ADVANCE OUTWASH)**	S-13	17-22-28		
45		Very dense, olive-brown, silty, fine to coarse SAND, wet. Olive-gray, silty, fine sand in sampler tip.	S-14	16-26-27		
50	SP SM	Very dense, olive-brown, silty, fine to medium SAND grading to fine SAND, wet. Red bands of iron oxide.	S-15	17-27-33		
55		Dense, olive-brown, slightly silty, fine to coarse SAND, wet.	S-16A S-16B S-16C	13-30-50/6"		
60	SP					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

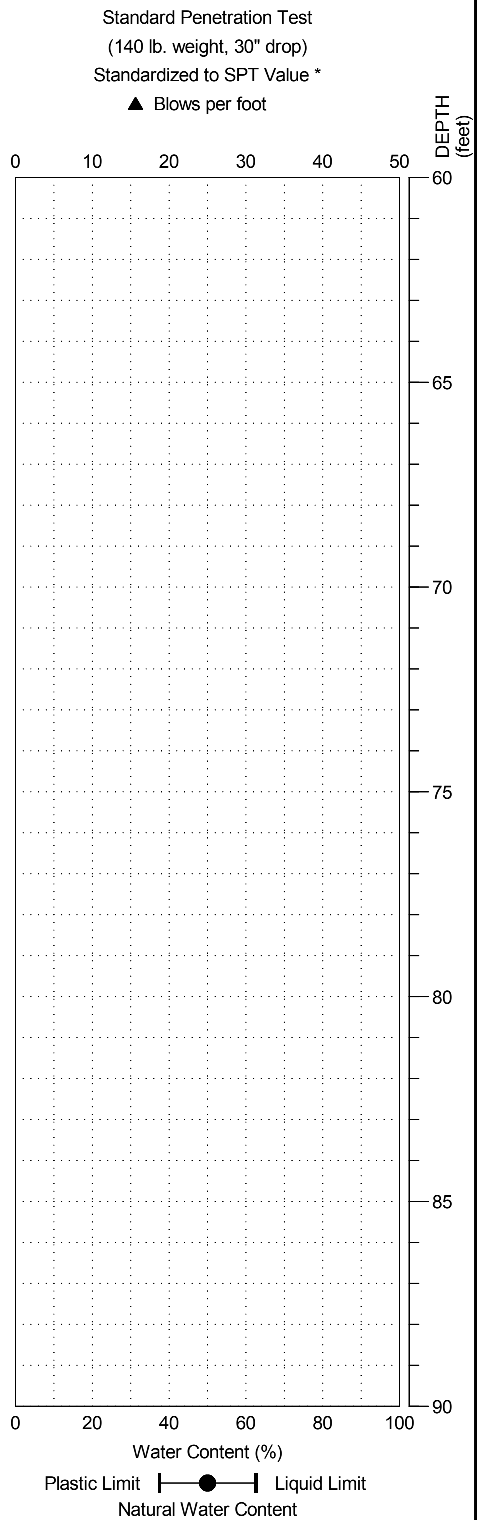
BORING: BH-13

PROJECT NO.: 2015-061 FIGURE: A-14

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.70 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/2/2017
DATE COMPLETED: 6/2/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60			Dense, olive-gray, clean, fine to coarse SAND, wet. Scattered fine gravel.		S-17	10-19-26		
			Borehole terminated at 61.5' below ground surface. Ground water encountered at ~22.5' during drilling. Borehole abandoned with bentonite grout.					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-13

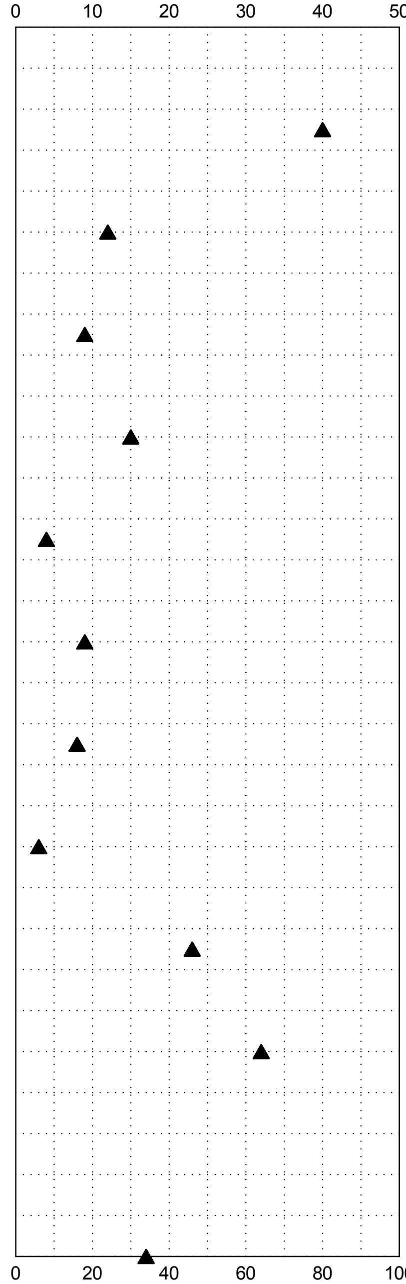
PROJECT NO.: 2015-061 FIGURE: A-14

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.30 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/7/2017
DATE COMPLETED: 6/7/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Silty SAND soil cap. **(FILL)**				
		Dense, dark brown, silty, fine to medium SAND, moist. Scattered fine gravel, wood fragments. ~10% Refuse, <5% Decomposable. **(REFUSE)**	S-1	20-27-13		
5		Stiff, dark brown, fine sandy SILT, moist. Scattered fine gravel, wood fragments, glass pieces. ~10% Refuse, <5% Decomposable.	S-2	16-6-6		
		Loose, dark brown, silty, fine sandy SAND, moist. Scattered fine gravel, red brick fragments and cinders. ~50% Refuse, <5% Decomposable.	S-3	16-5-4		
10		Medium dense, dark grayish-brown, fine SAND, moist. Scattered fine gravel, glass and metal pieces. ~10% Refuse, <5% Decomposable.	S-4	6-7-8		
		Loose, dark brown to reddish brown, silty, fine gravelly, fine to coarse SAND, moist. With glass pieces, cinders, and wood fragments. ~40% Refuse, <5% Decomposable.	S-5	2-2-2		
15		Loose, reddish brown, fine to coarse SAND composed of red brick fragments and fine cinder, grading to a dark brownish black, silty, fine to medium SAND, moist. With scattered fine gravel, wood fragments and red brick fragments, ceramic, and glass. ~40% Refuse, <5% Decomposable.	S-6	3-4-5		
		Loose, dark brown to black, silty, fine to medium SAND, wet. Consists of charcoal with cinders and glass pieces. ~50% Refuse, 30% Decomposable.	S-7	1-3-5		▽
20		Loose, black grading to dark brown, silty, fine to medium SAND, wet. Scattered fine gravel, charcoal, wood, glass and metal pieces. ~60% Refuse, ~30% Decomposable.	S-8	1-2-1		
	ML	Hard, light olive-brown with rust mottling, clayey SILT, moist. Grading to a fine sandy SILT **(ALLUVIUM)**	S-9	6-10-13		
25	SM	Dense, light olive brown with rust mottling, silty, fine SAND, moist. Scattered fine gravel.	S-10	9-13-19		
		Drillers switched over to Mud Rotary.				
30						

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-14

PAGE: 1 of 3

PROJECT NO.: 2015-061

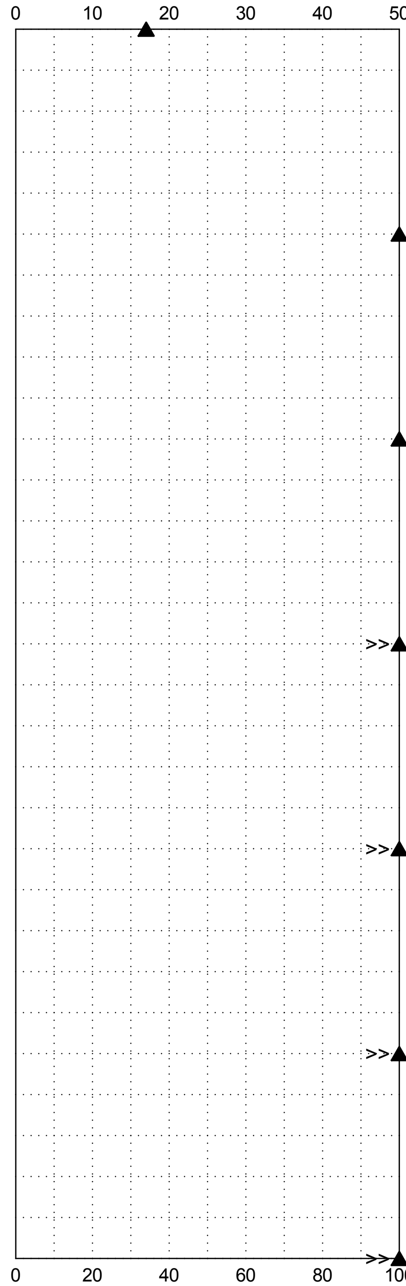
FIGURE: A-15

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.30 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/7/2017
DATE COMPLETED: 6/7/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30	SP	Medium dense, light olive-brown, silty, fine to medium SAND, moist.	S-11	7-7-10		
	CL	Hard, light greenish gray, silty CLAY, moist.				
	ML	Hard, light olive-brown with rust mottling, SILT, moist. With interbedded layers of silty, fine to medium sand.				
35	SM	Very dense, light olive-brown, silty, fine to medium SAND, moist. Orange layer of iron oxidation. **(ADVANCE OUTWASH)**	S-12	19-23-27		
40		Very dense, light olive-brown, silty, fine to medium SAND, moist. Scattered fine gravel. Orange layer of iron oxidation.	S-13	13-23-27		
45		Very dense, olive-brown, silty, fine to medium SAND, moist. Layers of fine to coarse sand.	S-14	17-25-43		
	SP	Dense, light olive-brown, silty, fine SAND, moist. Small pockets of red iron oxidation, scattered fine gravel.	S-15A	35-50/6"		
50	SM	Very dense, olive-brown, slightly silty, fine to medium SAND, moist. Scattered fine gravel.	S-15B			
55	SP	Very dense, grayish olive-brown, clean, fine to medium SAND, moist. Scattered fine gravel.	S-16	34-50/6"		
60						

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-14

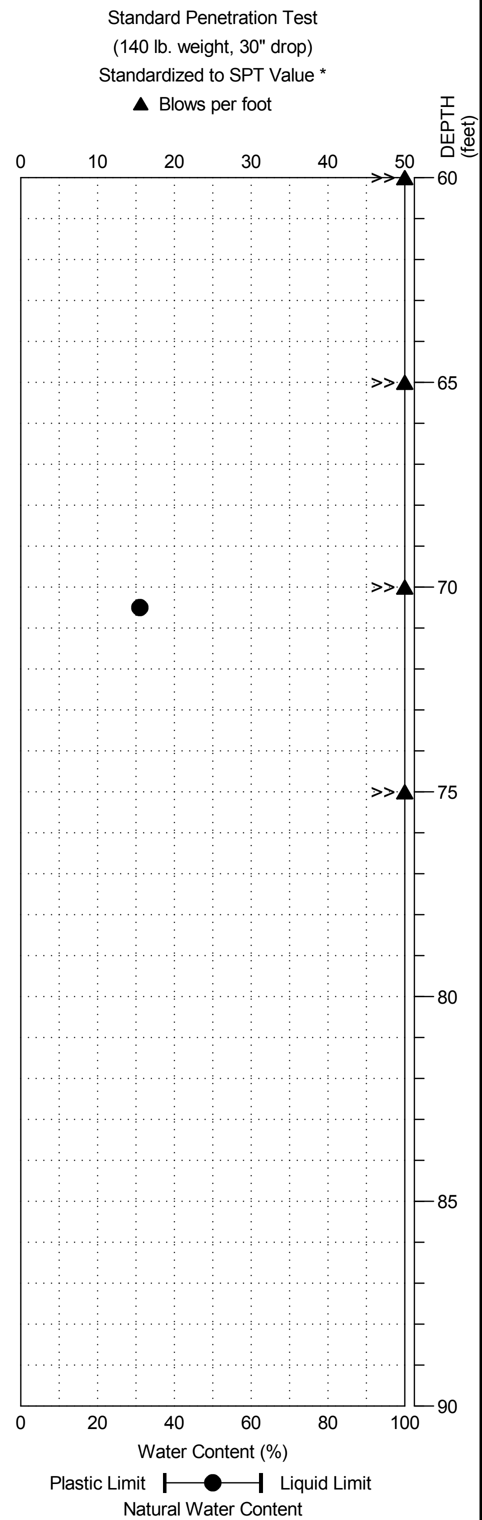
PROJECT NO.: 2015-061 FIGURE: A-15

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.30 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/7/2017
DATE COMPLETED: 6/7/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60	SP	Very dense, olive-gray, silty, fine SAND grading to clean, fine to medium SAND, wet. Scattered fine gravel.	S-17	26-27-32		
	ML	Hard, olive-gray, SILT, moist. Nonplastic.				
65	SP SM	Very dense, dark olive-gray, slightly silty, fine to medium SAND, moist.	S-18	33-21-37		
70	ML	Hard, dark brownish gray, SILT, moist. Interbedded with dark brown to black organics. **(PRE-VASHON ALLUVIUM)**	S-19A S-19B S-19C	32-35-50/5"	DS	
75	SP SM	Very dense, dark olive-gray, slightly silty, fine to medium SAND, moist.	S-20	25-34-38		

Borehole terminated at 76.5' below ground surface.
Ground water encountered at ~17.5' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-14

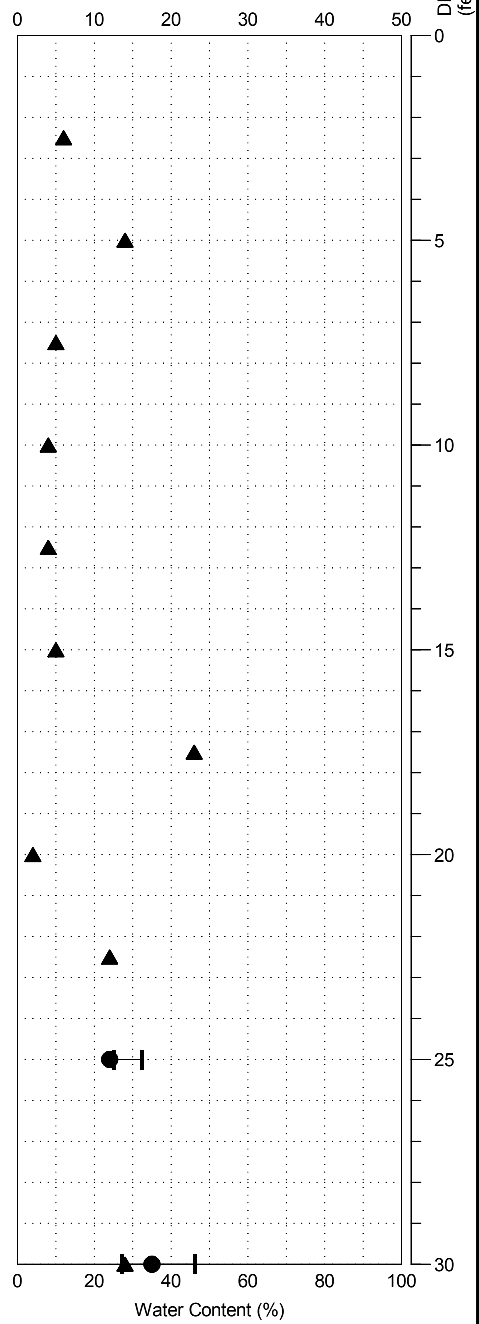
PROJECT NO.: 2015-061 FIGURE: A-15

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 31.18 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SM	Silty, gravelly SAND. **(FILL)**			
		Loose, brown grading to black, silty, fine SAND, moist, scattered fine gravel and rootlets.	S-1	5-3-3	
5		Loose, brown olive-gray, silty, fine to coarse SAND, moist, grading to silty, fine gravelly, fine to coarse SAND.	S-2	2-8-6	
		Loose, dark brown, silty, fine to coarse SAND, wet, glass and brick pieces, ~30% Refuse, <5% Decomposable. **(REFUSE)**	S-3	2-3-2	
10		Soft, dark grayish, greenish brown, SILT, moist. Plastic. Some rootlets, blue glass in bottom of sample. ~10% Refuse, <5% Decomposable.	S-4	2-1-3	
		No recovery: Some sample in tip shows brown, silty, fine to coarse SAND.	NR	2-2-2	
15		Loose, red to light brown, brick fragments in top 2", cinder and glass pieces, some soil, light brown, SAND. ~95% Refuse, <5% Decomposable.	S-5	2-3-2	
		Medium dense, light orange-brown, gravelly cinder pieces, dry, scattered fine gravel, some silty, fine to medium SAND. ~90% Refuse, <5% Decomposable.	S-6	13-19-4	
20	ML	Soft, brown, fine sandy, SILT, wet. Plastic. Some black mottling. **(ALLUVIUM)**	S-7	2-1-1	
		Very stiff, light grayish brown with orange mottling, SILT, moist. Nonplastic.	S-8	5-5-7	
25		Very stiff, light olive brown, SILT, moist. With scattered organics.	S-9	Push	DS AL
30					

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-15

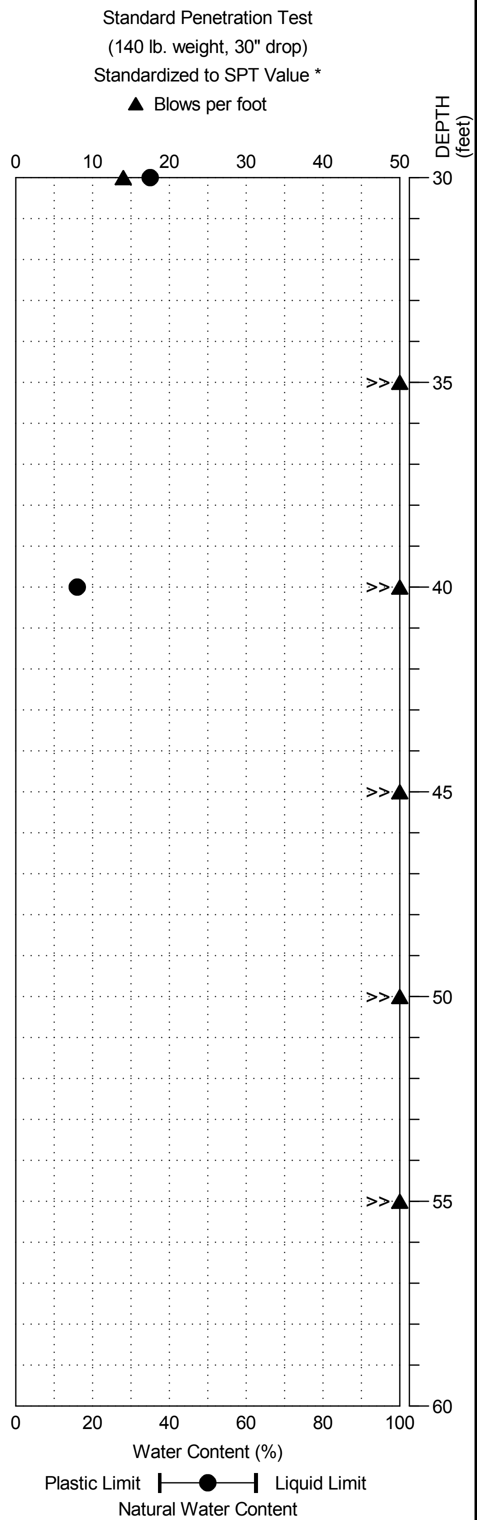
PROJECT NO.: 2015-061 FIGURE: A-16

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 31.18 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30	ML	Very stiff, light olive-brown with gray and orange mottling, SILT, moist. Moderately plastic.	S-10	3-5-9	AL	
35	SP SM	Very dense, olive-brown, silty, fine to medium, grading to fine to coarse SAND, wet. Some fine gravel in bottom 6". **(ADVANCE OUTWASH)**	S-11	32-50/5"		∇ (35')
40		Very dense, olive-brown, slightly silty, fine to coarse SAND, wet. Drillers used QuikGel grout.	S-12	9-28-36	GS	
45		Very dense, olive-brown, slightly silty, fine to medium SAND, wet, with some lenses of silty, fine SAND.	S-13	22-24-33		
46	SM					
50		Very dense, orange-brown, silty, fine to medium SAND, wet.	S-14	9-31-50/5"		
55		Very dense, orange-brown, silty, fine to medium SAND, wet, olive-gray lens at 56.2-56.4', grades to fine to coarse SAND.	S-15	10-38-35		

Borehole terminated at 56.5' below ground surface.
Ground water encountered at 35' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

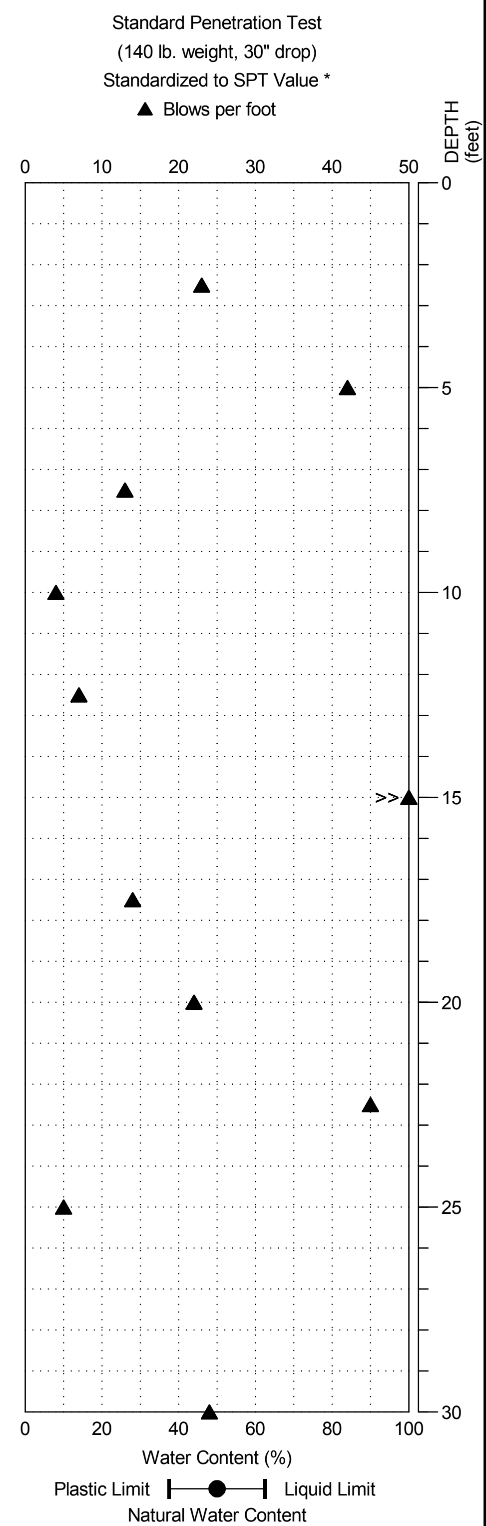
BORING:
BH-15

PROJECT NO.: 2015-061 FIGURE: A-16

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.24 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/7/2017
DATE COMPLETED: 6/7/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0		SM	Silty, fine gravelly, fine to coarse SAND. **(FILL)**					
			Medium dense, brown to dark gray, silty, fine to medium SAND, dry. Scattered fine gravel.		S-1	9-10-13		
5			Medium dense, brown, silty, fine SAND, dry. Scattered fine gravel.		S-2	20-26-16		
			Medium dense, olive-brown, silty, fine to coarse SAND, wet.		S-3	8-9-4		
10			Loose, dark brown, silty, fine to medium SAND, moist. With partially decomposed paper, paper, plastic and cloth pieces. ~20% Refuse, ~10% Decomposable. **(REFUSE)**		S-4	3-2-2		
			Loose, dark brown, silty, fine to medium SAND, wet. With plastic pieces. ~50% Refuse, <5% Decomposable.		S-5	3-5-2		▽
15			Very dense, dark grayish-brown, silty, fine to medium SAND, wet. With cloth, plastic, aluminum can, and elastic rubber pieces. ~50% Refuse, ~30% Decomposable.		S-6	3-4-50/6"		
			Very little recovery; dark grayish-brown, silty, fine SAND, wet. With plastic pieces in sampler.		NR	5-7-7		
20			Medium dense, dark brownish-gray, silty, fine SAND, wet. With thin rubber, fine elastic rubber bands, plastic pieces. ~50% Refuse, ~10% Decomposable.		S-7	5-17-5		
			Dense, black, silty, fine to medium SAND, wet. With scattered fine gravel, cloth and plastic pieces. ~40% Refuse, ~20% Decomposable.		S-8	9-17-28		
25			Loose, dark brown, silty, fine to medium SAND, moist. With partially decomposed paper, paper, plastic and cloth pieces. ~30% Refuse, ~10% Decomposable.		S-9	2-2-3		
30								



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-16

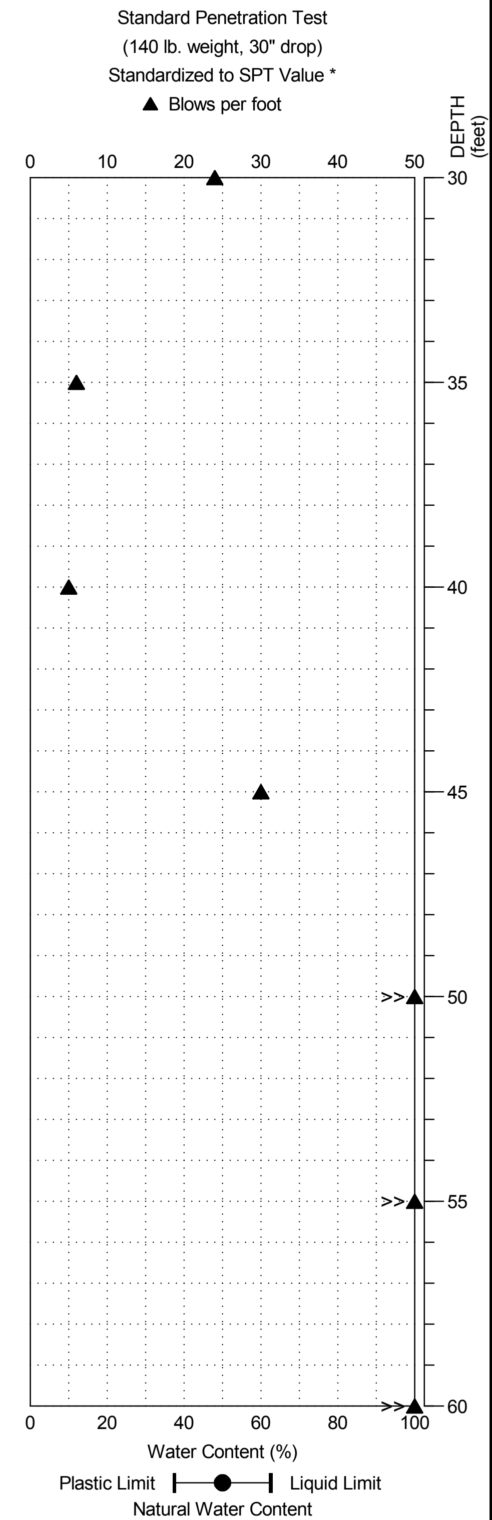
PAGE: 1 of 4

PROJECT NO.: 2015-061 FIGURE: A-17

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.24 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/7/2017
DATE COMPLETED: 6/7/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Medium dense, black, silty, fine to medium SAND, wet. With partially decomposed paper, cloth and glass pieces, partially decomposed wood in lower 6". ~50% Refuse, ~30% Decomposable.	S-10	4-5-19		
35	PT	Soft, dark brown, PEAT, moist. With scattered wood fragments and rootlets. **(ALLUVIUM)**	S-11	3-3-3		
40		Soft, dark brown, PEAT, moist. Grading to light olive-brown, fine, sandy SILT, moist. Plastic. Scattered fine gravel. Drillers switched over to mud rotary.	S-12	3-2-3		
	SM	Attempted to push a Shelby tube; too firm to push, no recovery.	NR	Push		
45		Dense, light brown, silty, fine to coarse SAND, wet. Scattered fine gravel, layers of orange to red iron oxidation. **(ADVANCE OUTWASH)**	S-13	14-13-17		
50		Very dense, olive-brown, silty, fine to medium SAND, wet. Scattered fine gravel.	S-14	15-25-29		
55	SP	Very dense, dark olive-gray, clean, fine to medium SAND, moist.	S-15A S-15B	27-50/6"		
60						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

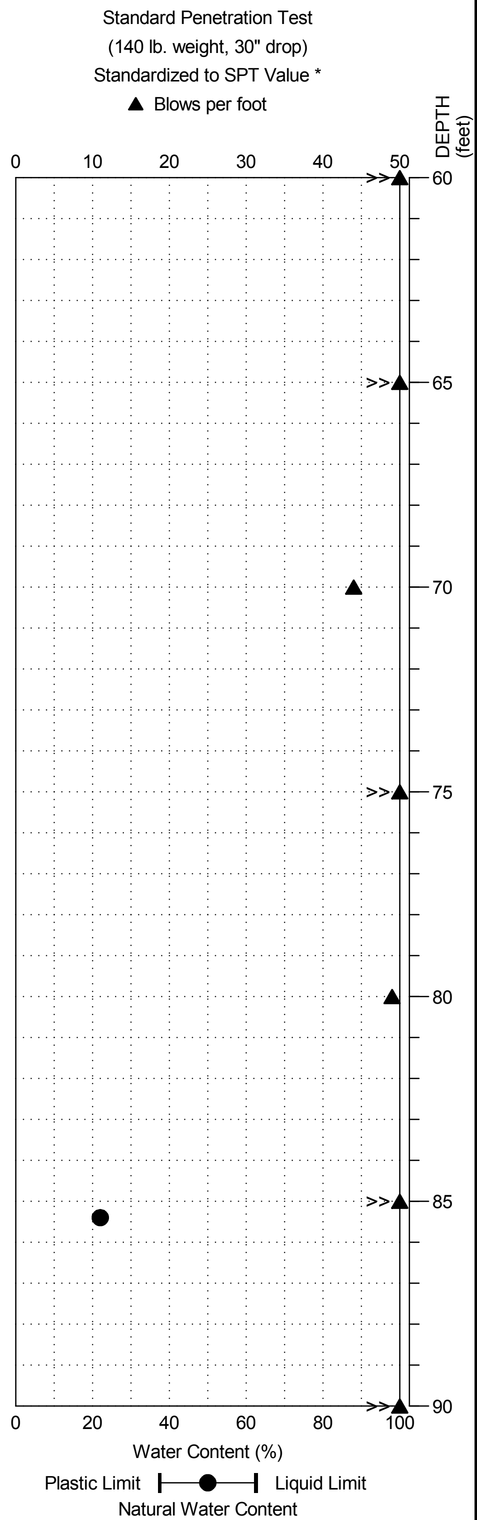
BORING:
BH-16

PROJECT NO.: 2015-061 FIGURE: A-17

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.24 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/7/2017
DATE COMPLETED: 6/7/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60	SP SM	Very dense, olive-gray, slightly silty, fine to coarse SAND, wet. Scattered fine gravel.	S-16	19-34-39		
65	ML	Hard, dark gray, SILT, moist. Scattered fine woody organics.	S-17	18-30-44		
	SM	Very dense, dark gray, silty, fine SAND, wet. Small lenses of slightly silty fine to medium sand. **(PRE-VASHON ALLUVIUM)**				
70	ML	Hard, dark olive-gray, SILT, moist. Scattered fine dark brown woody fragments, bottom 4" finely laminated with dark brown organics.	S-18	17-20-24		
75	SP	Very dense, dark olive-gray, clean, fine SAND, moist.	S-19	20-26-32		
80	ML	Hard, dark olive-gray, SILT, moist. Scattered dark brown woody organics, small silty fine sand lens.	S-20	17-22-27		
85	SM	Very dense, dark olive-gray, silty, fine SAND, moist.	S-21A S-21B	30-50/5"	DS	
90						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-16

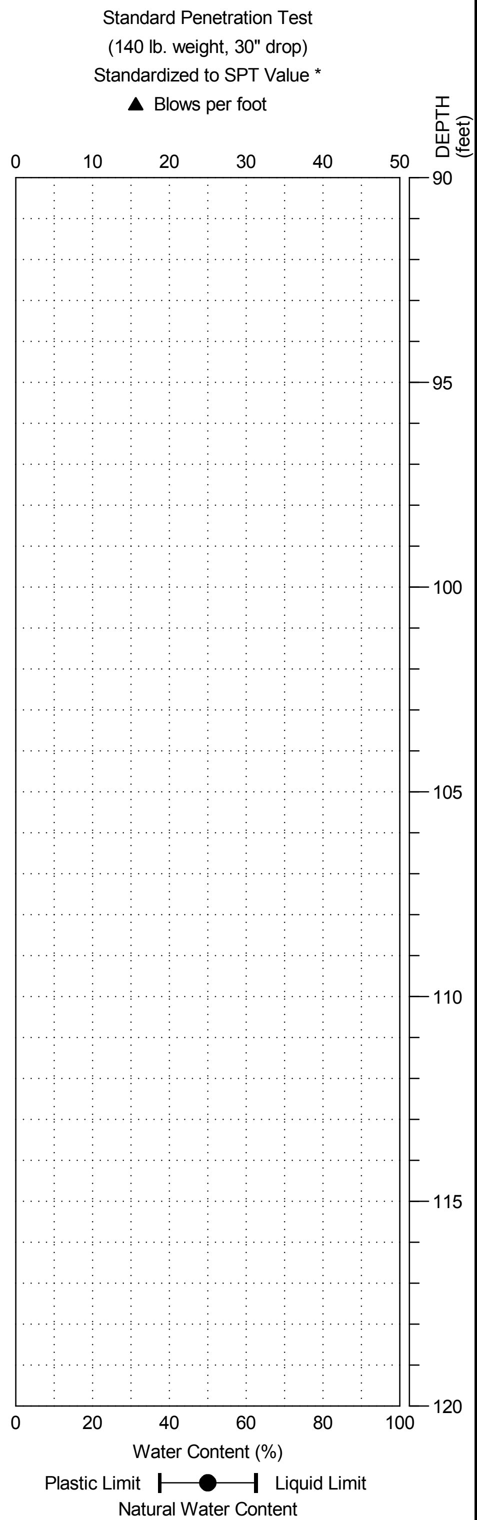
PROJECT NO.: 2015-061 FIGURE: A-17

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.24 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/7/2017
DATE COMPLETED: 6/7/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90			Very dense, dark olive-gray, slightly silty, fine SAND, moist.		S-22	20-36-40		

Borehole terminated at 91.5' below ground surface.
Ground water encountered at ~12.5' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-16

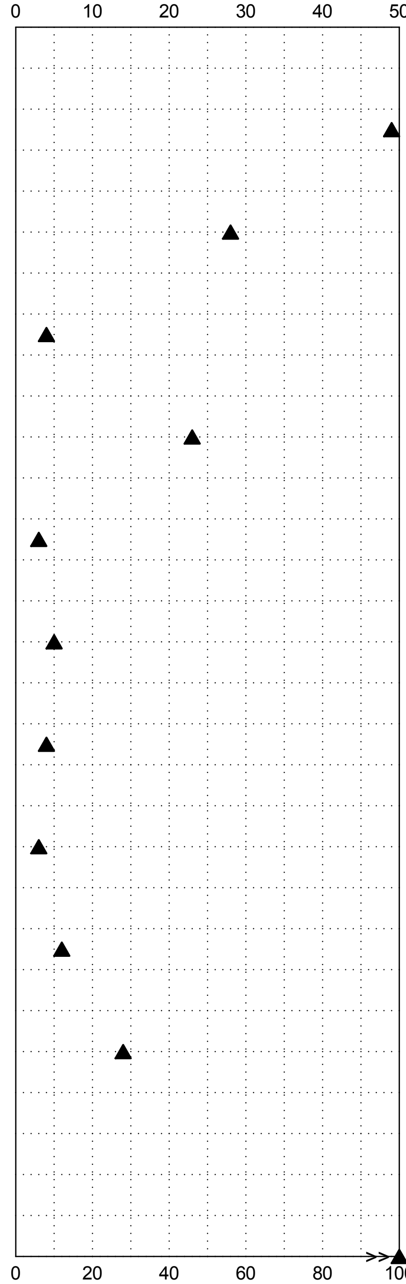
PROJECT NO.: 2015-061 FIGURE: A-17

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.35 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Medium dense, olive brown, fine to coarse gravelly, silty, fine to coarse SAND, moist. **(FILL)**				
		Dense, light brown to dark brown, silty, fine to medium SAND, moist. Wood fragments. ~10% Refuse, ~10% Decomposable. **(REFUSE)**	S-1	12-24-25		
5		Medium dense, black to dark brown, asphalt with silty, fine to medium SAND, moist. Brick fragments, glass, hard plastic pieces, scattered fine to coarse gravel. ~20% Refuse, <5% Decomposable.	S-2	9-11-17		
		Loose, reddish-black, silty, fine to coarse SAND, moist. Red brick fragments, glass pieces, fine grains of cinders, metal wire piece (1"). ~40% Refuse, <5% Decomposable.	S-3	1-1-3		
10		Medium dense, dark red to black, red brick and cinder grains, with silty, fine to coarse SAND, moist. Scattered fine to medium gravel, glass pieces. ~50% Refuse, <5% Decomposable.	S-4	2-8-15		∇
		Loose, dark brown to black, silty, fine to coarse SAND, wet. Fine to coarse grains of cinder and red brick, hard plastic pieces, scattered fine medium gravel. ~80% Refuse, <5% Decomposable.	S-5	1-1-2		
15		Loose, dark brown to black, silty, fine to coarse SAND, moist to wet. Red brick fragments, glass pieces, burnt wood fragments. ~80% Refuse, <5% Decomposable.	S-6	2-1-4		
		Loose, dark brown to black, silty, fine to coarse SAND, wet. Glass pieces. ~20% Refuse, <5% Decomposable.	S-7	3-2-2		
20		Loose, dark brown to black, silty, fine to coarse SAND, wet. Metal and glass pieces, scattered fine to coarse gravel. ~20% Refuse, <5% Decomposable.	S-8	2-1-2		
		Loose, black, silty, fine to coarse sandy, fine GRAVEL, wet. Glass pieces. ~30% Refuse, <5% Decomposable.	S-9	2-1-5		
25		Medium dense, black, silty, fine gravelly, fine to coarse SAND, wet. Wood fragments, glass. 3" layer of olive-gray, silty fine to medium SAND, scattered fine gravel at 25.4'. ~40% Refuse, 10% Decomposable.	S-10	5-7-7		
30						

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-17

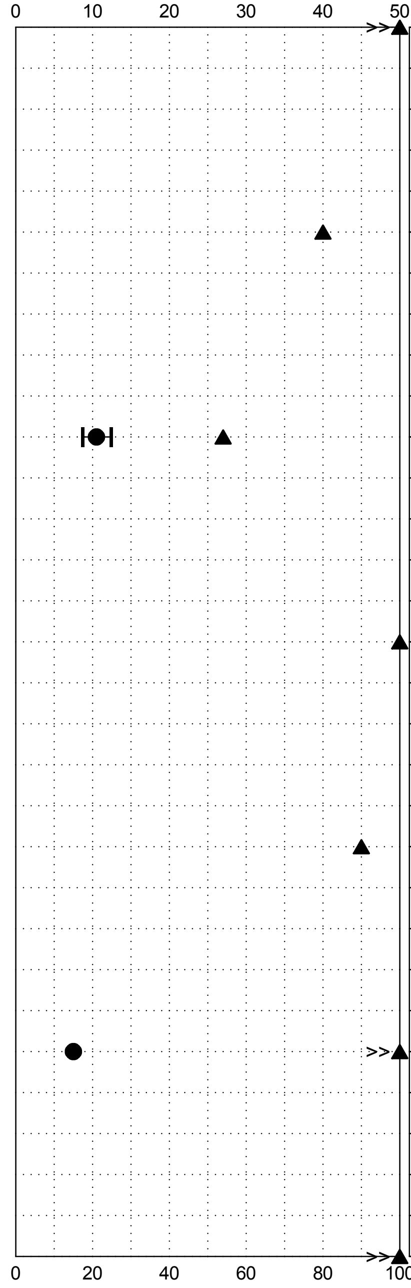
PROJECT NO.: 2015-061 FIGURE: A-18

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.35 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Hard, black, WOOD fragments with silty, fine to coarse SAND, wet. Scattered fine gravel. ~50% Refuse, ~50% Decomposable. Driller injected QuikGel into auger at 35'.	S-11	4-25-50/5"	
35	ML	Hard, dark brown-coated, partially decomposed WOOD with some dark brown SILT above the wood, ~90% decomposable. **(ALLUVIUM)** Very hard drilling at 37'-40'.	S-12	17-17-23	
40	ML SC	Slough contains mixture of wood fragments and SILT. Very stiff, olive-brown with rust mottling, clayey SILT, moist. Grades to olive-brown, clayey, fine to medium SAND, moist. Scattered fine gravel.	S-13	11-13-14	AL GS
45	SM	Very dense, light orange olive-brown, silty, fine to coarse SAND, wet. Scattered fine gravel. **(ADVANCE OUTWASH)**	S-14	17-22-28	
50		Dense, light orange olive-brown, silty, fine to medium SAND, wet.	S-15	12-21-24	
55	SW SM	Very dense, olive-brown, slightly silty, fine to medium SAND, wet. Trace fine gravel.	S-16	20-30-40	GS
60					

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-17

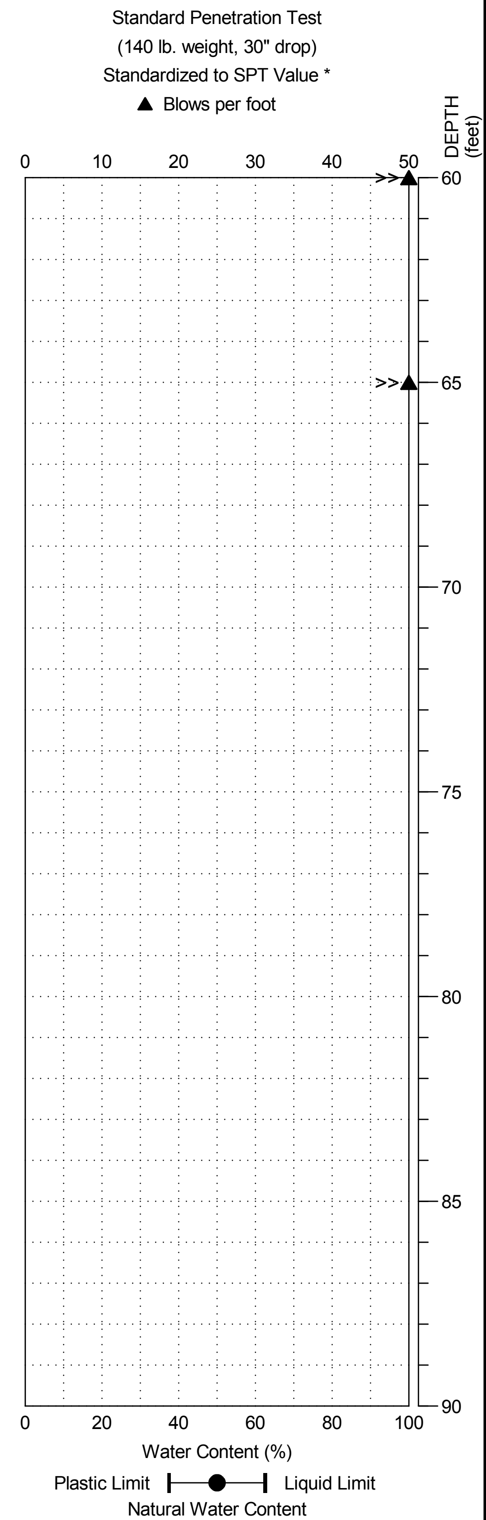
PROJECT NO.: 2015-061 FIGURE: A-18

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 33.35 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		SW	Very dense, olive-gray, clean, fine to coarse SAND, wet. Scattered fine gravel.		S-17A S-17B	30-50/5"		
65		SM	Very dense, olive-gray, silty, fine SAND, wet.		S-18	14-23-43		

Borehole terminated at 66.5' below ground surface.
Ground water encountered at ~12.5' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

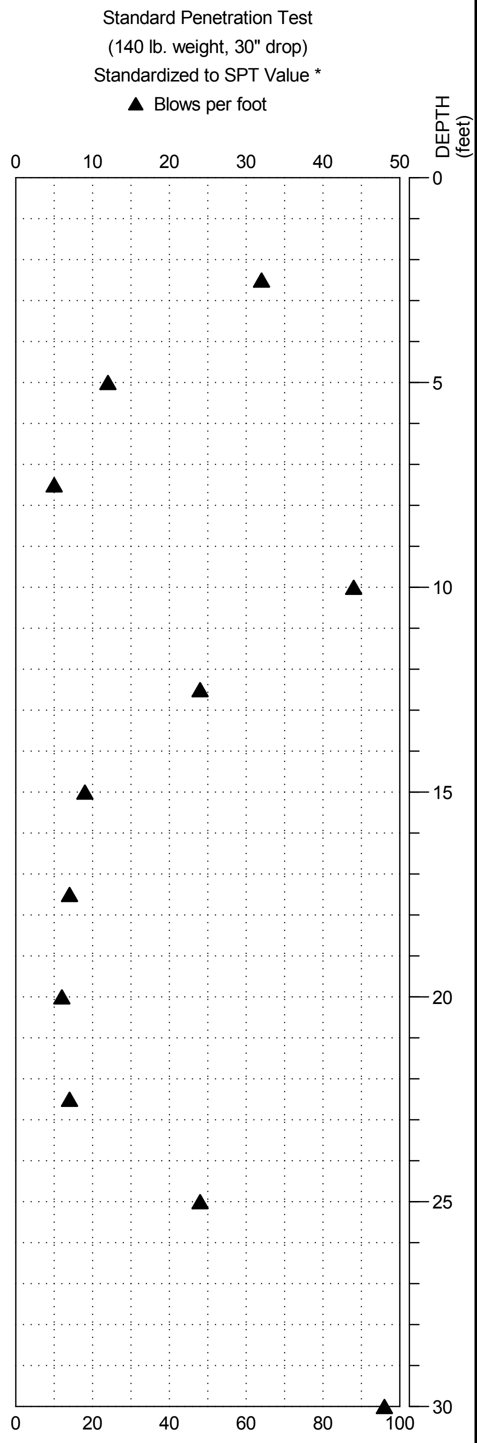
BORING:
BH-17

PROJECT NO.: 2015-061 FIGURE: A-18

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.12 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0–4	SM	Dense, light brown, silty, fine to coarse SAND, moist, scattered fine gravel. **(FILL)**	S-1	18-18-14		
5		Medium dense, dark brown, silty, fine to medium SAND, moist, glass pieces, wood fragments, scattered fine gravel. ~10% Refuse, ~5% Decomposable. **(REFUSE)**	S-2	9-7-5		
		Loose, dark brown, silty, fine to medium SAND, moist, small pieces of burnt wood fragments, small glass and metal pieces. ~40% Refuse, ~20% Decomposable.	S-3	2-2-3		
10		Dense, dark brown to black, silty, fine to medium SAND, moist, small brick fragments and glass pieces, scattered rootlets over fine gravel. ~10% Refuse, ~5% Decomposable.	S-4	13-20-24		
		Medium dense, red, brick fragments with metal wires, scattered fine gravel, moist, with some silty, fine to medium SAND. ~95% Refuse, ~30% Decomposable.	S-5	20-16-8		
15		Loose, dark brown, silty, fine to coarse, sandy, fine GRAVEL, moist, wood fragments. ~25% Refuse, ~25% Decomposable.	S-6	3-4-5		
		Loose, dark reddish-brown, silty, fine to coarse SAND, moist, brown glass pieces, burnt wood fragments, small grains of red brick, ~15% Refuse, <5% Decomposable.	S-7	3-3-4		
20		Loose, dark brown to black, silty, fine to coarse SAND, wet, brick fragments, burnt wood fragments. ~25% Refuse, ~10% Decomposable.	S-8	3-3-3		▽
		Loose, dark brown to black, silty, fine gravelly, fine to coarse SAND, burnt wood fragments. ~50% Refuse, ~10% Decomposable.	S-9	2-3-4		
25		Medium dense, dark brown to black, silty, fine to coarse SAND, moist to wet, wood fragments throughout and in sampler tip, scattered fine to medium gravel, glass pieces and small grains of brick. ~50% Refuse, ~25% Decomposable.	S-10	5-6-19		
30		Very hard drilling at 27.5'-30' (probably wood log).				



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING: BH-18

PAGE: 1 of 3

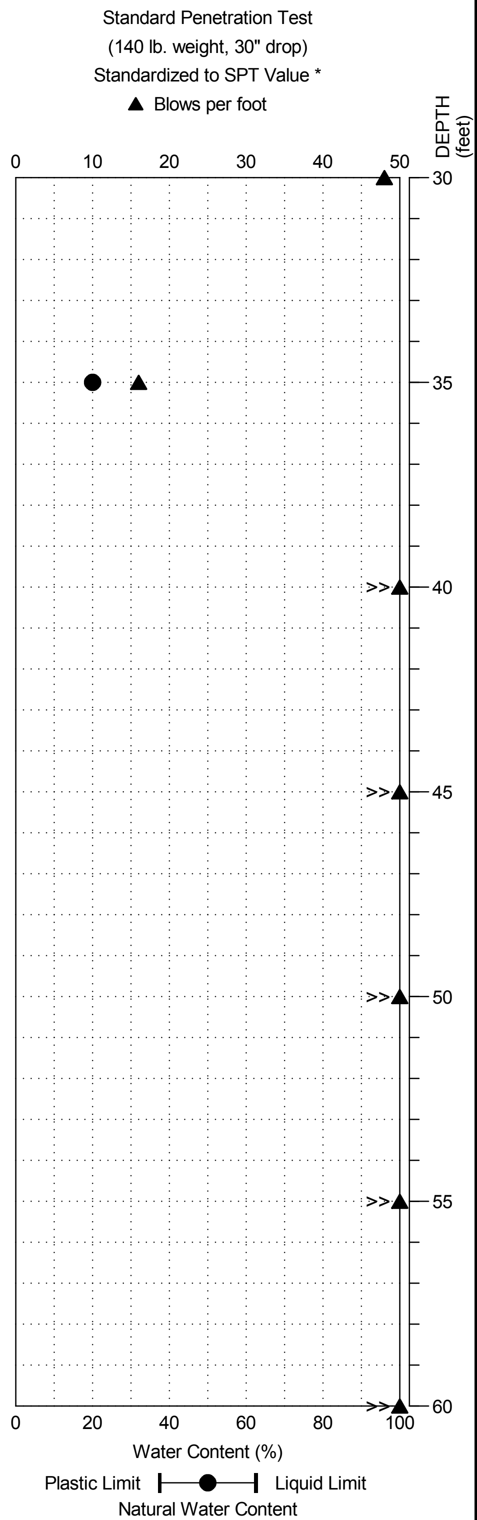
PROJECT NO.: 2015-061

FIGURE: A-19

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.12 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Dense, dark brown-coated, undecomposed WOOD, dry. 100% Refuse, 100% Decomposable. Hard drilling continues from 31.5'-35'.	S-11	13-20-28		
35	ML SM	Medium dense, brownish-gray, silty, fine to medium SAND, grading to very stiff, light gray with rust mottling, SILT, moist. **(ALLUVIUM)**	S-12	4-7-9		
	SM	@ 37.5 feet: Shelby Tube sample attempted; Too firm to push, no recovery.	NR	Push		
40		~5" of slough (light olive-brown, silty, fine to medium SAND). Very dense, light olive-brown, silty, fine to coarse SAND, wet. **(ADVANCE OUTWASH)**	S-13	50/5"		
45		Driller using QuikGel in borehole. Very dense, light olive-brown, silty, fine gravelly, fine to medium SAND, wet.	S-14	20-50/3"		
50		Very dense, light olive-brown, silty, fine to coarse SAND, wet, scattered fine gravel.	S-15	20-50/4"		
55		Very dense, light olive-brown, silty, fine to coarse SAND, wet.	S-16A S-16B	21-50/6"		
60						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-18

PROJECT NO.: 2015-061 FIGURE: A-19

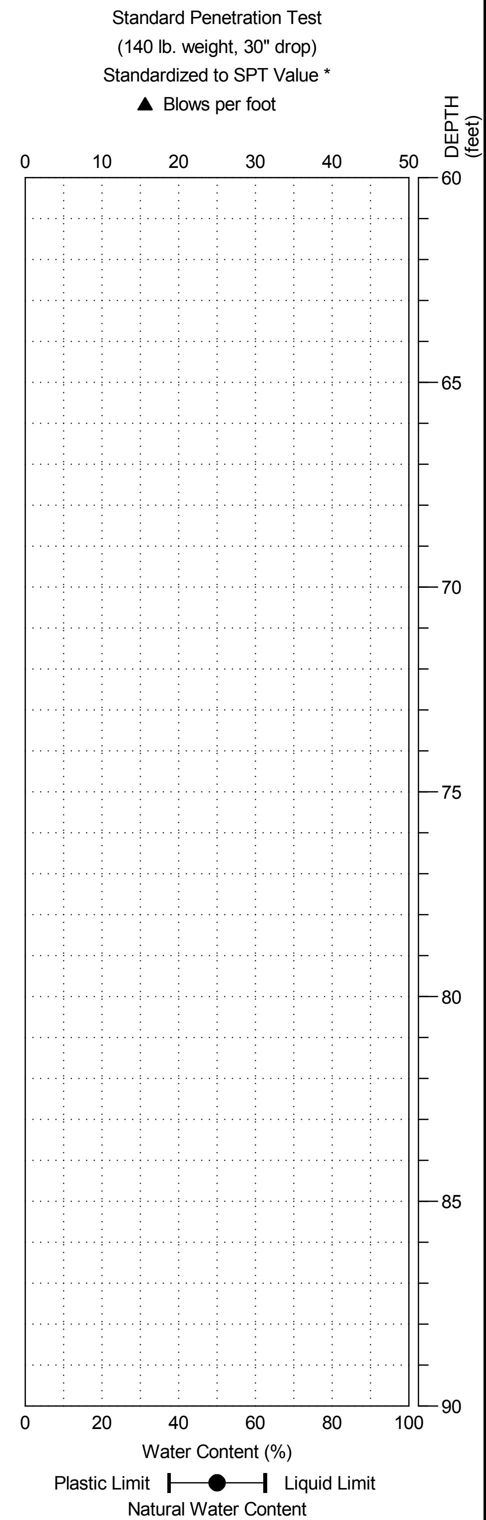
DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 32.12 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60			Very dense, light olive-brown, silty, fine to coarse SAND, wet.	⊠	S-17	40-50/3"		

Borehole terminated at 60.8' below ground surface.
Ground water encountered below 20' during drilling.
Borehole abandoned with bentonite grout.

Depth scale (feet): 60, 65, 70, 75, 80, 85, 90



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-18

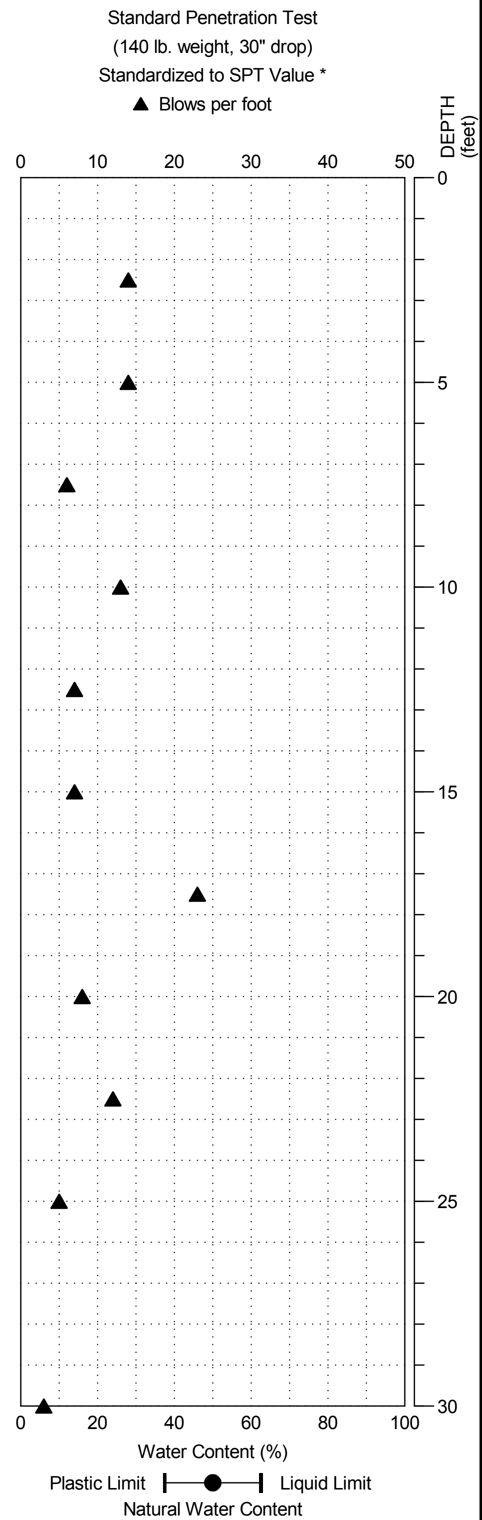
PAGE: 3 of 3

PROJECT NO.: 2015-061 FIGURE: A-19

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 31.11 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM					
		Medium dense, dark brown, silty, fine to medium SAND, moist, scattered fine to medium gravel. **(FILL)**	S-1	5-6-8		
5		Medium dense, dark brown, silty, fine to medium gravelly, fine to medium SAND, moist, small rootlets, <1% Decomposable.	S-2	6-7-7		
		Loose, black, silty, fine to medium SAND, moist, glass pieces and mostly decomposed paper. ~20% Refuse, ~10% Decomposable. **(REFUSE)**	S-3	2-3-3		
10		Medium dense, black, silty, fine to coarse SAND with REFUSE, moist. Pieces of glass, decomposed paper and metal, wood fragments. ~40% Refuse, ~5% Decomposable.	S-4	4-7-6		
		Loose, orange-brown to black, silty, fine gravelly, fine to coarse SAND, dry, pieces of cinder. ~10% Refuse, <5% Decomposable.	S-5	3-3-4		
15		Loose, reddish-brown, fine, sandy SILT to silty fine to medium SAND, moist, pieces of glass, metal wire, scattered fine gravel. ~10% Refuse, <5% Decomposable.	S-6	3-3-4		
		Medium dense, dark brown to black, silty, fine to coarse SAND, moist, pieces of glass, scattered fine gravel. ~10% Refuse, <5% Decomposable.	S-7	6-9-14		
20		Loose, dark brown to brownish red, silty, fine to coarse, sandy, fine GRAVEL, wet. Crushed cinder in bottom 3". ~10% Refuse, <5% Decomposable.	S-8	3-4-4		▽
		Medium dense, black, silty, fine to coarse, sandy, fine GRAVEL, wet. Large piece of cinders, ceramic and glass pieces, copper wiring. ~20% Refuse, <5% Decomposable.	S-9	10-7-5		
25		Loose, dark brown, silty, fine to coarse SAND, wet. Small grains of cinders, pieces of glass, wood fragments. ~20% Refuse, <5% Decomposable.	S-10	2-2-3		
	PT					
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-19

PAGE: 1 of 3

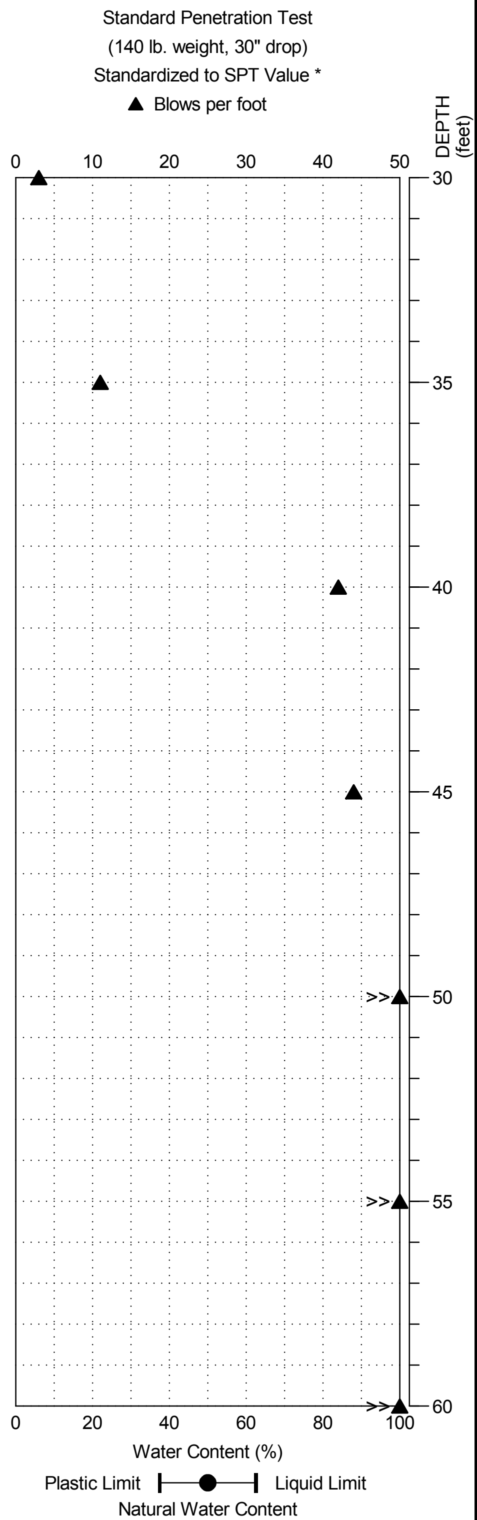
PROJECT NO.: 2015-061

FIGURE: A-20

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 31.11 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)
30		Soft, dark brown, PEAT, moist, with wood chips and rootlets, grading to dark brownish-gray, organic SILT, plastic. **(ALLUVIUM)**	S-11	1-1-2
35	SM	Medium dense, olive-brown, silty, fine to medium SAND, wet, trace fine gravel.	S-12	2-5-6
40	SP SM	Driller added QuikGel to auger. Dense, olive-brown, slightly silty, fine to coarse SAND, wet, grading to silty, fine to medium SAND, scattered fine gravel. **(ADVANCE OUTWASH)**	S-13	9-14-28
45	SM	Dense, olive-brown, silty, fine to medium SAND, moist, small layers (1mm) of iron oxide.	S-14	9-19-25
50		Very dense, olive-brown, silty, fine to coarse SAND, wet, grading to brownish dark red, silty, fine SAND with heavy iron oxide staining, grading to silty, fine to medium SAND.	S-15	11-24-35
54	SP SM	Very dense, olive-gray, slightly silty, fine to medium SAND, moist.	S-16	13-24-34
56.5	ML	Hard, olive-brown, SILT, moist. Laminated, nonplastic. **(PRE-VASHON ALLUVIUM)**		



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-19

PROJECT NO.: 2015-061 FIGURE: A-20

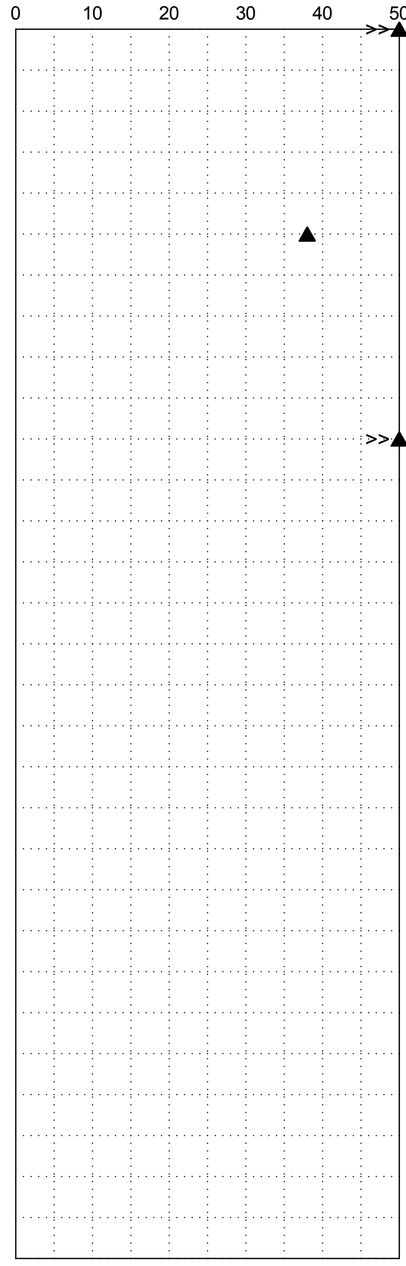
DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 31.11 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Hard, grayish, olive-brown, SILT, moist, nonplastic, laminated.	S-17A	12-26-48		
	SM	Very dense, olive-gray, silty, fine to medium SAND, moist, small layer (2 mm) of dark brown organics, grading to olive-gray, silty, fine SAND, wet.	S-17B			
65	ML	Hard, olive-gray to olive-brown, SILT, moist, plastic grading to nonplastic.	S-18A	13-25-33		
			S-18B			
			S-18C			
70		Hard, olive-gray to brown, SILT, moist, nonplastic, laminated.	S-19A	19-40-49		
	SP SM	Very dense, olive-gray, slightly silty, fine SAND, moist.	S-19B			

Borehole terminated at 71.5' below ground surface.
Ground water encountered below at 20' during drilling.
Borehole abandoned with bentonite grout.

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

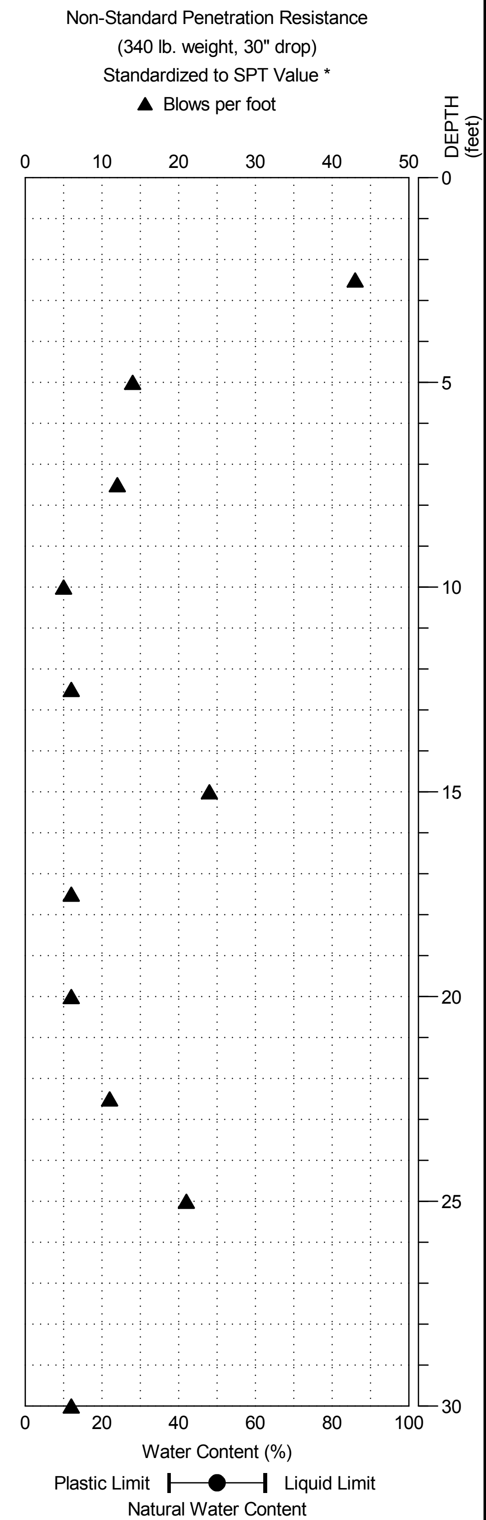
BORING:
BH-19

PROJECT NO.: 2015-061 FIGURE: A-20

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer; CA w/ 340 lb. Autohammer
SURFACE ELEVATION: 30.39 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Dense, dark gray to dark brown to black, silty, fine gravelly, fine to coarse SAND, dry. Pieces of asphalt. **(FILL)**	S-1	14-21-22		
5		Medium dense, olive-gray to dark brown, silty, fine to medium SAND, moist. Wood from 6.2' to 6.4'. Scattered fine to medium gravel. ~40% Refuse, ~30% Decomposable. **(REFUSE)**	S-2	5-8-6		
		Medium dense, olive-brown to black, silty, fine to medium SAND, wet. Scattered fine to medium gravel, wood fragments, plastic and glass pieces. ~15% Refuse, ~5% Decomposable. **140-lb hammer broke down. Switched over to 340-lb hammer and California sampler.**	S-3	5-8-7		
10		Loose, black, silty, fine to coarse SAND, wet. Wood fragments, glass, metal, and paper pieces. ~50% Refuse, ~10% Decomposable.	S-4	1-2-1		
		Loose, dark brown to black, silty, fine to coarse SAND, wet. Partially decomposed paper, glass and ceramic pieces. ~50% Refuse, ~10% Decomposable.	S-5	3-2-2		
15		Medium dense, dark brown to black, silty, fine to medium SAND, moist. Large wood fragments and aluminum can, glass, ceramic and metal wire pieces. ~50% Refuse, ~25% Decomposable.	S-6	5-7-8		
		Loose, brown to gray, silty, fine to medium SAND, moist. Scattered fine to medium gravel. Wood fragments in upper 4". ~50% Refuse, ~50% Decomposable.	S-7	3-2-2		
20		Loose, dark brown to black, silty, fine to medium SAND, wet. Aluminum can, glass pieces. ~15% Refuse, ~25% Decomposable.	S-8	2-2-2		▽ (~20 ft)
		Loose, dark brown, silty, fine to coarse SAND, wet. Glass and ceramic pieces. ~20% Refuse, ~25% Decomposable.	S-9	1-2-5		
25	PT	Stiff, dark brown to black, silty, fine to medium SAND, wet. Dark brown PEAT with wood fragments in tip of sampler. **(ALLUVIUM)**	S-10	4-7-6		
		Driller added QuikGel in auger.				
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

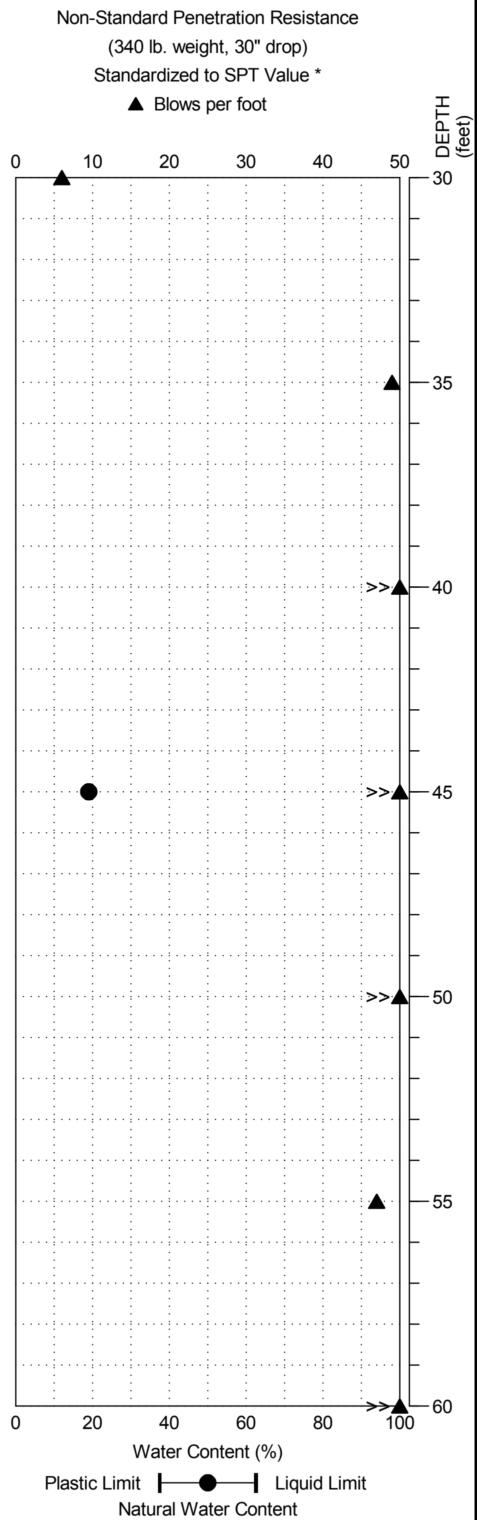
BORING:
BH-20

PROJECT NO.: 2015-061 FIGURE: A-21

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer; CA w/ 340 lb. Autohammer
SURFACE ELEVATION: 30.39 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Soft, dark brown, PEAT, moist.	S-11	2-2-2		
	ML SM	Soft, light olive-brown, fine to medium sandy, SILT, wet. Plastic.				
	SM	Dense, olive-brown with rust mottling, silty, fine SAND, wet. Stratified layers of fine to coarse sand. **(ADVANCE OUTWASH)**				
35			S-12	9-14-17		
	SP SM	Very dense, light olive-brown, slightly silty, fine gravelly, fine to coarse SAND, wet.				
40			S-13	9-19-28		
45		Very dense, light olive-brown, slightly silty, fine to medium SAND, wet. Grading to olive-brown with rust mottling, slightly silty, fine gravelly, fine to coarse SAND, wet.	S-14	9-16-19		
50		Very dense, light olive-brown, slightly silty, fine to coarse SAND, wet. Grading to fine to medium SAND, moist. Scattered fine gravel.	S-15	11-17-20		
55	SP	Dense, olive-gray, clean, fine to coarse SAND, wet.	S-16A	4-11-19		
	ML SM	Hard, olive-gray, SILT, moist. Nonplastic. Laminated. **(PRE-VASHON ALLUVIUM)**	S-16B			
60						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

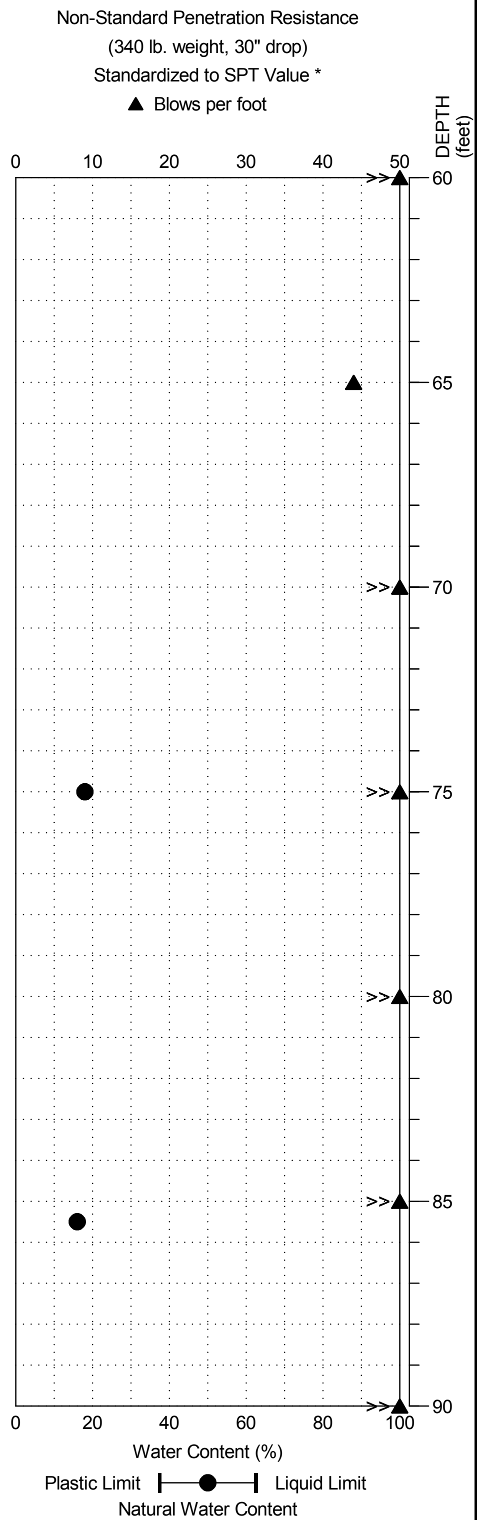
BORING:
BH-20

PROJECT NO.: 2015-061 FIGURE: A-21

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer; CA w/ 340 lb. Autohammer
SURFACE ELEVATION: 30.39 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Very dense, dark olive-gray, silty, fine SAND, moist. Lenses (1" to 2") of brownish-gray, silt. Scattered small woody organics, strong organic odor.	S-17	13-22-21		
63	ML	Hard, dark olive-gray to dark brown, SILT, moist. Laminated with dark brown organics and woody layers. Grades to silty, fine sand in the bottom 3".	S-18	8-12-16		
68	SM	Very dense, dark olive-gray, silty, fine SAND, moist. Interbedded layers of silt and fine to medium sand.	S-19	9-14-19		
75		Very dense, dark olive-gray, silty, fine to medium SAND, moist. Interbedded layers of fine, sandy silt and fine to coarse sand.	S-20	11-15-22		
80		Very dense, dark olive-gray, slightly silty, fine to medium SAND, moist. Interbedded layers of silty fine sand.	S-21	9-20-30		
85		Very dense, dark olive-gray, silty, fine to medium SAND, wet.	S-22A S-22B	17-20-26	DS	
90						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-20

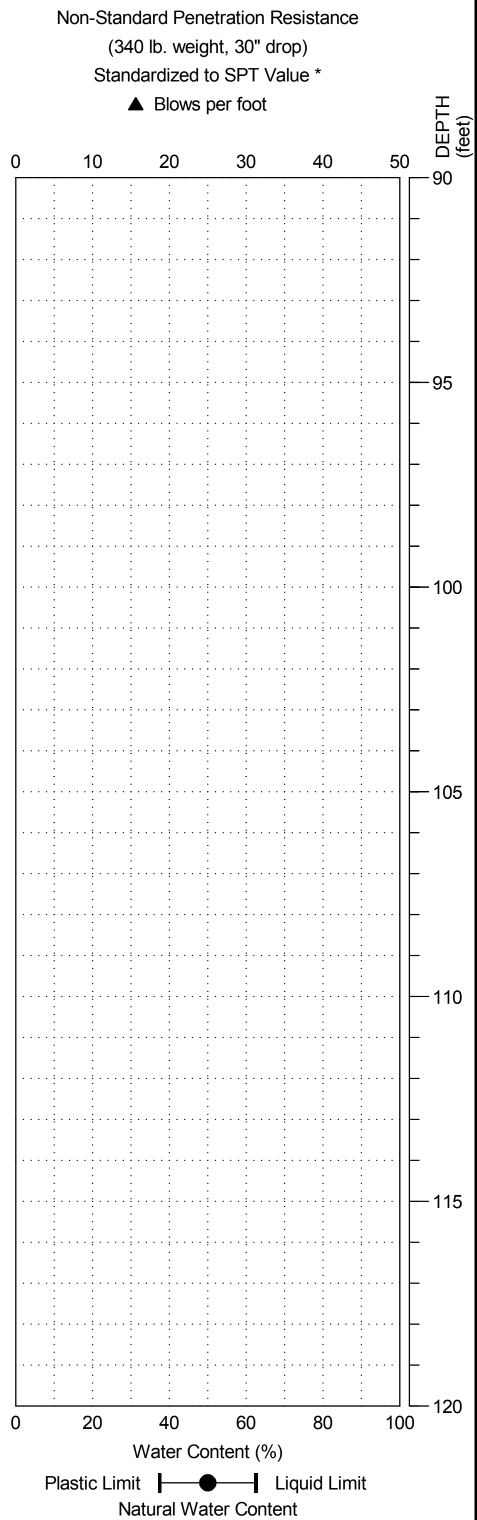
PROJECT NO.: 2015-061

FIGURE: A-21

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer; CA w/ 340 lb. Autohammer
SURFACE ELEVATION: 30.39 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/31/2017
DATE COMPLETED: 5/31/2017
LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90			Hard, dark brownish-gray, SILT, moist. Finely bedded with dark organics in bottom 3".		S-23	5-19-19		
			Borehole terminated at 91.5' below ground surface. Ground water encountered below ~20' during drilling. Borehole abandoned with bentonite grout.					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

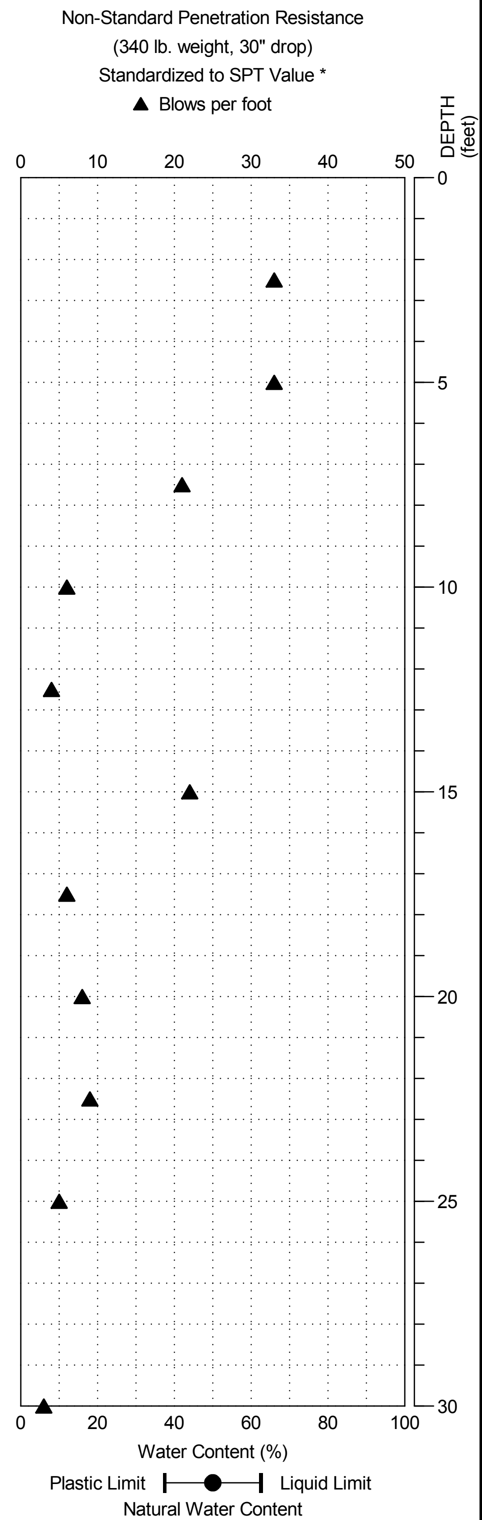
BORING:
BH-20

PROJECT NO.: 2015-061 FIGURE: A-21

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: California w/ 340-lb Autohammer
SURFACE ELEVATION: 33.51 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Hard, silty sand (Cap).				
		Dense, olive-brown, silty, fine SAND, moist. Scattered fine to coarse gravel. **(FILL)**	S-1	5-10-11		
5		Dense, grayish-brown to olive-brown, silty, fine SAND, moist. Scattered fine to coarse gravel.	S-2	7-10-11		
	SP	Medium dense, dark gray, clean, fine to medium SAND, moist, scattered fine gravel, large 3" rock in sampler tip.	S-3	5-6-7		
10		Loose, dark gray, clean, fine to medium SAND, moist, scattered coarse gravel.	S-4	2-2-2		
		Loose, black, wood fragments, glass and plastic pieces, some soil (SILT). ~95% Refuse, ~10% Decomposable. **(REFUSE)**	S-5	1-1-3		
15		Medium dense, dark brown to black, medium sandy SILT, moist, plastic bagging, bottle cap, rubber wires, glass, large 4" metal piece, wood fragments. ~40% Refuse, ~10% Decomposable.	S-6	2-8-6		
		Top 4" partially decomposed wood fragments. Loose, dark brown to black, silty, fine SAND, moist, glass, newspaper, plastic, metal washer, scattered fine to coarse gravel. ~20% Refuse, ~5% Decomposable.	S-7	2-2-4		
20		Loose, dark brown to black, WOOD fragments, some silty, fine sand, plastic bags and glass pieces. ~95% Refuse, ~80% Decomposable.	S-8	2-4-4		
		Top 8", dark brown, WOOD fragments over loose, black, silty, fine gravelly, fine to coarse SAND, moist. Copper wires, steel and plastic pieces, large wood fragment in sampler tip. ~95% Refuse, ~75% Decomposable.	S-9	3-3-3		
25		Loose, black, silty, fine to coarse SAND, wet. Copper wire and glass pieces, large gravel piece in sampler tip. ~35% Refuse, ~10% Decomposable.	S-10	2-2-1		∇
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

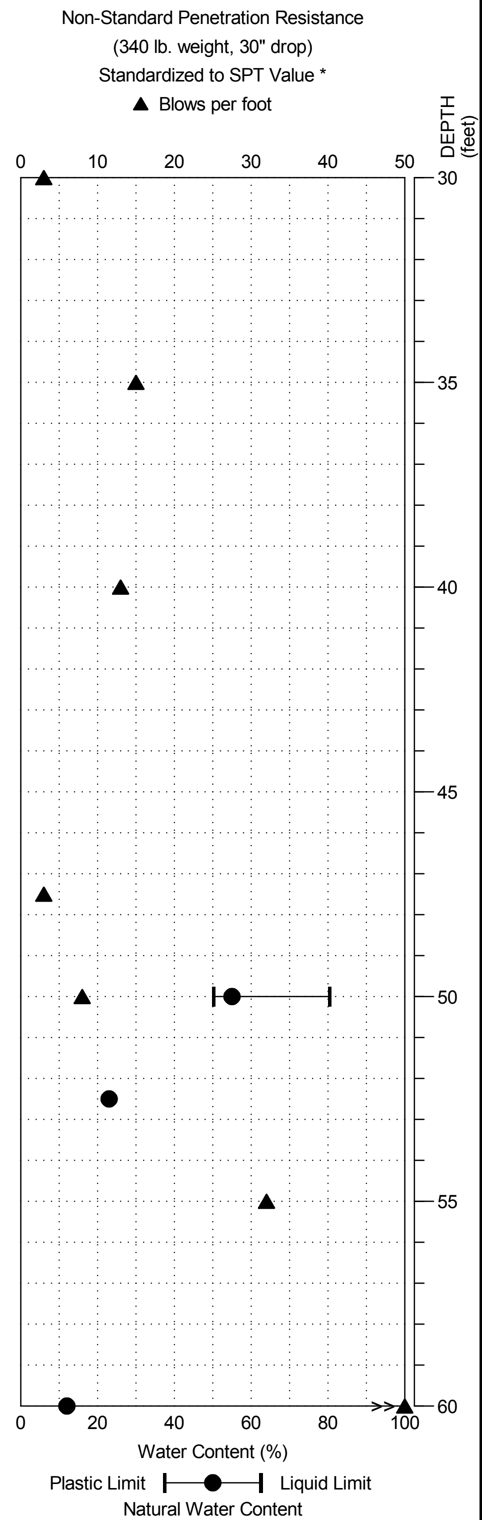
BORING: BH-21

PROJECT NO.: 2015-061 FIGURE: A-22

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: California w/ 340-lb Autohammer
SURFACE ELEVATION: 33.51 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Loose, black, REFUSE, wet. Paper and newspaper pieces, plastic, glass, and metal wire pieces, with silty, fine to coarse SAND. ~80% Refuse, <5% Decomposable.	S-11	1-1-2	
35	PT	No recovery. Plastic pieces on tip of sampler (carry-down). **(ALLUVIUM)**	NR	4-5-10	
40		Stiff, dark brown, PEAT, moist, scattered rootlets and small wood chips.	S-12	5-4-4	
45	OH	No recovery from Shelby tube.	NR	Push	
		Soft, olive-gray, organic SILT, moist. 1/2" diameter x 3" long wood branch in sample, scattered rootlets and wood chips.	S-13	1-1-2	
50		Medium stiff, grayish brown, organic SILT, moist, with interbedded 1 mm layers of organics, finely laminated, scattered small wood chips.	S-14	2-2-3	AL
	SW SM	Poor recovery, Shelby Tube crushed, sand in bottom of tube. Medium dense, brown, slightly silty, fine to coarse SAND, wet. Scattered organics in gravel.	S-15	Push	GS DS OC
55		Dense, olive-brown, silty, fine to medium SAND, wet. **(ADVANCE OUTWASH)**	S-16A S-16B	8-6-14	
60	SP				



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING: BH-21

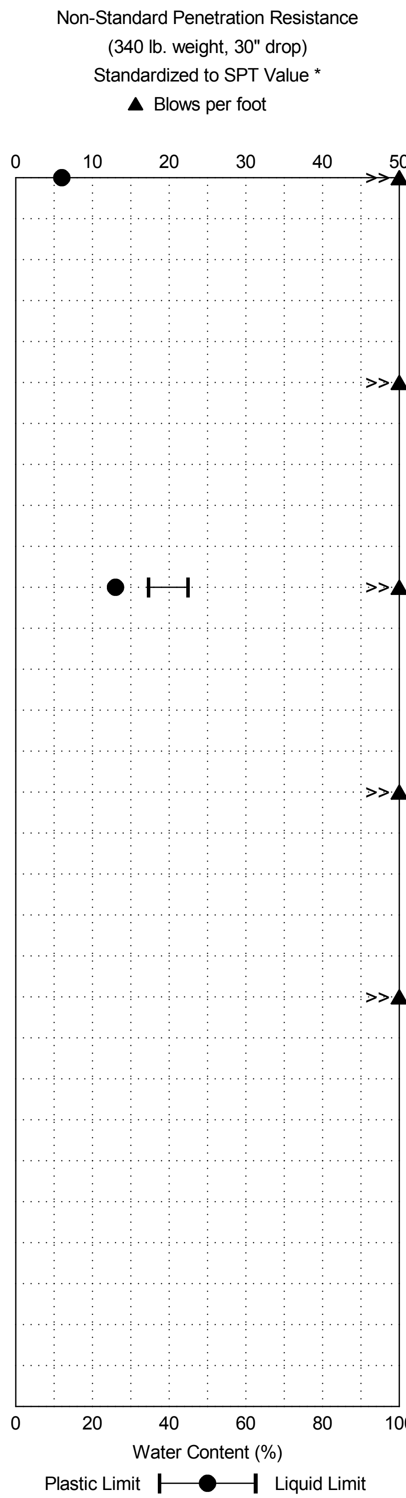
PROJECT NO.: 2015-061 FIGURE: A-22

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: California w/ 340-lb Autohammer
SURFACE ELEVATION: 33.51 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
60	SM	Very dense, olive-gray, slightly silty, fine to coarse SAND, wet, scattered fine to coarse gravel. Drillers added QuikGel grout in auger.	S-17	8-23-24	GS
65		Very dense, olive-gray to dark olive-gray, slightly silty, fine to medium SAND, wet. Scattered coarse grains and fine gravel, thin lens of dark greenish gray, fine SAND at 66' (contact for Pre-Vashon Alluvium?)	S-18A	9-16-19	
	ML	Sampler tip: Olive-brown, SILT, moist. Laminated, silty, fine sand above the silt.	S-18B		
70		Hard, olive-gray grading to brown, SILT, moist. Interbedded lenses (~1-2 mm) of olive-gray, silty fine sand, laminated, 2" lens of silty, fine sand, olive-gray at 70.1', olive-gray silt at 70.3' and dark brown organics. **(PRE-VASHON ALLUVIUM)**	S-19	8-12-21	AL
75	SP SM	Very dense, dark olive-gray, slightly silty, fine to medium SAND, wet. Tip of sampler is olive-gray SILT.	S-20A S-20B S-20C	12-21-28	
80		Very dense, dark olive-gray, clean to slightly silty, fine to medium SAND, wet, fine to coarse sand lens at 81.3'.	S-21	16-22-26	

Borehole terminated at 81.5' below ground surface.
Ground water seepage observed at 25' below ground surface at the time of exploration.
Borehole abandoned with bentonite Grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-21

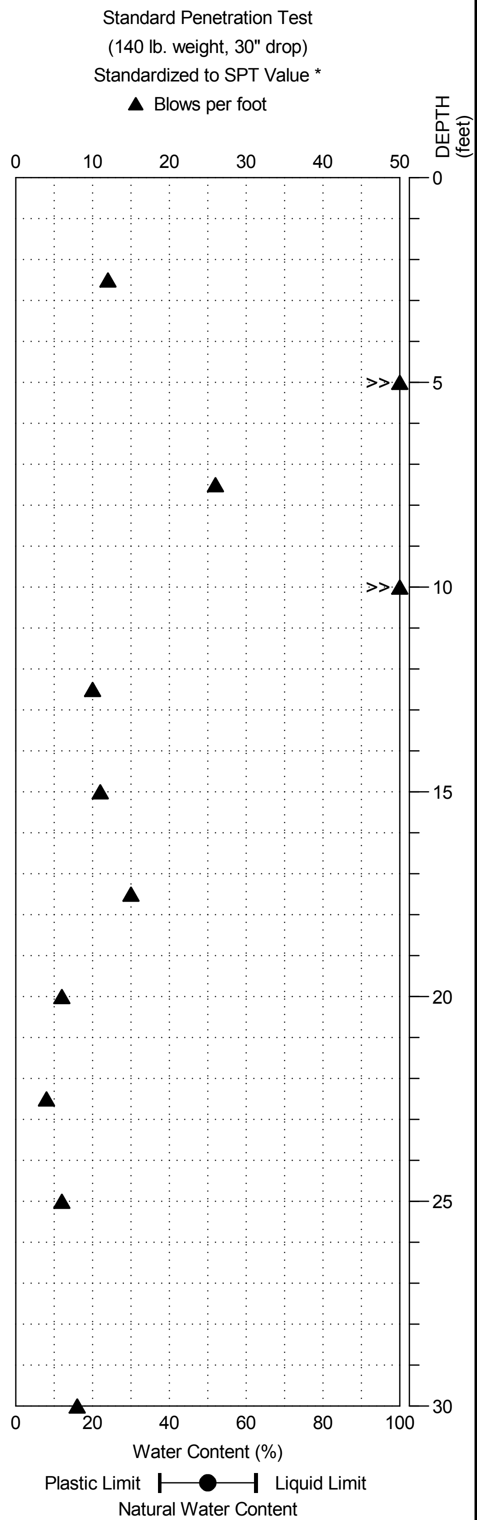
PAGE: 3 of 3

PROJECT NO.: 2015-061 FIGURE: A-22

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 34.02 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/19/2017
DATE COMPLETED: 5/19/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Fill cap.				
		Medium dense, olive-brown, silty, fine to medium SAND, moist. scattered fine gravel. **(FILL)**	S-1	3-5-7		
5	SM	Very dense, gray to brown, silty SAND, grading to silty, fine to medium gravelly, fine to coarse SAND, moist **(CEMENT-TREATED FILL)**	S-2	12-16-30		
	SM	Medium dense, dark brown, silty fine to medium SAND, grading to fine to medium gravelly, fine to coarse SAND, moist. **(FILL)**	S-3	6-12-14		
10		Very dense, dark brown, fine to medium gravelly, silty, fine to coarse SAND, moist. Trace rootlets (<1%).	S-4	12-50/5"		
		Medium dense, dark brown to black, silty, fine to coarse SAND, moist. Brick fragments, wood fragments, fine to medium gravel. ~20% Refuse, ~10% Decomposable. **(REFUSE)**	S-5	10-5-5		
15		Medium dense, brown grading to olive-gray, silty SAND, wet. Scattered fine to medium gravel, rootlets <1%, brick fragments, olive-gray SILT in bottom 6", non-plastic. <10% Refuse, <5% Decomposable.	S-6	10-5-6		
		Medium dense, dark brown to black, silty, fine to medium SAND and wood fragments, moist. ~70% Refuse, ~50% Decomposable.	S-7	5-6-9		
20		Loose, dark brown to black, fine to medium gravelly, silty, fine to coarse SAND, wet. Glass, ceramic and plastic pieces. ~20% Refuse, <1% Decomposable.	S-8	3-3-3		
		Loose, dark brown, fine gravelly, silty, fine to coarse SAND, wet. Glass pieces and cinder. ~30% Refuse, <1% Decomposable.	S-9	2-2-2		▽
25		Loose, dark brown, silty fine to coarse SAND, wet. Abundant glass pieces, ceramic, plastic pieces and scattered fine gravel. ~30% Refuse, <1% Decomposable.	S-10	3-3-3		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

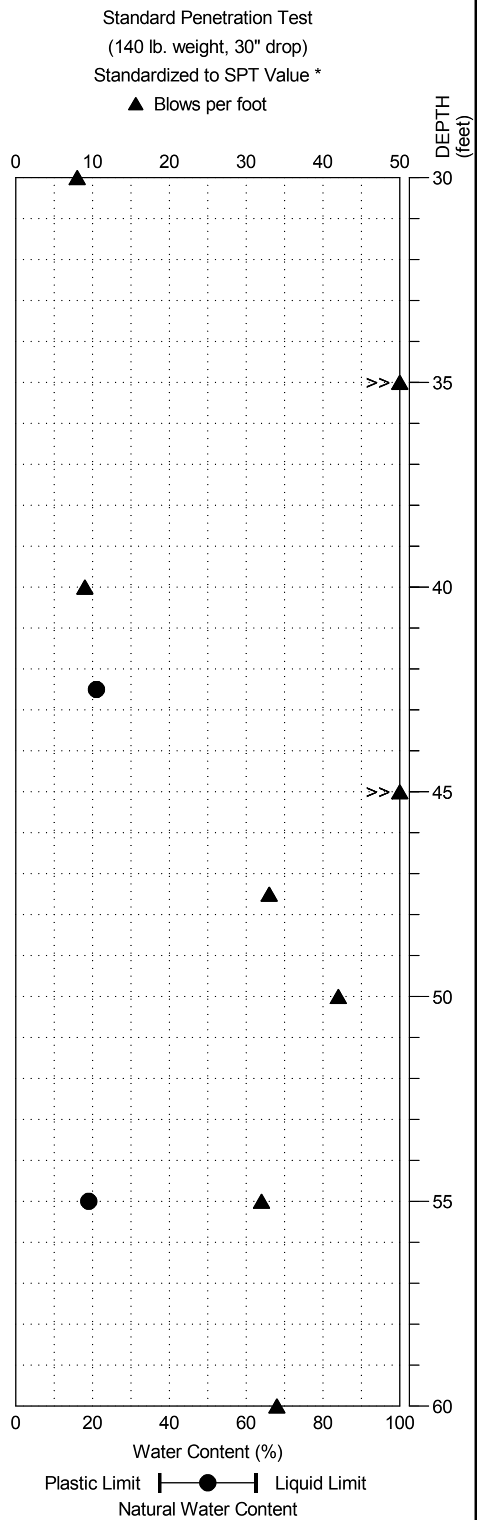
BORING:
BH-22

PROJECT NO.: 2015-061 FIGURE: A-23

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 34.02 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/19/2017
DATE COMPLETED: 5/19/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Loose, dark brown, silty fine to coarse SAND, wet, abundant glass pieces, cinders, scattered fine gravel and creosote staining and odor. ~30% Refuse, <1% Decomposable.	S-11	7-5-3		
35	PT	Medium stiff, dark brown, PEAT, moist. 4" slough (black, silty, fine to coarse SAND, wet) - creosote stained. Blow counts overstated; drove obstruction from Refuse? **(ALLUVIUM)**	S-12	18-22-34		
40	SP	Loose, gray, clean, fine to medium grading to fine to coarse SAND, wet. Driller estimates 6" heave in borehole. QuikGel injected into auger.	S-13	3-4-5		
	SW SM	Loose, grayish brown, slightly silty, fine to coarse SAND, wet. Trace fine gravel. 1-inch lens of organic SILT.	S-14	Push	GS	
45	SP	Very dense, gray, clean, fine to medium grading to fine to coarse SAND, wet. **(ADVANCE OUTWASH)**	S-15	3-9-50/4"		
		Very dense, gray, clean, fine to coarse SAND, wet.	S-16A / S-16B	12-18-32		
50		Dense, gray, clean, fine to medium grading to fine SAND (bottom 6"), wet. Scattered fine gravel in middle (50.5'-50.8').	S-17	12-19-23		
55		Dense, gray, clean, fine to medium SAND, wet. Slightly silty in bottom 6".	S-18	12-12-20		
60						



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HWA GEOSCIENCES INC.

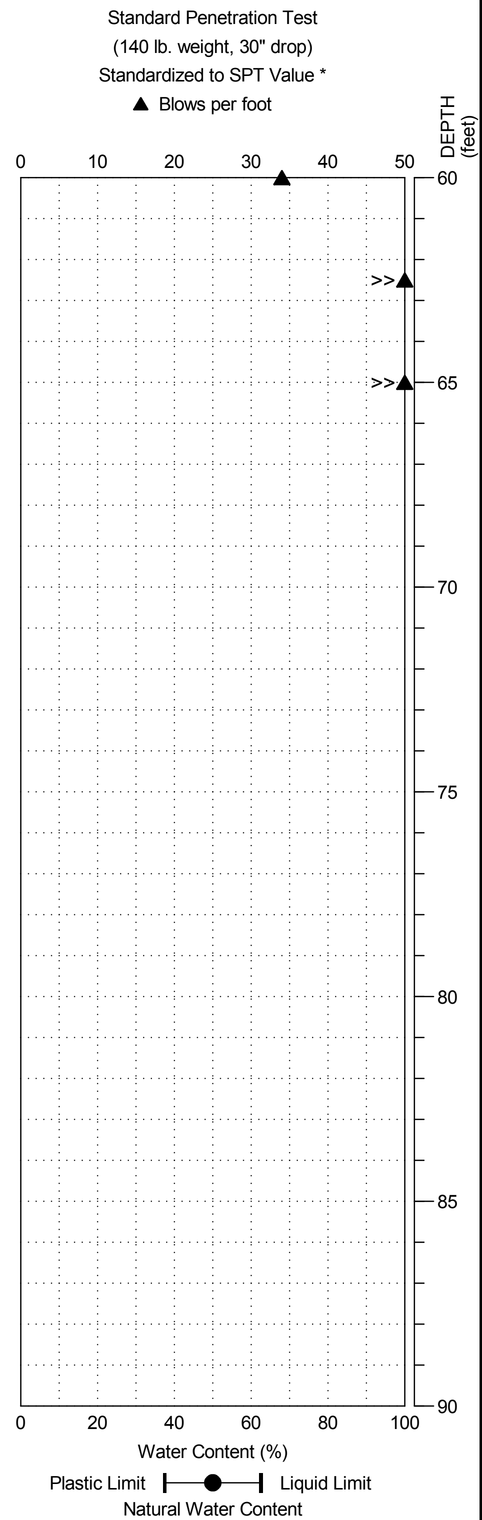
PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-22

PROJECT NO.: 2015-061 FIGURE: A-23

DRILLING COMPANY: Holocene Drilling	LOCATION: See Figure 2
DRILLING METHOD: CME 850 Tracked Rig, HSA	DATE STARTED: 5/19/2017
SAMPLING METHOD: SPT with Autohammer	DATE COMPLETED: 5/19/2017
SURFACE ELEVATION: 34.02 ± feet	LOGGED BY: A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60			Dense, gray, clean to slightly silty, fine to medium SAND, wet. Slightly silty lenses with fine SAND at 60.8'-61' and 61.3'-61.5'.		S-19	9-11-23		
					S-20A	13-43-50/5"		
		ML	Very dense, olive-gray, SILT, moist, massive. **(PRE-VASHON ALLUVIUM)**		S-20B			
					S-20C			
65			Hard, brown grading to olive-brown, SILT, moist, scattered fine gravel, silty fine to medium SAND lens at 65.8'-66'.		S-21	12-18-33		
			Borehole terminated at 66.5' below ground surface (bgs). Ground water encountered below ~22.5' during drilling. Borehole abandoned with ~80 gallons of grout.					
70								
75								
80								
85								
90								



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-22

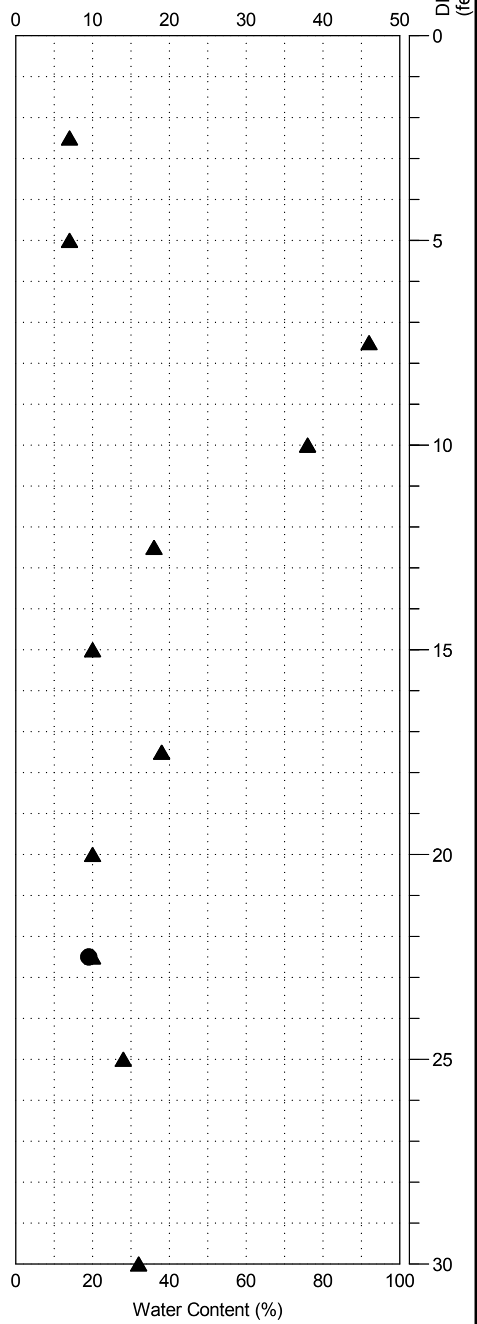
PROJECT NO.: 2015-061 FIGURE: A-23

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 39.61 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/17/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Surface: Medium dense, olive brown, gravelly, very silty SAND, wet. Scattered cobbles, concrete and AC rubble.				
		Loose, gray and brown, silty, fine to medium SAND, moist. Silt varies, scattered gravel. **(LOOSE 2016 FILL)**	S-1	1-3-4		
5		Loose, gray and brown, silty grading to slightly silty, fine to medium SAND, moist. Scattered gravel.	S-2	3-3-4		
	SM	Very dense, olive-gray, fine gravelly, silty, fine to coarse SAND, moist. **(CEMENT-TREATED FILL)**	S-3	19-24-22		
10		Dense, grey, slightly silty, fine to coarse SAND, moist. Scattered gravel.	S-4	10-16-22		
		Medium dense, black and brown, woody debris and charcoal, scattered glass, trace soil. ~95% Refuse, ~90% Decomposable. **(REFUSE)**	S-5	9-8-10		
15		Medium dense, black and brown, woody fiber, sandy silt clumps, pieces of plastic, glass. ~95% Refuse, ~60% Decomposable.	S-6	8-6-4		
		Medium dense, black with mottled brown, organic silty SAND, moist. Trace glass, metal fragment (1"x3"). ~50% Refuse, <5% Decomposable.	S-7	7-8-11		
20		Medium dense, light brown and black, organic, sandy SILT, moist. Mixed with roots and fine wood fibers. ~15% Refuse, ~15% Decomposable.	S-8	6-7-9		
		Medium dense, black, grey, and red, silty SAND, moist. Scattered glass, trace metal, cinders. ~25% Refuse, ~5% Decomposable.	S-9	3-4-6		
25		Medium dense, black, organic, sandy SILT and charcoal, moist. With ~10% light brown silty sand with trace gravel and trace ceramic. ~80% Refuse, ~60% Decomposable.	S-10	3-7-14		∇ (~28 ft)
30						

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

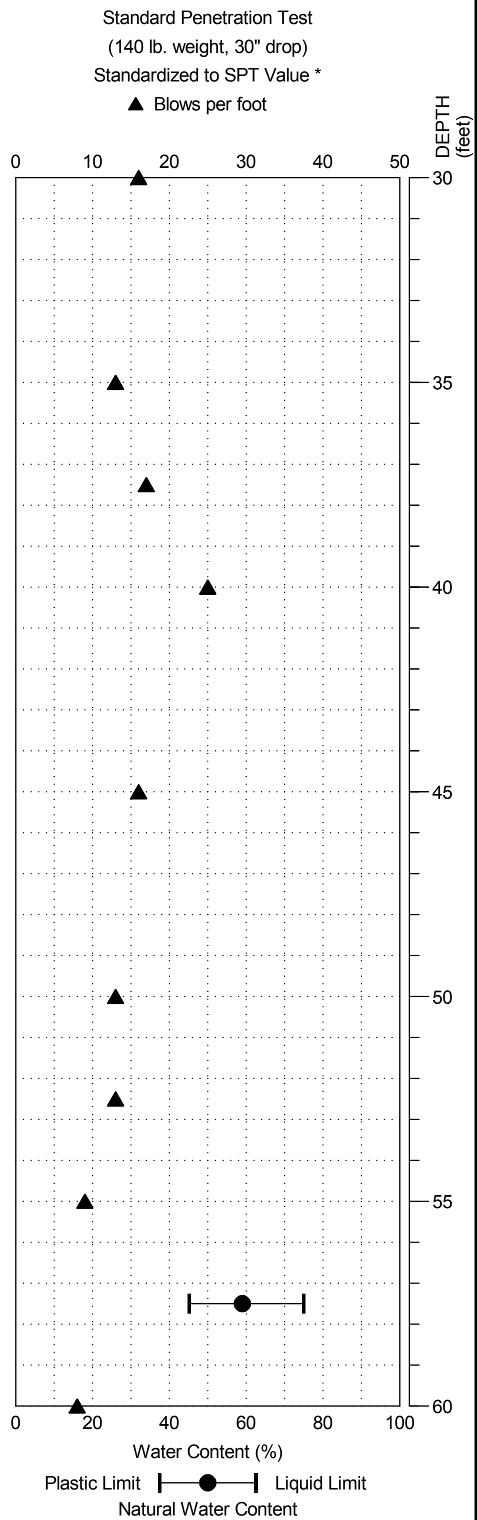
BORING:
BH-23

PROJECT NO.: 2015-061 FIGURE: A-24

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 39.61 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/17/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Medium dense, black, organic, silty SAND, wet. With scattered blackened wood, ash, orange cinder fragments and trace gravel. ~90% Refuse, ~70% Decomposable.	S-11	4-7-9	
35		No recovery.	NR	6-6-7	
		Medium dense, greyish black, slightly silty, fine to medium SAND, ash and medium to course gravel of cinder brick, glass and ceramic, wet. ~70% Refuse, <5% Decomposable.	S-12	11-12-14	
40		Medium dense, black and brownish dark grey, organic silty SAND, wet. With scattered wood debris and fine gravel, glass, copper cable wire in tip. ~60% Refuse, ~15% Decomposable.	S-13	8-12-13	
45	PT	Medium dense, dark brown and brown, partly decomposed WOOD, wet. **(ALLUVIUM)**	S-14	12-9-7	
50		Poor recovery. (Slough of greyish black, silty, fine to medium SAND, wet.)	S-15	5-6-7	
		Stiff, dark brown, fibrous PEAT, moist.	S-16	5-7-13	
55	OH	Medium stiff, variable brown, organic SILT with woody fibers, moist grading to medium stiff, olive grey, plastic SILT, moist. Scattered wood fragments, finely bedded.	S-17	3-4-5	
		Shelby sample: 3 inches of PEAT over medium stiff, dark gray, organic SILT, moist.	S-18	Push	CN AL OC
60					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

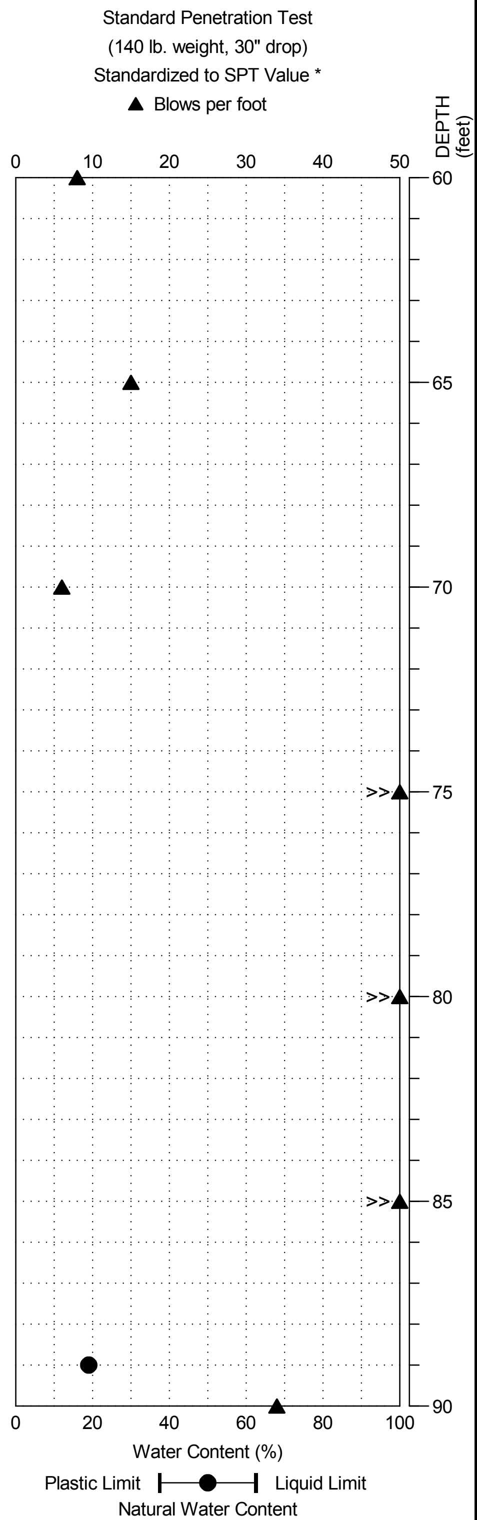
BORING:
BH-23

PROJECT NO.: 2015-061 FIGURE: A-24

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 39.61 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/17/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
60		Medium stiff, grey and olive grey, laminated SILT with woody fragment layers, moist. Roots, partly decomposed 1" layer of wood.	S-19	2-3-5	
65	SM	Medium dense, grey, slightly silty, fine to medium SAND, wet. With peat lenses ~2" thick, bluish grey, sandy SILT lenses ~1" thick.	S-20	5-7-8	
70		Loose, grey, slightly silty, fine to course SAND, wet. Trace fine gravel with ~2" lens of silty fine SAND with partially decomposed roots.	S-21	5-4-2	
75	SP	Very dense, grey, clean, fine to medium and fine to coarse SAND, wet. **(ADVANCE OUTWASH)**	S-22	22-34-48	
80	ML	Very dense, olive grey and olive brown, finely bedded, non-plastic SILT, moist, ~2" dark brown with fine organics in silt at 80'. 4" piece of partly decomposed wood at 80.6'. **(PRE-VASHON ALLUVIUM)**	S-23	9-28-35	
			S-24a		
	SP SM	Very dense, grey, silty fine gravelly, fine to coarse SAND, wet grading to slightly silty, fine SAND, moist.	S-24b		
85	ML	Hard, olive grey, SILT, moist. Mostly non-plastic with scattered charcoal lenses and possible ash, off-white.	S-25	19-28-34	
	SP	Very dense, grey, clean, fine to medium SAND, wet.	S-26a		
90			S-26b		DS



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-23

PROJECT NO.: 2015-061 FIGURE: A-24

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 39.61 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/17/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90			Dense, grey, clean, fine to coarse SAND, wet.		S-26c S-27	9-12-22		
			Boring terminated at an approximate depth of 91.5 feet below the existing ground surface. Ground water encountered below 28 feet during drilling. Borehole abandoned with ~120 gallons of bentonite Quik-grout.					

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot

0 10 20 30 40 50

DEPTH (feet): 90, 95, 100, 105, 110, 115, 120

0 20 40 60 80 100
Water Content (%)
Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

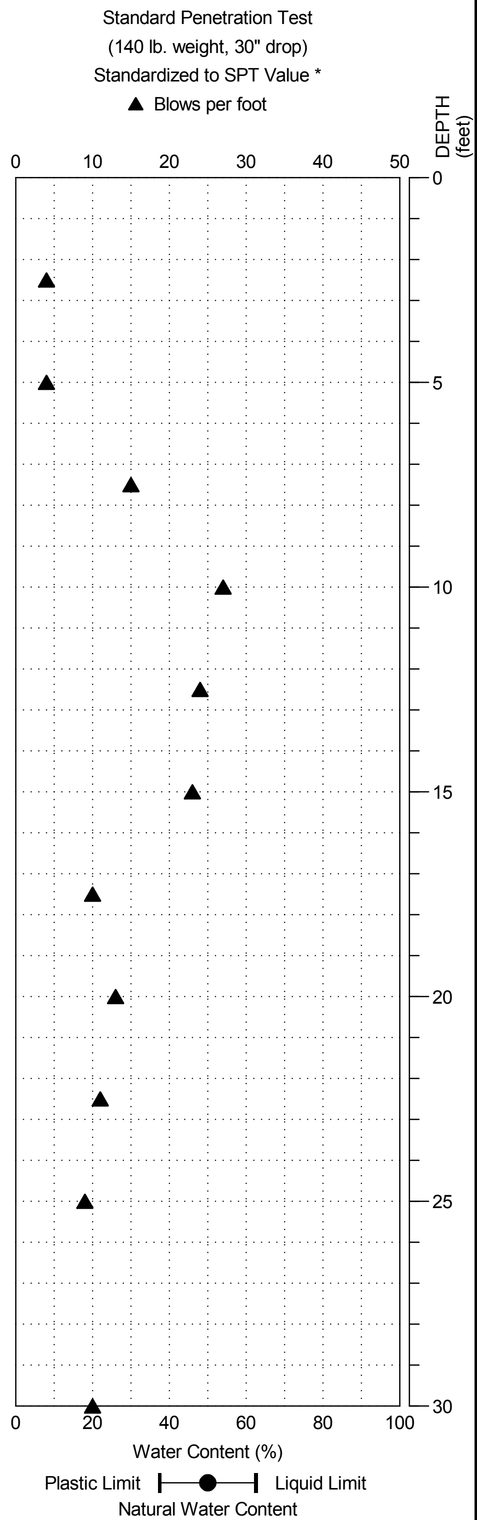
BORING:
BH-23

PROJECT NO.: 2015-061 FIGURE: A-24

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 34.50 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/18/2017
DATE COMPLETED: 5/18/2017
LOGGED BY: A. York/B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Loose, olive gray, gravelly, silty SAND, moist. **(LOOSE 2016 FILL)**				
	SM	Loose, dark gray, silty, fine to medium SAND, wet. Trace fine gravel. **(FILL)**	S-1	1-2-2		
5		Loose, dark gray, silty, fine to medium SAND, wet. Fine to medium gravel.	S-2	1-2-2		
		Medium dense, dark gray, grading to dark brown, silty, fine SAND, grading to silty, fine to coarse SAND, moist. Trace fine to medium gravel, wood fragments in lower 6". ~10% Refuse, ~10% Decomposable. **(REFUSE)**	S-3	3-6-9		
10		Medium dense, dark brown, silty, fine to coarse SAND, moist. Large (2-3") partially decomposed wood fragment in bottom of sample and in sampler tip. ~50% Refuse, ~50% Decomposable.	S-4	12-13-14		
		Medium dense, dark brown, silty, fine to coarse SAND, moist. Slight creosote odor, fire brick in bottom 3", metal piece in tip of sampler and wood fragments in upper 2". ~70% Refuse, ~30% Decomposable.	S-5	8-12-12		
15		Medium dense, olive-gray with some light brown, silty, fine SAND, moist. Trace fine to medium gravel, woody fragments in top 6". ~20% Refuse, ~20% Decomposable.	S-6	12-11-12		
		Medium dense, dark brown, silty fine to medium SAND, moist. Glass pieces and wood fragments, metal bolt. ~50% Refuse, ~25% Decomposable.	S-7	5-2-8		
20		Medium dense, dark brown, silty fine to medium SAND, moist. Red brick and fire brick fragments, glass pieces, wood fibers, trace fine gravel. ~50% Refuse, ~5% Decomposable.	S-8	4-5-8		
		Medium dense, dark brown to black, silty fine SAND (slag sand?), wet. With fire brick or cinder pieces, glass, and trace fine to coarse gravel. ~50% Refuse, <5% Decomposable.	S-9	2-6-5		
25		Loose, dark brown to black, silty fine to medium SAND, wet. With paper fibers and glass, woody fibers in tip of sampler, creosote sheen on water. ~50% Refuse, <5% Decomposable.	S-10	2-4-5		
		Driller noticed water at 28'.				▽
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-24

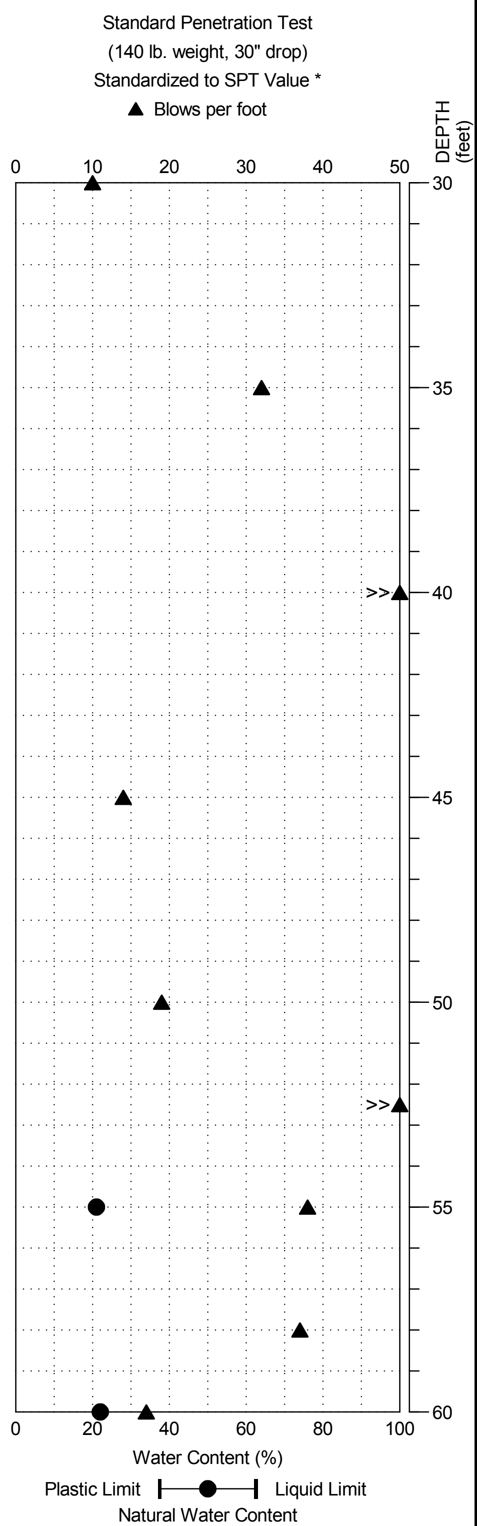
PAGE: 1 of 3

PROJECT NO.: 2015-061 FIGURE: A-25

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 34.50 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/18/2017
DATE COMPLETED: 5/18/2017
LOGGED BY: A. York/B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Medium dense, dark brown to black, silty, fine to coarse SAND, wet. Ceramic and glass pieces, small brick pieces, metal fragment, trace fine gravel. ~80% Refuse, <5% Decomposable.	S-11	2-5-5		
35		Dense, dark brown, silty fine to coarse SAND, wet. Glass, brick, and ceramic pieces, nail and metal wire, trace fine gravel. ~80% Refuse, <5% Decomposable.	S-12	12-15-17		
40		Poor recovery. Slough in sampler - dark brown, slaggy SAND, with broken glass and brick fragments. ~80% Refuse, <5% Decomposable. Hard drilling at 41'.	S-13	50/4"		
45	PT	Stiff, dark brown, alluvial PEAT, moist. With interbedded alluvial silt, wood fragments (50%/50% organic peat/alluvial silt), LEL meter detecting gas (~14% of LEL). **(ALLUVIUM)**	S-14	5-6-8		
		No recovery. Bottom of shelby tube squashed shut.	NR	Push		
50		Very stiff, dark brown, PEAT, moist. With interbedded silt, 2" partially decomposed wood layer at 50.5'.	S-15	5-8-11		
	SP	Attempted to push shelby tube, too dense - no recovery. Re-attempted to sample at 52.5' with ring sampler in CA - no recovery. Driller started using QuikGel mixture in auger.	NR	50/4"		
55		Dense, dark gray, clean, fine grading to fine to medium SAND, wet. **(ADVANCE OUTWASH)** **3' of heave, driller washed out from auger.** **3 batches of QuikGel lost in formation when auger at 57.5' (120-135 gal). Heave washout water (200 gal) also disappeared.**	S-16	9-15-23	GS	
	OH		S-17a	13-23-34		
	SP	Very dense, dark gray, clean, fine to coarse SAND, wet.	S-17b			
60						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-24

PROJECT NO.: 2015-061 FIGURE: A-25

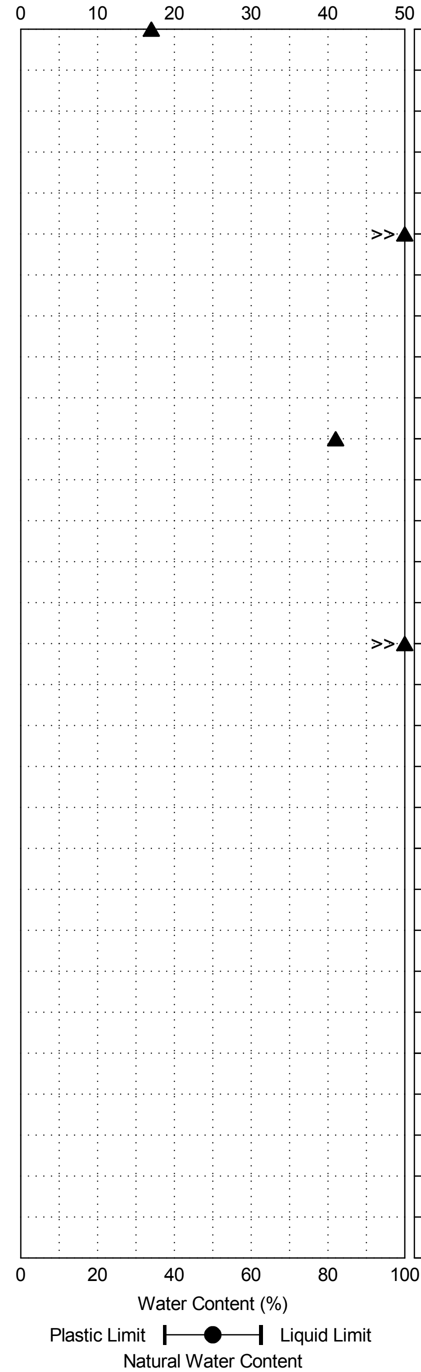
DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 34.50 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/18/2017
DATE COMPLETED: 5/18/2017
LOGGED BY: A. York/B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Heave in top 12".	S-18	5-8-9	GS	
		Stiff, brown, organic SILT, moist.				
		(PRE-VASHON ALLUVIUM)				
		Medium dense, gray, clean, fine to medium SAND, wet. Driller notes heaving sands, SPT values likely not true, ~8" of heave. Still losing Quik grout down the borehole.				
65	SM	Very dense, gray, silty, fine to coarse SAND, with fine gravel, wet. Small lenses of silt (~1") at 66'.	S-19	9-22-36		
70	ML	Dense, olive-brown, SILT, with interbedded fine sand and rootlets, moist.	S-20	12-18-23		
	SM	Dense, olive-gray, silty, fine to medium SAND, wet.				
75		Very dense, olive-gray, silty, fine to medium SAND, wet. Fine gravel in upper 2-3".	S-21	8-24-40		

Borehole terminated st 76.5' below ground surface.
Ground water observed at 28' below ground surface during drilling.
3 batches of QuikGel lost in formation when auger at 57.5' (~120-135 gal). Heave washout water (200 gal) also disappeared.
2.5 barrels (~130 gal) of extra thick grout used to abandon the borehole.

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

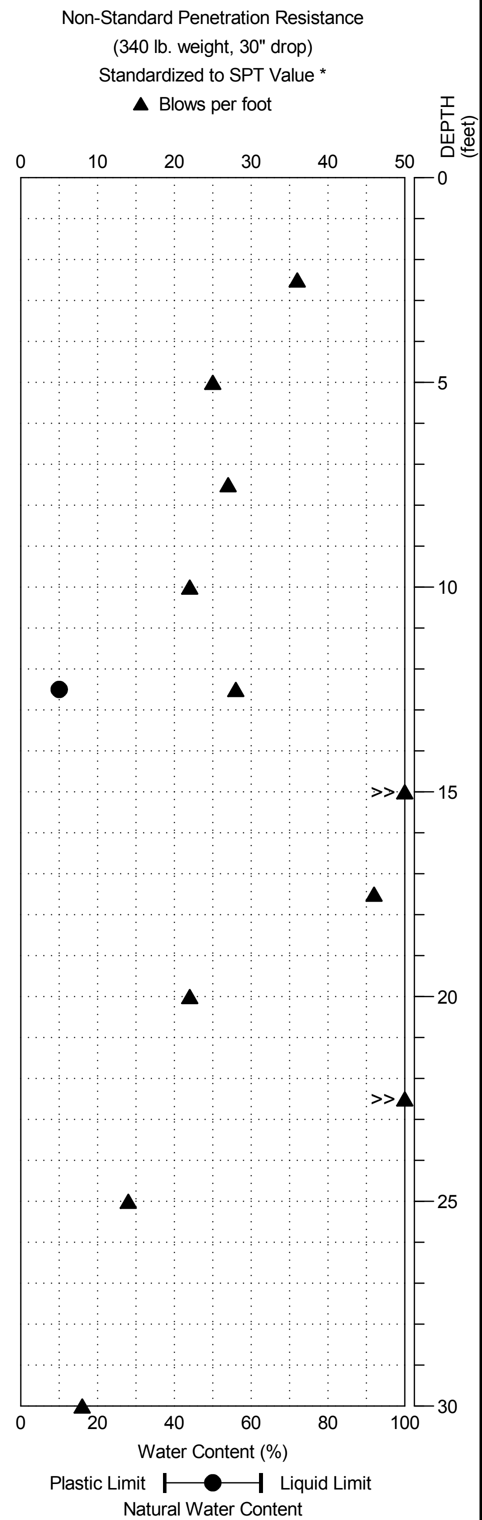
BORING:
BH-24

PROJECT NO.: 2015-061 FIGURE: A-25

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: California w/ 340-lb Autohammer
SURFACE ELEVATION: 32.10 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0	SM	Grass over cement-treated cap fill.			
		Dense, olive-gray, fine to coarse gravelly, silty, fine to medium SAND, moist. ~2" of AC on top. **(FILL)**	S-1	3-3-20	
5		Poor recovery, medium dense, drove ~4" of AC (in tip).	S-2	8-8-8	
		Poor recovery, medium dense, gray, fine to coarse gravelly, fine to medium SAND, moist.	S-3	7-10-7	
10		Poor recovery, meduim dense, dark gray, slightly gravelly, silty, fine to medium SAND, moist, 0.25" thick x 2" wood fragment and shredded clear plastic sheeting. <10% Refuse, <5% Decomposable. **(REFUSE)**	S-4	5-6-8	
		Medium dense, gray, slightly gravelly, silty, fine to medium SAND, moist, over medium dense, dark gray, gravelly, silty SAND with glass and blackened wood fragments. <10% Refuse, <5% Decomposable.	S-5	8-7-11	GS
15		Dense, gray and light gray, silty, sandy, fine to coarse GRAVEL, moist, with ~3" of broken concrete in tip. 100% Refuse, 0% Decomposable.	S-6	20-22-18	
		Gravelly drilling action below 17.5'. Medium dense, dark gray, silty, sandy GRAVEL, moist. With upper 8" of broken concrete, one large sheet of clear visqueen. 100% Refuse, 0% Decomposable.	S-7	14-11-18	
20		Medium dense, dark gray and black, organic, gravelly, silty, fine to coarse SAND, moist. Some of the soil is blackened; no odor, sheen, or smear. ~5% Refuse, ~10% Decomposable.	S-8	6-8-6	
		Medium dense, dark brown with mottled brown, slightly gravelly, organic, silty SAND, moist, with Refuse: Glass, metal, concrete, wood fragments, rubber, broken concrete on tip, blow counts overstated. ~30% Refuse, ~10% Decomposable.	S-9	2-3-33	
25		Heavy drilling action at ~23.5'-24'. Medium dense, black and dark brown to black, slightly gravelly, silty SAND, moist. With wood, rubber ball, glass, cardboard, shredded paper, plastic, and fabric. ~70% Refuse, ~40% Decomposable.	S-10	3-6-3	
30					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

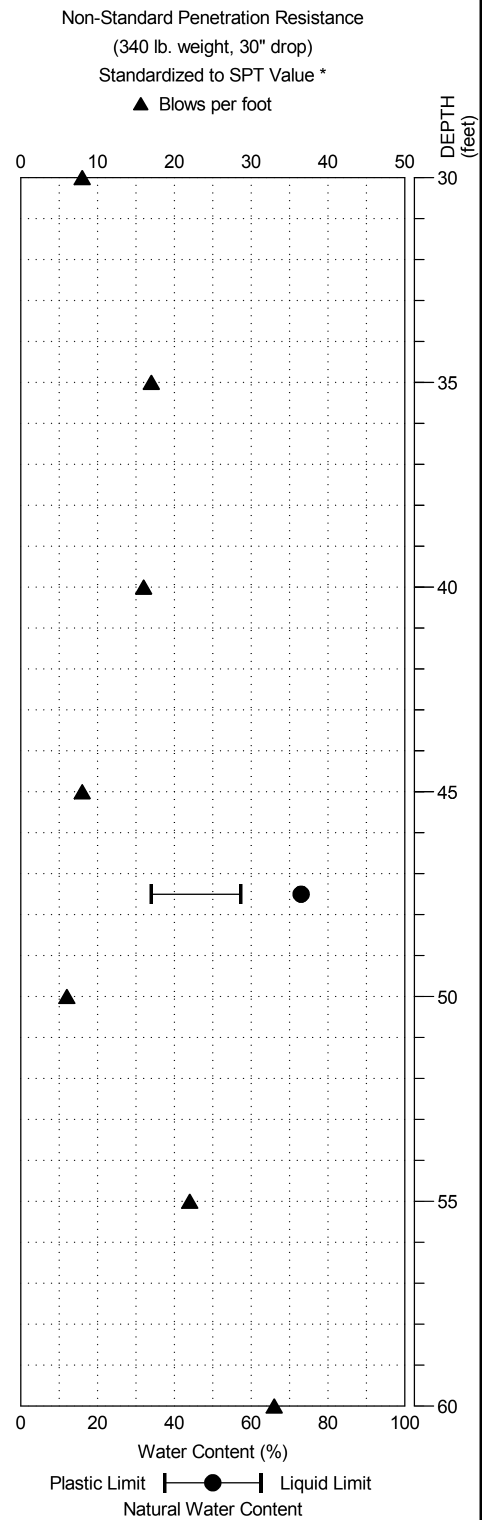
BORING:
BH-25

PROJECT NO.: 2015-061 FIGURE: A-26

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: California w/ 340-lb Autohammer
SURFACE ELEVATION: 32.10 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Loose, black, silty REFUSE: plastic sheeting, glass, rubber. ~80% Refuse, ~10% Decomposable.	S-11	3-2-3		
	ML					
35		Very stiff, partly decomposed wood in olive-brown, SILT, moist, ~60% Decomposable. **(ALLUVIUM)**	S-12	6-5-6		
40		No recovery. Mixed bentonite slurry to control anticipated heave in sand.	NR	6-5-5		
	PT	No recovery. Tip of Shelby Tube crumpled at points; drove something hard.				
45		Medium stiff, dark brown with brown, woody PEAT, moist. Hard, mangled wood at top of sampler.	S-13A	2-2-3		
	OH		S-13B			
		Medium stiff, gray and brownish gray, organic SILT, then SILT, moist. Lenses of woody organics.	S-14		AL TC CN OC	
50	MH	Medium stiff, brownish gray, slightly fine sandy SILT, moist. Non-plastic and plastic, with partly decomposed wood at 50.5', ~1" thick.	S-15	2-2-2		
	SP					
55		Medium dense, dark gray, clean, fine SAND, wet.	S-16	2-5-9		
60						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

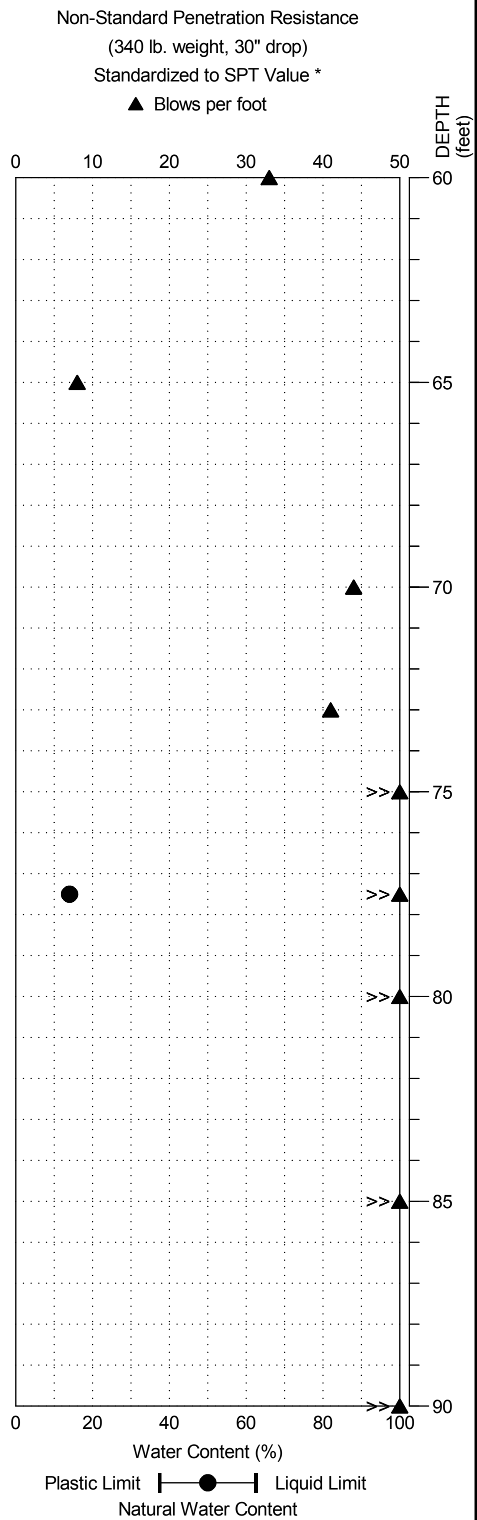
BORING:
BH-25

PROJECT NO.: 2015-061 FIGURE: A-26

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: California w/ 340-lb Autohammer
SURFACE ELEVATION: 32.10 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
60		Dense, dark gray, clean, fine to medium SAND, wet. Massive. With mica grains.	S-17	8-10-11	
65	OL	Medium stiff, brown and gray, organic SILT and SILT, moist, with lenses of woody debris, partly decomposed, turns from light yellow-brown to black with air exposure.	S-18	2-2-3	
	SM	Dense, gray, silty fine to medium SAND, moist.	S-19A	9-12-16	
70	ML	Non-plastic SILT with dark brown woody fragments, moist. Over gray, slightly silty, gravelly, fine to coarse SAND, moist to wet.	S-19B		
	SP SM	Dense, gray, clean, fine to coarse SAND, wet. With brownish-gray, fine sandy, SILT, moist. Silty, fine to medium SAND, wet, at tip.	S-20A S-20B	12-13-13	
75	SW SM	Very dense, gray, slightly silty, fine to coarse SAND, wet. **(ADVANCE OUTWASH)**	S-21	6-14-19	
		Very dense, gray, slightly silty, fine to medium SAND, wet.	S-22A S-22B	9-15-27	DS GS
80		Very dense, gray, slightly silty, fine to medium and fine to coarse SAND, wet.	S-23	7-13-22	
85	SP SM	Very dense, dark gray, clean to slightly silty, fine to medium SAND, wet.	S-24	16-18-25	
90					



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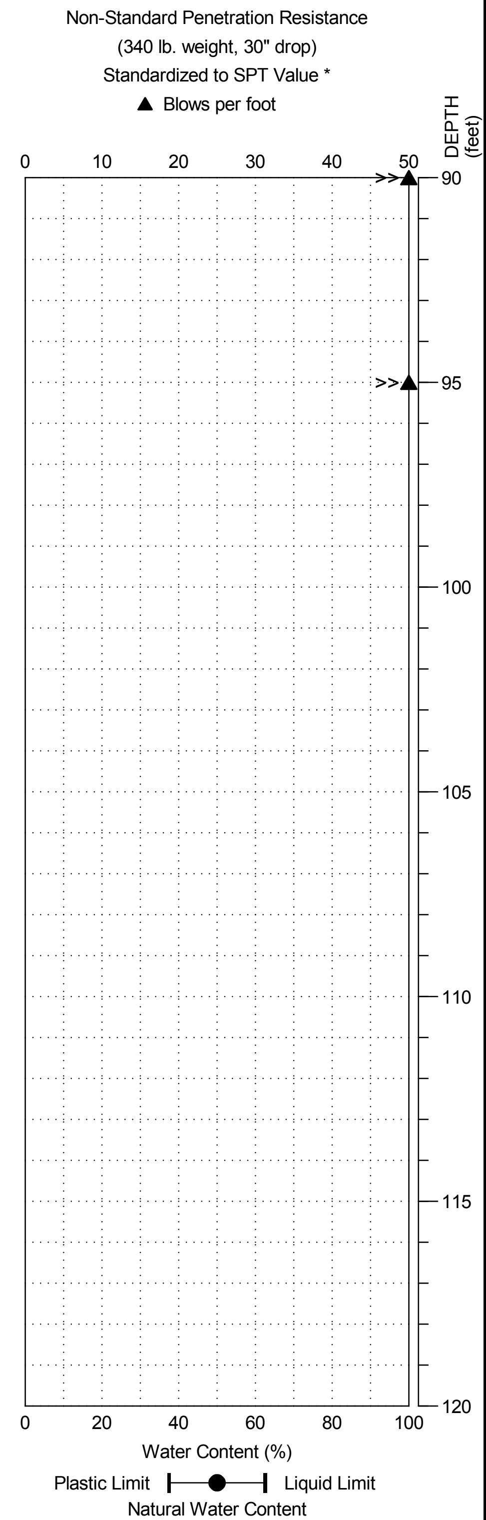
DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: California w/ 340-lb Autohammer
SURFACE ELEVATION: 32.10 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/23/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90		SP	Dense, olive-gray, clean, fine to medium SAND, wet. Driller notes at least 6" of heave in CA sampler.		S-25A S-25B S-25C	6-18-24		
95			Dense, dark, olive-gray, clean, fine to medium, grading to fine to coarse, SAND, moist.		S-26	8-16-16		

Borehole terminated at an approximate depth of 96.5' below the existing ground surface.
Ground water encountered below ~28' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

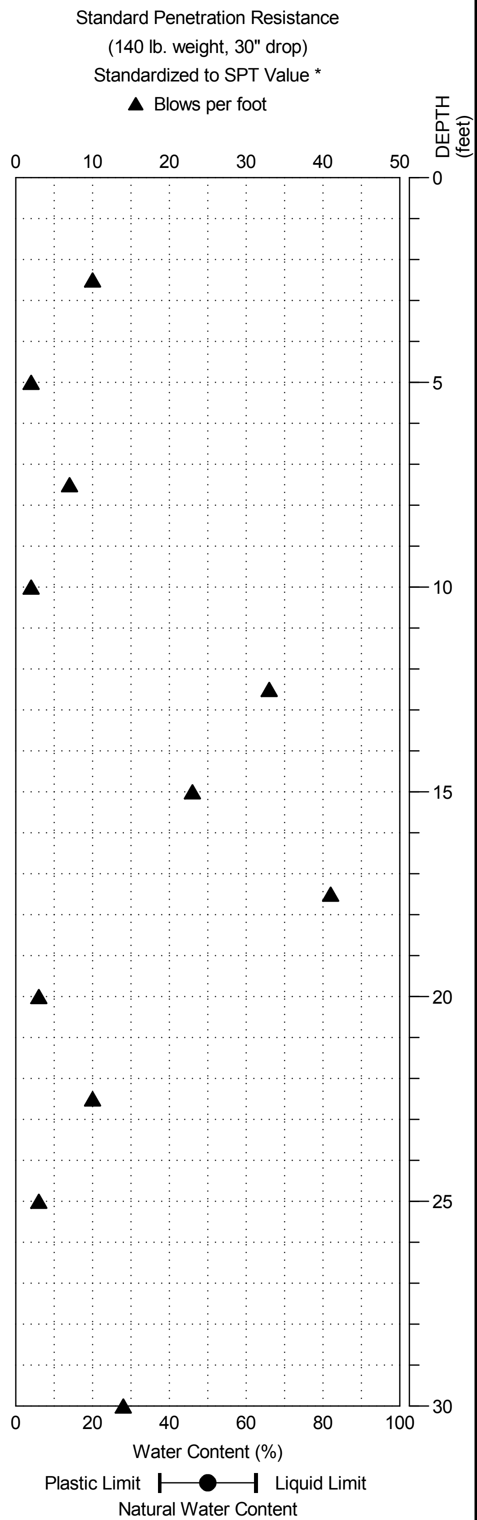
BORING:
BH-25

PROJECT NO.: 2015-061 FIGURE: A-26

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 36.30 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/18/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Cap fill.				
		Loose to medium dense, olive-gray, silty and slightly silty, fine to medium SAND, moist. **(FILL)**	S-1	4-4-6		
5		Very loose, olive-brown, slightly gravelly, silty, fine to medium SAND, moist.	S-2	4-1-1		
		Loose, olive-brown and olive-gray, slightly gravelly, silty, fine to medium SAND, moist to wet.	S-3	2-3-4		
10		Very loose, olive-gray, slightly gravelly, silty, fine to medium SAND, wet.	S-4	1-1-1		
		Dense, olive-brown grading to dark gray, silty, gravelly, fine to medium SAND, moist. Scattered wood fragments, creosote odor from cuttings (Landfill Cap).	S-5	9-16-17		
15		Poor recovery: Olive-brown, silty SAND with white paper or fibrous insulation, blue plastic, aluminum can fragment. ~30 Refuse, <5% Decomposable. **(FILL AND REFUSE)**	S-6	7-9-14		
		Medium dense, brown and gray, sandy SILT, mixed with Refuse: scattered gravel, yellow hard plastic, foil and paper, burnt wood in tip. ~25% Refuse, ~10% Decomposable.	S-7	5-26-37		
20		No recovery.	NR	2-2-1		
		Medium dense, brownish black, silty, sandy, fine to coarse GRAVEL, moist, with large wood fragments. Trace metal. ~5% Refuse, ~30% Decomposable.	S-8	13-9-7		
25		No recovery.	NR	2-1-2		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

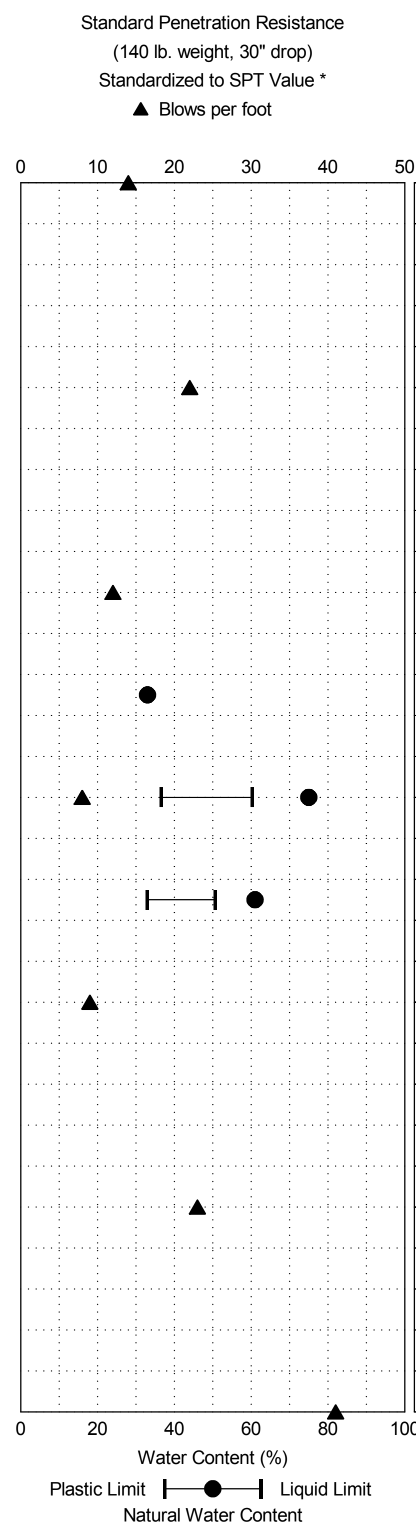
BORING:
BH-26

PROJECT NO.: 2015-061 FIGURE: A-27

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 36.30 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/18/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Medium dense, brownish black, silty, sandy, fine to coarse GRAVEL, wet. Angular gravel, with woody fibers, trace metal. <5% Refuse, ~5% Decomposable.	S-9	9-5-9	
35	OH	6" slough of medium dense, black, silty, fine to coarse SAND, wet. Heavy black staining and strong odor. Very stiff, dark brown, partly decomposed wood in SILT, moist. Outer layer has heavy dark staining and strong odor, ~50% wood fragments. **(ALLUVIUM)**	S-10	16-9-13	
40		Stiff, brown and olive-brown, wood fragments and organic SILT, moist, ~50% wood and organics. Olive-gray below ~41', ~30% woody debris.	S-11	10-6-6	
	SM	Medium dense, dark brown, silty SAND, moist.	S-12	Push	GS
45	OH	Medium stiff, olive-gray, finely bedded, organic SILT, moist. Plastic, with dark brown, partly decomposed wood at 41', and interbedded partly decomposed wood fragments from 46'-46.5'.	S-13	3-3-5	AL
	MH	Stiff, gray, elastic SILT, moist.	S-14	Push	AL OC
50		Stiff, olive-gray, elastic SILT, moist.	S-15	4-5-4	
55		Very stiff, olive-brown, SILT, wet.	S-16A	9-9-14	
	SP SM	Medium dense, olive-gray to gray, slightly silty, fine to medium SAND and silty fine SAND, wet. Began adding bentonite slurry inside auger when drilling below 55 '.	S-16B		
	SP				
60					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

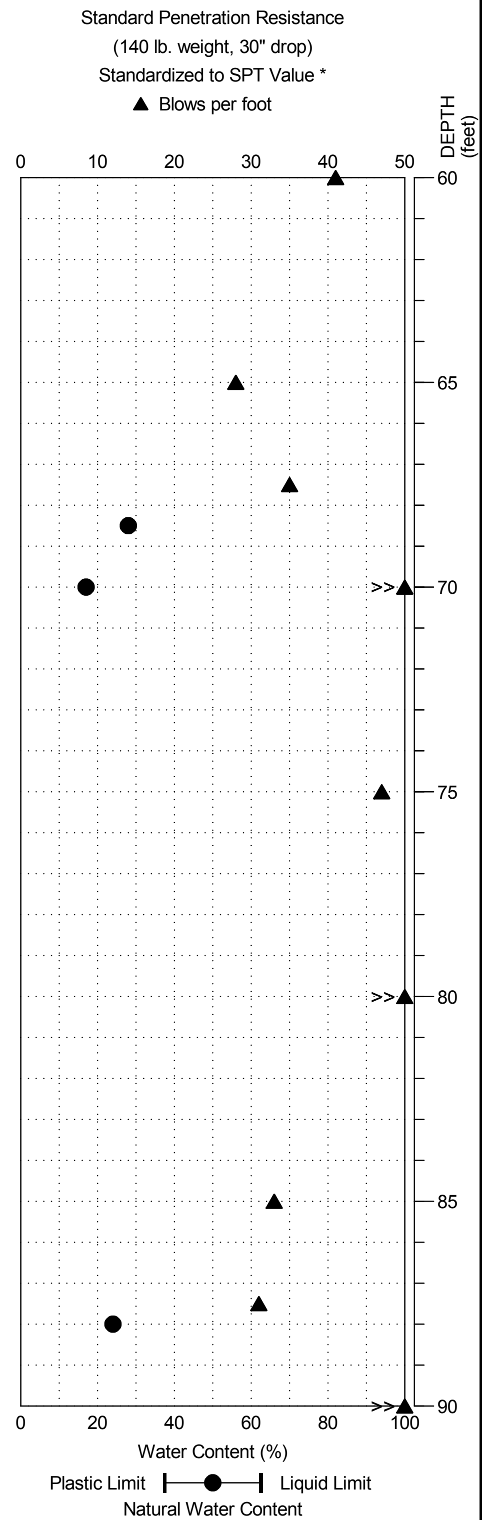
BORING:
BH-26

PROJECT NO.: 2015-061 FIGURE: A-27

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 36.30 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/18/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Dense, dark gray, dense, clean, fine SAND, wet. **(OUTWASH)**	S-17	14-19-22		
65	ML SM	Medium dense, olive-gray, fine, sandy SILT with interbedded layers of gray silty fine SAND, moist, scattered fine gravel.	S-18	9-10-18		
	ML	Hard, olive-gray, SILT, moist. Non plastic.	S-19A	22-19-35		
	SM	Very dense, olive-gray, silty, fine to medium SAND, moist. Scattered fine gravel.	S-19B		DS	
70			S-20	18-25-37		
75	ML	Dense, olive-gray grading to brown, SILT, moist. Interbedded dark brown layers of organics, small lens of silty sand at 75.5', finely laminated in lower 10". **(PRE-VASHON ALLUVIUM)**	S-21	15-22-25		
	SP	Very dense, gray, clean, fine to medium SAND, wet.				
80			S-22	19-30-50/6"		
85		Dense, gray, clean, fine to coarse SAND, wet.	S-23	9-13-20		
		Dense, gray, clean, fine to coarse SAND, wet.	S-24A	12-18-30		
			S-24B		DS	
			S-24C			
90						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-26

PROJECT NO.: 2015-061 FIGURE: A-27

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 36.30 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/17/2017
DATE COMPLETED: 5/18/2017
LOGGED BY: B. Thurber/A. York

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90			Dense, gray, clean to slightly silty, fine to medium SAND, wet.	☒	S-25	18-50/6"		

Borehole terminated at 91' below ground surface.
Ground water encountered below 38' during drilling.
Borehole abandoned with bentonite grout.

Depth scale (feet): 90, 95, 100, 105, 110, 115, 120

Standard Penetration Resistance
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot
0 10 20 30 40 50

0 20 40 60 80 100
Water Content (%)
Plastic Limit ├──●──┤ Liquid Limit
Natural Water Content

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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

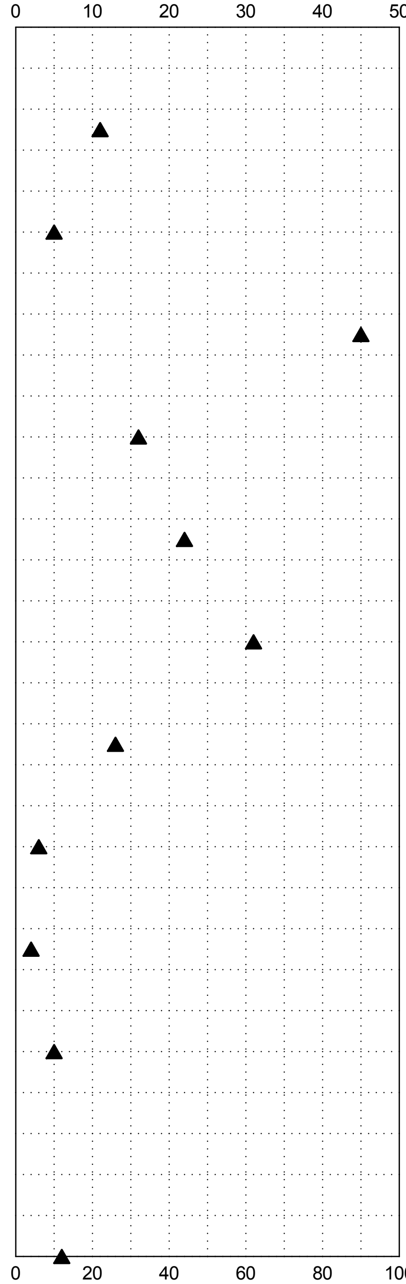
BORING:
BH-26

PROJECT NO.: 2015-061 FIGURE: A-27

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: CA and D&M with 340-lb Autohammer
SURFACE ELEVATION: 30.52 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/25/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Loose, grayish-brown, silty, fine to coarse SAND, moist. Scattered fine gravel. **(FILL)**				
		Loose, grayish-brown, silty, fine to coarse SAND, moist. Scattered fine to medium gravel, wood fragments and roots, ~5% Decomposable.	S-1	2-3-4		
5			S-2	2-2-1		
		Medium dense, grayish-brown, silty, fine to coarse SAND, moist. Large 3"x3" rock stuck in sampler tip (blow counts overstated).	S-3	13-18-27		
10		Medium dense, brownish-gray, silty, fine to coarse SAND, moist. Scattered fine gravel.	S-4	5-5-5		
		Medium dense, dark brown, silty, fine to medium SAND, moist. Large 3"x4" wood fragment at 12.8', plastic bag pieces, scattered fine gravel and rootlets. ~80% Refuse, ~20% Decomposable. **(REFUSE)**	S-5	5-7-7		
15		Dense, gray to light brown, wood fragments, glass, fabric and fiberglass-type material. ~95% Refuse, ~80% Decomposable.	S-6	2-20-11		
		Loose, brown, rubber tire pieces (ranging from 5-7" long), bent metal rod, plastic bags, some soil (silty, fine to medium SAND). ~90% Refuse, ~10% Decomposable.	S-7	7-5-3		
20		Loose, brown, silty, fine to coarse SAND, wet. With wood fragments, glass pieces, and scattered fine gravel. ~40 Refuse, ~5% Decomposable.	S-8	1-1-1		▽
		Loose, dark grayish-brown, silty, fine gravelly, fine to coarse SAND, wet. Glass, brick, and wood. ~30 Refuse, ~10% Decomposable.	S-9	0-1-1		
25		Loose, dark grayish-brown, silty, fine gravelly, fine to coarse SAND, wet. Scattered wood fragments and rootlets, glass pieces, plastic, and bottle top. ~30% Refuse, ~5% Decomposable.	S-10	1-1-2		
	OH					
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-27

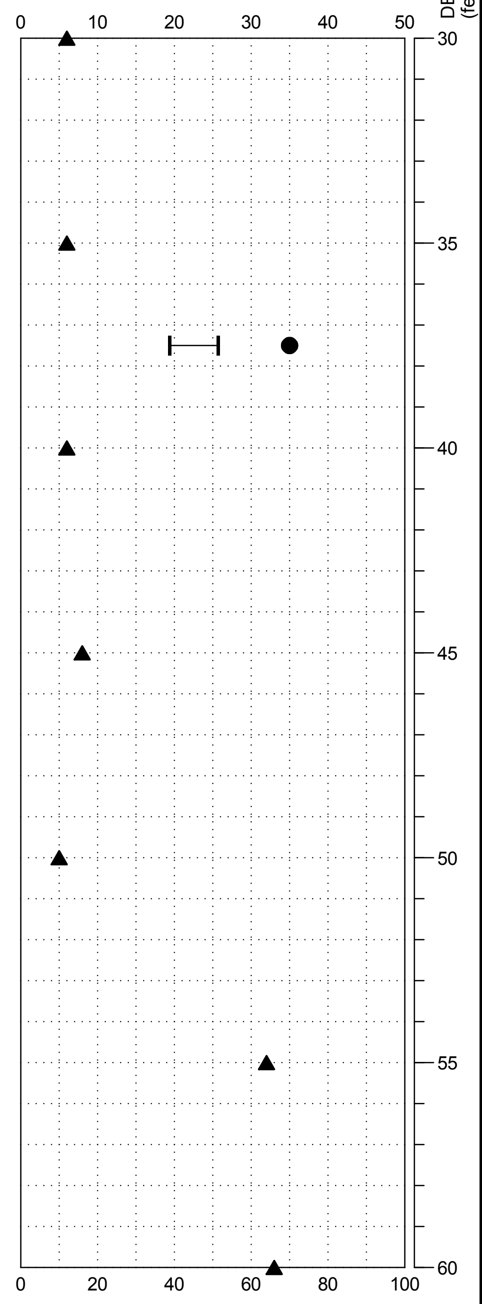
PROJECT NO.: 2015-061 FIGURE: A-28

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: CA and D&M with 340-lb Autohammer
SURFACE ELEVATION: 30.52 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/25/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Medium stiff, black to dark brown to olive-gray, organic SILT, moist. Plastic. Scattered roots and twigs. ~10% Decomposable. **(ALLUVIUM)**	S-11	1-2-2		
35	SM	Loose, olive-brown, silty, fine SAND, moist. Interbedded (~1 mm) layers of organics, scattered wood fragments. ~1% Decomposable.	S-12	2-3-3		
			S-13	Push	CN OC AL	
	MH	Medium stiff, grayish brown, elastic SILT, moist. With interbedded PEAT layers.				
40	OH	Medium stiff, dark brown, organic SILT with interbedded layers of peat grading to PEAT, moist. Scattered wood fragments and rootlets.	S-14	2-2-2		
45		Medium stiff, olive-gray, organic SILT, moist. With interbedded dark layers of organics. Plastic, silty fine SAND in bottom 2".	S-15	2-2-3		
	SM					
50		Loose, olive-gray, silty, very fine SAND, moist to wet. Silty, fine to medium SAND lens (~1-2 mm) at 51.4'. Switched to mud rotary using 3-7/8" tri-cone bit at 51.5'.	S-16	1-1-2		
55		Dense, dark olive-gray, slightly silty, fine to coarse SAND, wet.	S-17	10-8-12		
	SP					
60						

Non-Standard Penetration Resistance
(340 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

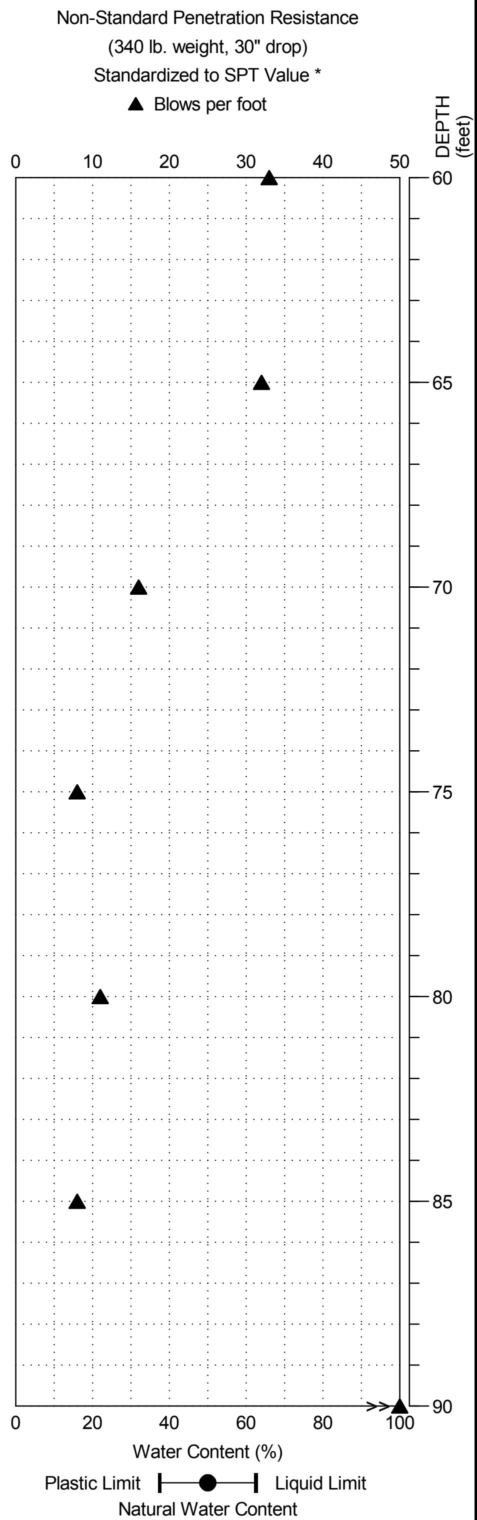
BORING: BH-27

PROJECT NO.: 2015-061 FIGURE: A-28

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: CA and D&M with 340-lb Autohammer
SURFACE ELEVATION: 30.52 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/25/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Dense, dark olive-gray, clean, fine to medium SAND, wet.	S-18	10-10-11		
65		Dense, dark olive-gray, clean, fine to medium SAND, wet.	S-19	11-8-12		
70	SP SM	Medium dense, dark olive-gray, slightly silty, fine to coarse SAND, wet. Scattered fine gravel.	S-20	5-5-5		
75	OH	Medium stiff, dark olive-brown to dark olive-gray, organic SILT, moist. With interbedded layers of dark organics, rootlets and wood fragments, ash layer (light vanilla) at 76.3'-76.5'. ~5% Decomposable.	S-21	2-2-3		
			S-22	Push		
80	PT	Stiff, dark olive-brown PEAT, moist, grading to dark, brownish-gray, silty, fine SAND, wet, grading to olive-gray, silty, fine to coarse SAND, wet. Scattered fine gravel. Olive-gray, SILT in sampler tip. Plastic.	S-23A S-23B	4-3-4		
85	ML	Medium stiff, olive-gray, SILT, moist. Plastic. Dark brown lens (~1") of hard, brittle, plate-like shale material at 85.4'. Scattered fine gravel.	S-24	3-2-3		
90	SP					



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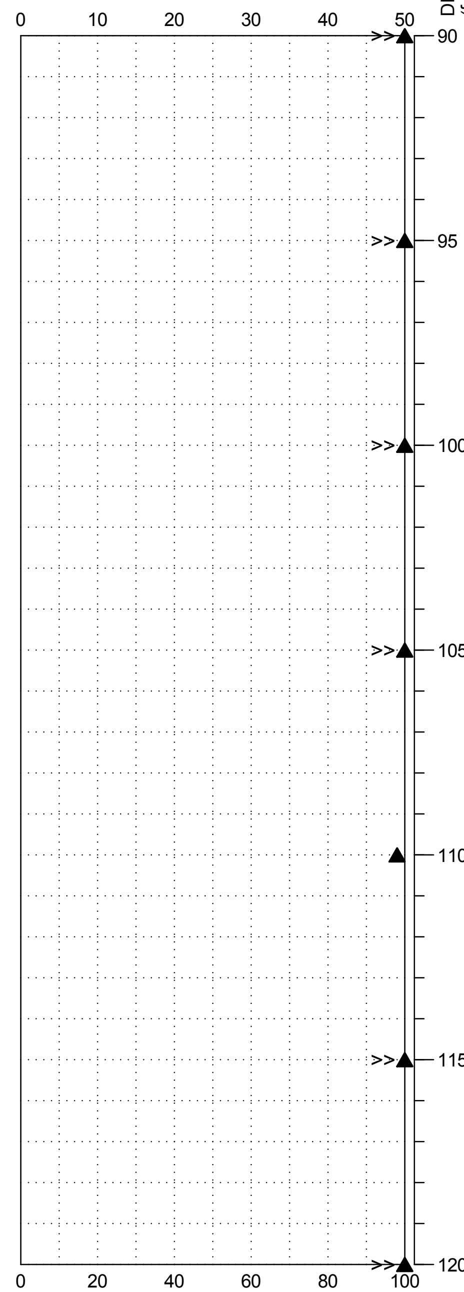
DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: CA and D&M with 340-lb Autohammer
SURFACE ELEVATION: 30.52 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/25/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90		Very dense, olive-gray, clean, fine to coarse grading to fine to medium SAND, wet. Scattered fine gravel. **(ADVANCE OUTWASH)**	S-25	11-17-21		
95		Very dense, olive-gray, clean, fine to coarse grading to fine to medium SAND, wet. Scattered fine gravel.	S-26A S-26B S-26C	20-21-24		
100		Very dense, olive-gray, clean, fine to medium SAND, wet.	S-27	17-22-25		
	SM					
105		Very dense, olive-gray, silty, fine SAND, wet.	S-28A	14-16-17		
	ML	Hard, olive-gray, SILT, moist. **(PRE-VASHON ALLUVIUM)**				
	PT	Hard, dark brown, PEAT, moist.				
	ML					
110		Hard, olive-gray, SILT, moist. With interbedded layers of dark brown organics grading to olive-gray, silty, fine SAND at 110.8'.	S-29	9-13-18		
	SM					
115		Very dense, olive-gray, slightly silty, fine to medium SAND, wet, grading to silty, fine SAND with interbedded dark brown layers of organics and small wood fragment. Hard, olive-gray, SILT, moist. Nonplastic. Trace fine gravel.	S-30A S-30B	17-22-27		
	SP SM					
120						

Non-Standard Penetration Resistance
(340 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-27

PROJECT NO.: 2015-061 FIGURE: A-28

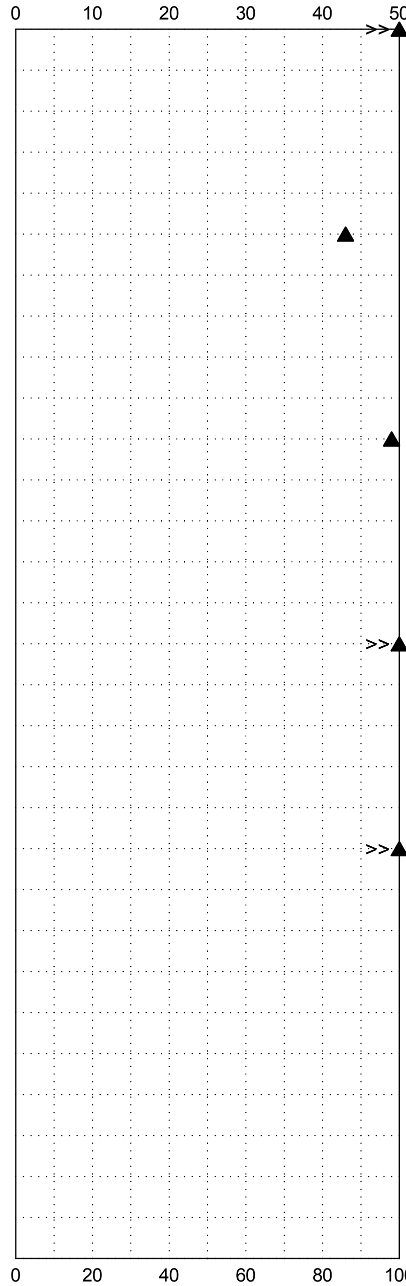
DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: CA and D&M with 340-lb Autohammer
SURFACE ELEVATION: 30.52 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/25/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
120		Very dense, olive-gray, slightly silty, fine to medium SAND, wet.	S-31A	20-24-27		
123	ML SM					
125		Hard, olive-gray, SILT, moist. With lenses of fine SAND, some lamination.	S-32	9-12-15		
130		Hard, olive-gray, SILT, moist. Finely laminated in top 1" with some interbedded layers of dark brown organics and silty fine SAND.	S-33	13-14-17		
133	SM					
135	SM / ML	Very dense, olive-gray, silty, fine SAND, wet grading to hard, olive-brown, SILT, moist. Non-plastic.	S-34A, S-34B, S-34C	17-18-20		
140	ML	Hard, olive-gray, SILT, moist. Nonplastic. Massive 0.5" layer of ash (light vanilla color) at 140.5', finely laminated at 140.8', with interbedded dark brown organics in the bottom 6".	S-35	17-18-19		

Borehole terminated at 141.5' below ground surface.
Ground water encountered at ~20' during drilling.
Borehole abandoned with bentonite grout.

Non-Standard Penetration Resistance
(340 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

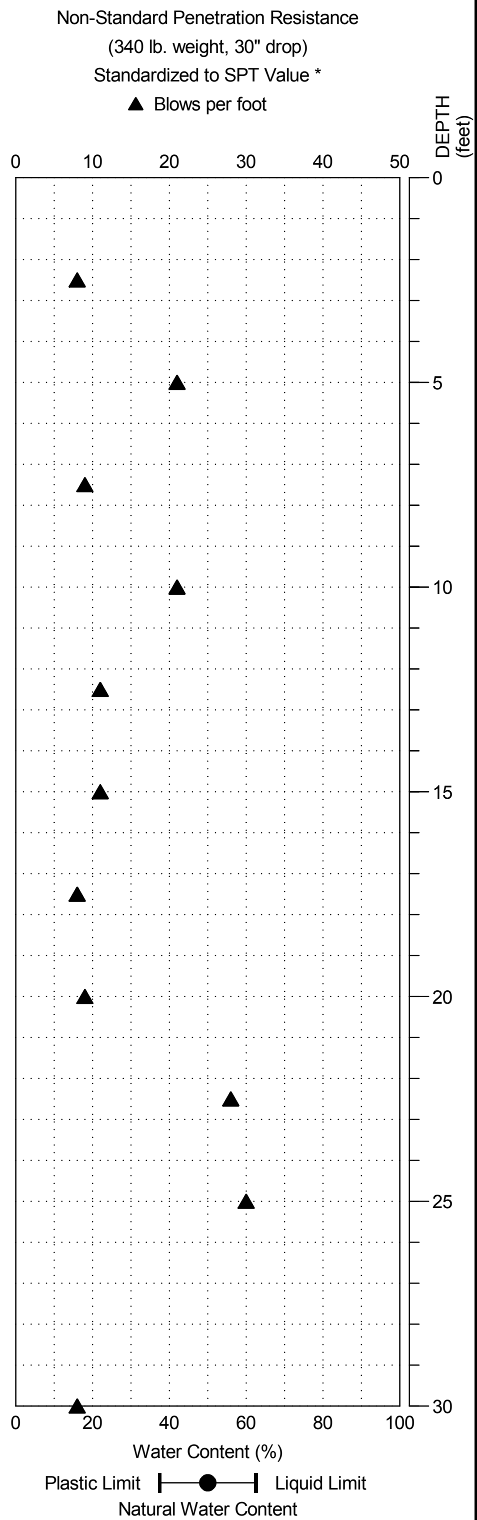
BORING:
BH-27

PROJECT NO.: 2015-061
FIGURE: A-28

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: CA and D&M with 340-lb Autohammer
SURFACE ELEVATION: 30.11 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/26/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SP	Silty, gravelly SAND with grass. **(FILL)**				
		Loose, brown to olive-brown, silty, fine to medium SAND, moist. Scattered fine to medium gravel and rootlets.	S-1	3-2-3		
5		Medium dense, dark brownish-gray, silty, fine to medium SAND, moist. Fine to coarse, sandy gravel lens, wet, in bottom 3", wood fragments. <5% Decomposable.	S-2	2-6-7		
		Loose, olive-gray, silty, fine gravelly, fine to coarse SAND, moist. Dark brown color and increase in silt content at 8.7'	S-3	4-4-2		
10		No recovery.	NR	2-6-7		
		Loose, reddish brown to dark brown, wood fragments, partially decomposed paper, aluminum can pieces, glass, silty, fine to medium SAND, wet. ~50% Refuse, ~30% Decomposable. **(REFUSE)**	S-4	3-2-5		▽
15		Loose, dark brown to black, decomposed paper, plastic bag, glass pieces, 2"x3" ceramic piece at top, wood fragments, silty, fine to medium SAND, moist. Scattered fine gravel. ~80% Refuse, ~30% Decomposable.	S-5	4-4-3		
		Loose, dark brown to black, silty, fine to medium SAND, moisat. Scattered fine gravel, partially decomposed newspaper, glass pieces, wood fragments. ~30% Refuse, ~10% Decomposable.	S-6	2-2-3		
20		Loose, dark brown to black, wood fragments, glass pieces, foam rubber, some soil (silty, fine to medium SAND, moist). ~70% Refuse, ~20% Decomposable.	S-7	2-3-3		
		Medium dense, black, silty, fine to coarse SAND, wet. Scattered fine gravel, large thin metal piece (~3"x5"), rubber wiring with copper wires, glass pieces. ~70% Refuse, ~50% Decomposable.	S-8	6-7-11		
25		Medium dense, black, silty, fine gravelly, fine to medium SAND, wet. Large 3"x6" wood core in bottom, glass and rubber wire pieces, copper wiring. ~80% Refuse, ~50% Decomposable.	S-9	2-6-13		
	OH					
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

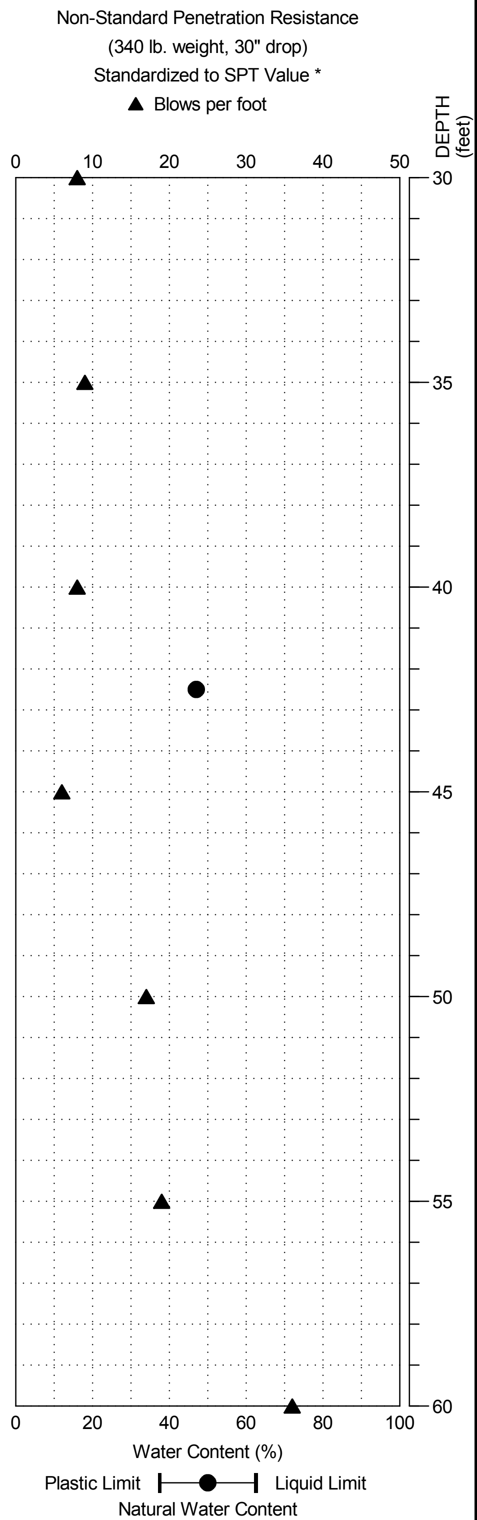
BORING:
BH-28

PROJECT NO.: 2015-061 FIGURE: A-29

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA & Mud Rotary
SAMPLING METHOD: CA and D&M with 340-lb Autohammer
SURFACE ELEVATION: 30.11 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/26/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30		Medium stiff, dark brown, organic SILT, moist. Plastic. Scattered rootlets, ~1% Decomposable. **(ALLUVIUM)**	S-10	3-3-2		
35		Stiff, dark brown, organic SILT, moist. Plastic. Wood fragments and rootlets, ~5-10% Decomposable.	S-11	2-2-4		
40		Stiff, brownish olive-gray, organic SILT, moist. Plastic. Interbedded layers of dark organics, large wood fragment on top of sample, scattered small partially decomposed wood chips.	S-12	2-2-3		
		Stiff, dark grayish brown, SILT, moist. Trace organics in lenses.	S-13	Push	CN	
45		Medium stiff, brownish olive-gray, organic SILT, moist. Plastic. Interbedded layers of dark organics, grades to silty, fine SAND at 47.2'. Switched over to mud rotary.	S-14	2-2-2		
	SP SM					
50		Medium dense, olive-gray to brownish olive-gray, silty, fine to coarse SAND, wet. With lenses of silty fine SAND, partially decomposed wood fragments. ~1% Decomposable.	S-15	5-5-6		
55		6" slough (olive-gray, clean, fine gravelly, fine to coarse SAND, wet). Medium dense, olive-gray, silty, fine to medium SAND, wet. Scattered coarse grains.	S-16	5-5-7		
60						



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HWA GEOSCIENCES INC.

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36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
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DATE STARTED: 5/26/2017
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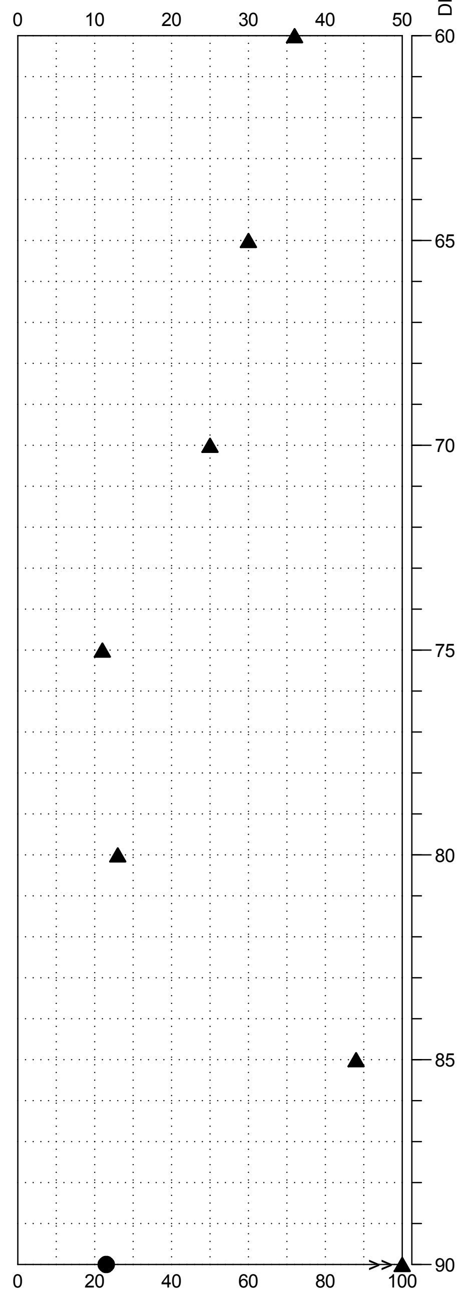
DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Dense, dark olive-gray, silty, fine to medium SAND, wet.	S-17A	8-11-12		
			S-17B			
65		Dense, olive-gray, silty, fine to medium SAND, wet. Scattered fine gravel.	S-18	7-10-9		
70		Medium dense, dark olive-gray, silty, fine to medium SAND, wet.	S-19	4-7-9		
75	PT	Stiff, dark brown, PEAT, moist. 3" layer of ash at 75.4', organic silt, nonplastic at 76-76.3'.	S-20	3-3-4		
80	SP SM	Medium dense, olive-gray, slightly silty to silty, fine to medium SAND, moist. With pockets of silt, some small wood fragments. ~<1% Decomposable.	S-21	3-4-4		
85	ML	Hard, olive-gray, SILT, moist. Nonplastic.	S-22	10-13-15		
	SP SM	Dense, slightly silty to silty, fine to coarse SAND, wet.				
90	SP					

Non-Standard Penetration Resistance
(340 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

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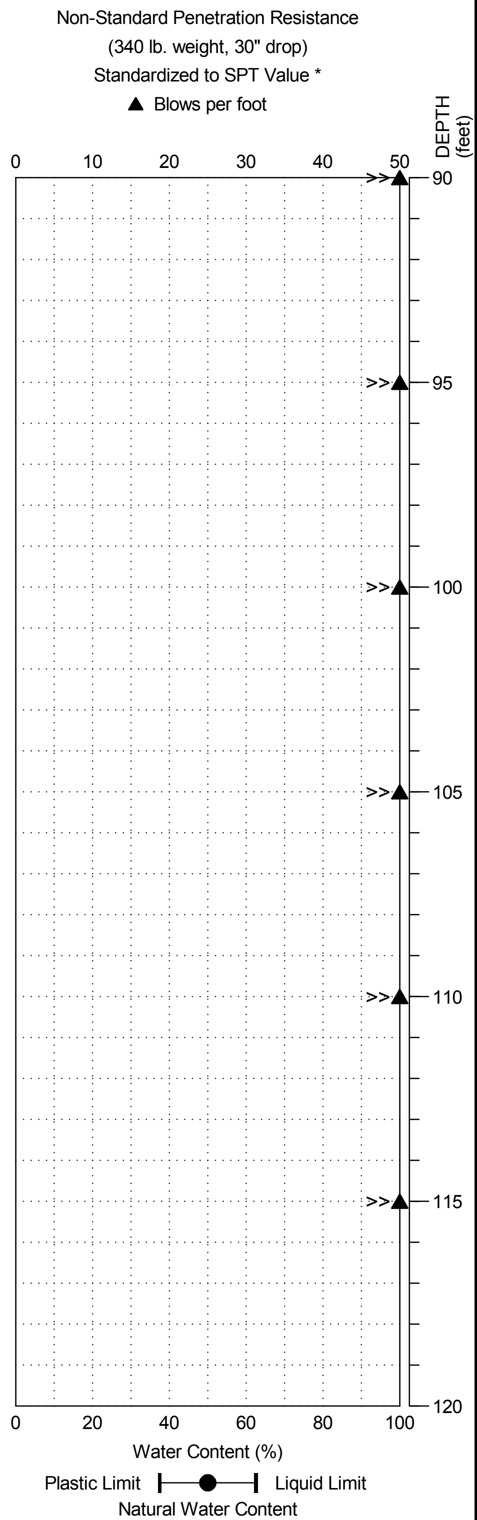
DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90	SM	Very dense, olive-gray, slightly silty, fine SAND, moist. **(ADVANCE OUTWASH)**	S-23	17-21-26		
95		Very dense, olive-gray, clean, fine to medium SAND, wet.	S-24	13-23-28		
100		Very dense, olive-gray, fine to medium SAND, wet.	S-25	15-24-27		
105	ML	Hard, olive-gray to brown, SILT, moist. With interbedded layers of silty, fine to medium SAND and dark brown organics, laminated. **(PRE-VASHON ALLUVIUM)**	S-26	12-13-19		
110	SP SM	Very dense, olive-gray, silty, fine SAND, wet. Interbedded layers of SILT. Nonplastic.	S-27	15-20-22		
115		Very dense, olive-gray, silty, fine to medium SAND, wet. 4-5" lens of brownish olive-gray, dilty, fine SAND at 116-116.4'.	S-28	16-21-38		

Borehole terminated at 116.5' below ground surface.
Ground water encountered below 12.5' during drilling.
Borehole abandoned with bentonite grout.



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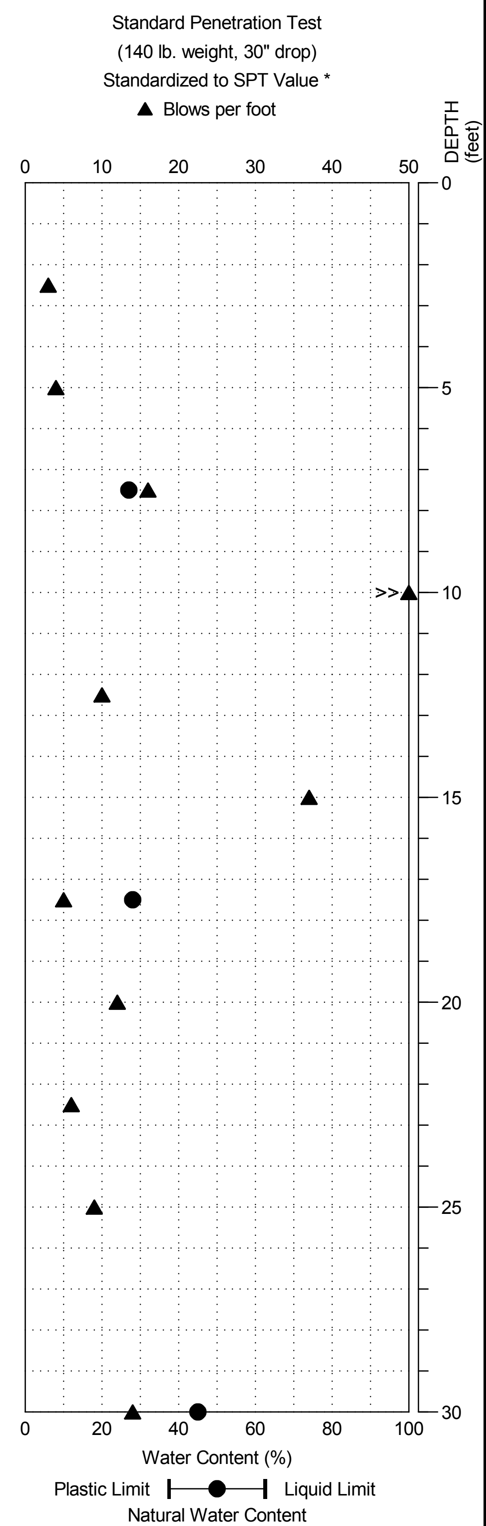
PROJECT NO.: 2015-061 FIGURE: A-29

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 28.67 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/25/2017
DATE COMPLETED: 5/26/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Surface: Cement-treated soil.				
		Loose, brown to bluish-gray, sandy SILT, moist. **(FILL)**	S-1	2-1-2		
5		Loose, light brown to dark dark olive-brown, gravelly, silty SAND, moist. 2" asphalt concrete chunk.	S-2	3-2-2		
		Medium dense, brown to olive-brown, gravelly, silty SAND, moist. With wood debris and plastic sheeting. ~40% Refuse, ~30% Decomposable. **(FILL AND REFUSE)**	S-3	5-6-10		
10		Medium dense, brownish-black, burnt WOOD and dark brown, sandy, SILT, moist. Scattered glass. ~60% Refuse, ~50% Decomposable.	S-4	7-26-30		
		Poor recovery. Medium dense, dark brown, sandy SILT with silty SAND, wet. Scattered glass. ~10% Refuse, ~5% Decomposable.	S-5	12-6-4		
15		Poor recovery; pushed/drove something. Blow counts overstated.	NR	12-21-16		
		Loose, strong brown, gray to black, silty SAND and sandy SILT, moist. With blackened wood and partly decomposed wood. ~25% Refuse, ~15% Decomposable.	S-6	3-2-3		
20		Medium dense, gray, clean, fine to medium SAND, moist to wet. Compressed paper and burnt paper. Wood and glass below 21.25'. ~20% Refuse, ~10% Decomposable.	S-7	13-5-7		
	ML	Medium stiff, olive-brown, SILT, moist. With layers of partly decomposed wood and detrital organics. ~35% organics. **(ALLUVIUM)**	S-8	3-2-4		∇
25		Medium stiff, olive-brown, SILT, moist. With layers of partly decomposed wood and detrital organics. ~30% organics.	S-9	6-4-5		
30						



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36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-29

PROJECT NO.: 2015-061 FIGURE: A-30

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 28.67 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/25/2017
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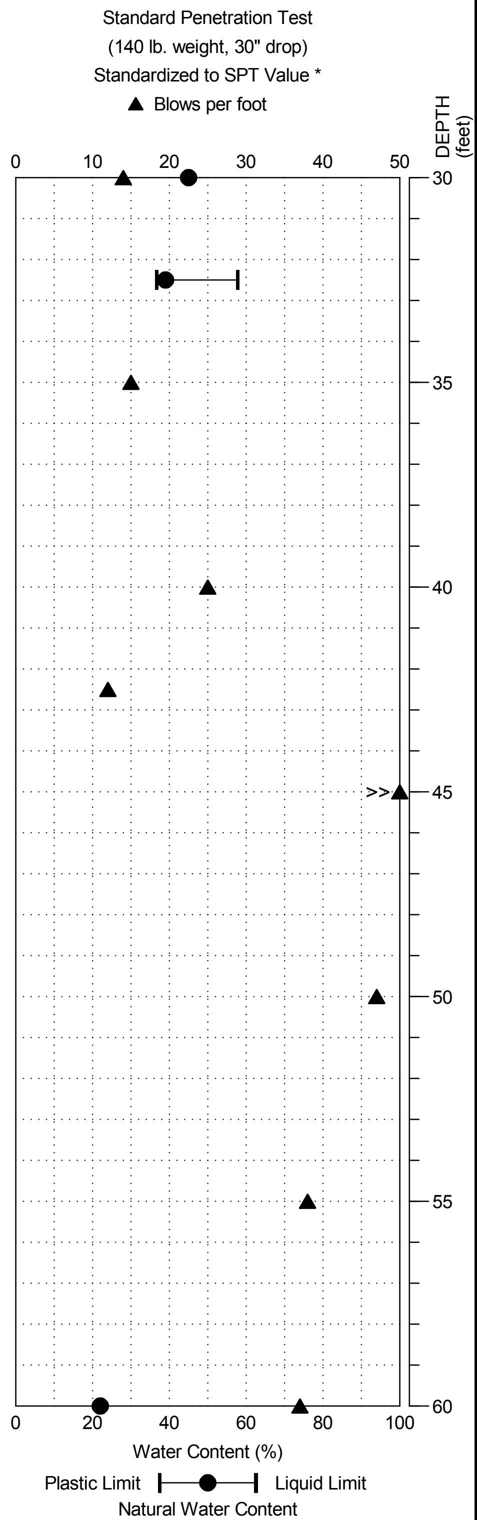
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Stiff, olive-gray, SILT, moist. With fine (<1/8") layers of detrital organics. Scattered partly decomposed wood. ~20% organics.	S-10	6-7-7	GS
	OH	Shelby tube heavily dented up one side; bottom crumpled shut. Stiff, dark grayish brown, organic SILT, moist. With lenses of detrital organics.	S-11	Push	CN OC AL
35	MH	Stiff, olive-gray, fine sandy SILT, moist. With lenses of silty, fine to medium SAND, moist. Abundant lenses of detrital organics and partly decomposed wood. ~10 to 15% organics.	S-12	3-6-9	
	MH				
40		(Same, with no sand lenses)	S-13	8-15-10	
		(Same)	S-14A	4-4-8	
			S-14B		
45		(Same)	S-15	50/6"	
50		(Same, plus sand lenses). Blow counts overstated?	S-16	18-20-27	
	SP SM	Dense, gray, clean and silty, fine to medium and fine to course GRAVEL, wet. Scattered fine gravel and partly decomposed wood. ~15% organics.			
55	SP	Dense, gray, clean, fine to medium SAND, wet. Trace red sand grains (volcanic).	S-17	17-18-20	
60					



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SURFACE ELEVATION: 28.67 ± feet

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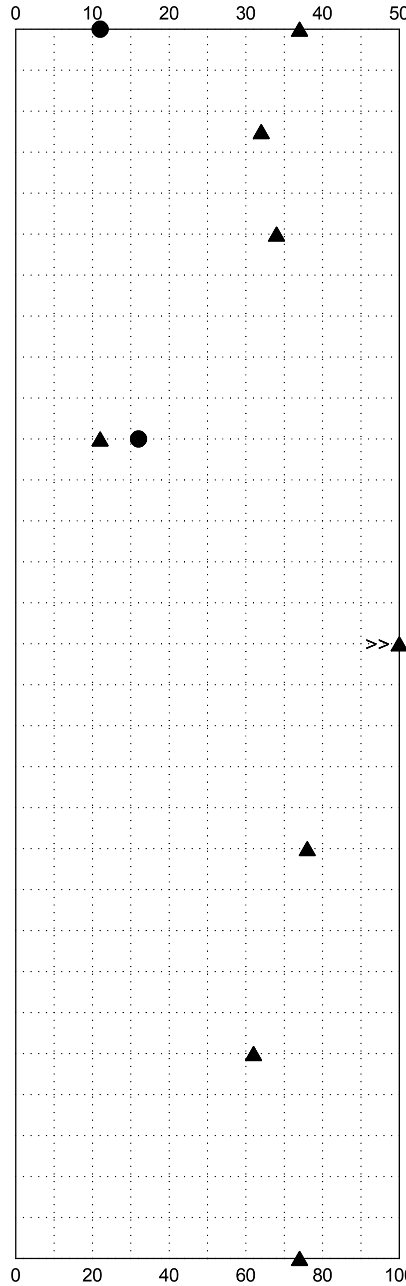
DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)
60		Dense, gray, clean, stratified beds 1-2" thick, fine to medium and fine to coarse SAND, wet.	S-18	17-18-19
	SP SM	Dense, gray, clean to slightly silty, fine to medium SAND, wet.	S-19	9-21-28
65		(Same)	S-20	12-15-19
	ML			
70		Medium stiff, gray, SILT, moist. With lenses of partly decomposed woody organics.	S-21	2-3-8
	OL	Hard drilling below 72'.		
75		Hard, dark grayish-brown, organic SILT, moist. 1"x 2" gravel at the top of sample, and smaller gravel. **(PRE-VASHON ALLUVIUM)** 5/26/17 resumed drilling below 75'.	S-22	50/5"
80	SM	Dense, gray, silty, fine to medium SAND, wet. Over slightly silty, fine to medium SAND, wet. (At 81'.)	S-23	17-18-20
	SP SM	Dense, gray, slightly silty, fine to medium SAND, wet.		
	SP			
85		Dense, gray, clean, fine to medium SAND, wet. Trace fine gravel. Easy drilling, 85-90'. 3' of heave, despite bentonite gel in the auger.	S-24	8-12-19
90				

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



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DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90			Dense, gray, slightly silty, fine to medium SAND, wet. Layer of fine gravel at top.		S-25	10-13-24		
			Borehole terminated at 91.5' below ground surface. Ground water encountered at ~22.5' during drilling. Borehole abandoned with bentonite grout (inside auger; augers pulled intermittently with additional grout), 6 batches x 40-45 gal.					

Depth scale: 90, 95, 100, 105, 110, 115, 120

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot
0 10 20 30 40 50

0 20 40 60 80 100
Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

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BORING:
BH-29

PROJECT NO.: 2015-061 FIGURE: A-30

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 28.07 ± feet

LOCATION: See Figure 2
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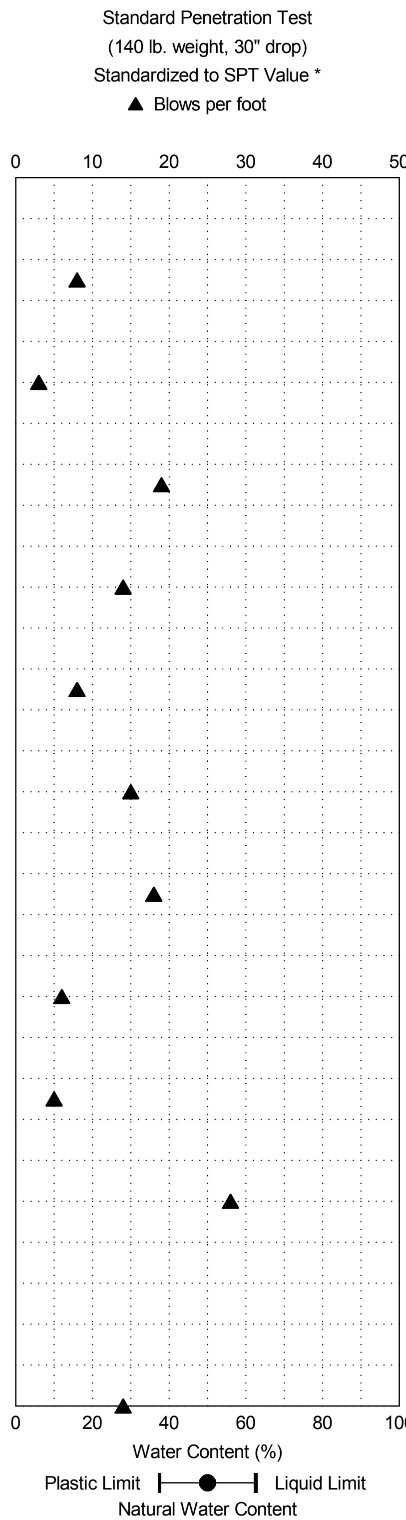
DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Cement-treated surface soil.				
		Loose, dark brownish-gray, gravelly, silty SAND, moist. **(FILL)**	S-1	4-4-4		
5		Loose, dark brownish-gray, gravelly, silty SAND, moist. Wet in lower 6".	S-2	2-1-2		
		Loose, dark brownish-gray, gravelly, silty SAND, moist.	S-3	5-9-10		
		Partly decomposed wood at 8.8', then glass. **(REFUSE)**				
10		Medium dense, brown and gray, silty SAND, moist. With wood, glass, aluminum. ~20% Refuse, ~10% Decomposable.	S-4	5-8-6		
		Medium dense, REFUSE with brown and gray, silty SAND, moist. Glass, paper, metal, plastic sheeting. ~70% Refuse, ~20% Decomposable.	S-5	3-5-3		
15		Medium dense, brown and brownish dark gray, slightly gravelly, silty SAND, moist. With REFUSE (paper, plastic, glass). ~35% Refuse, ~10% Decomposable.	S-6	3-5-10		
		Poor recovery. Medium dense, dark grayish-brown, sandy SILT, moist. 0% Refuse, 0% Decomposable.	S-7	5-11-7		
20		Loose, black charcoal with trace glass and ceramic. ~95% Refuse, ~20% Decomposable.	S-8	4-3-3		
	PT	Medium stiff, dark reddish brown, compressed woody PEAT, moist. With lenses of grayish brown SILT in upper 8". **(ALLUVIUM)**	S-9	1-2-3		
25		Stiff, dark reddish brown, woody PEAT, moist. With partly decomposed wood to ~3" thick at 26'.	S-10	5-6-22		
		Shelby tube sample. Tube dented in lower 2'.	S-11	Push		▽
	OH					
30						



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36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
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PROJECT NO.: 2015-061 FIGURE: A-31

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SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 28.07 ± feet

LOCATION: See Figure 2
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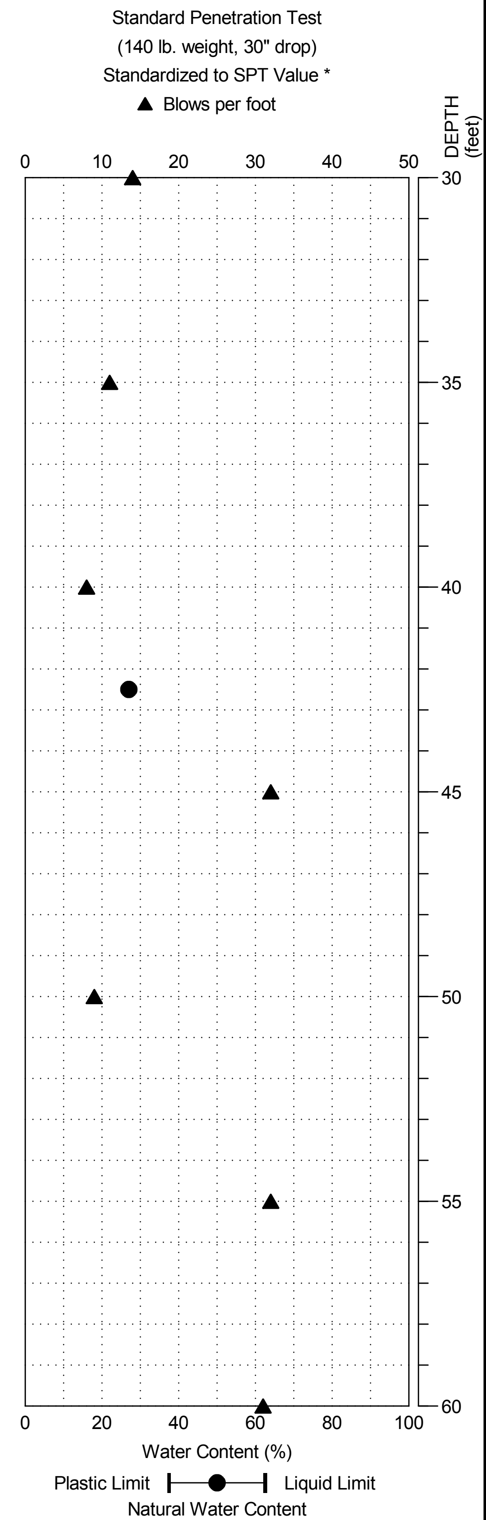
30		Stiff, brownish-gray, SILT, moist. With woody organics. Switched to mud rotary for drilling below 30'.	S-12	3-6-8		
35		Stiff, brownish-gray, SILT, moist. With lenses of woody organics.	S-13	3-5-6		
40		Poor recovery. Shredded wood in tip of auger.	NR	5-3-5		
	SP SM	Medium dense, gray, slightly silty SAND, moist. With layers of sandy SILT and partly decayed organics.	S-14	Push	DS GS	
45	SM	Medium dense grading to dense, gray, silty grading to clean, fine and fine to medium SAND, wet.	S-15A	12-15-17		
	SP	Medium dense, gray, fine gravelly, fine to coarse SAND, wet.	S-15B			
50	SP SM	Loose, gray, slightly silty, fine to medium SAND, wet. With soft, partly decomposed wood (four layers).	S-16	3-4-5		
55	SP	Dense, gray, clean, fine to medium SAND, wet. Vaguely stratified, ~2-4" beds.	S-17	12-16-16		
60						



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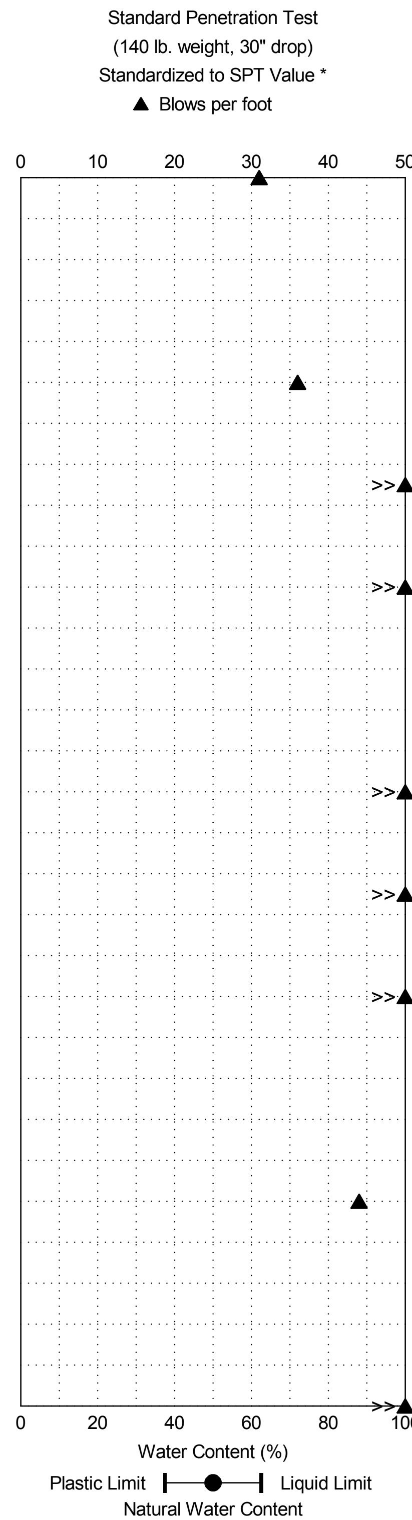
DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Dense, gray, clean, fine to medium SAND, wet. Vaguely stratified, ~2-4" beds.	S-18	8-10-21		
65	SP SM	Dense, gray, clean to slightly, fine to medium SAND, wet. With non-compressed WOOD in upper 3" and 1/2" wood at 66'. Wood was light brown.	S-19	8-15-21		
	GP GM	Gravelly drill action at 67'. 6" tube top: sandy, fine to coarse GRAVEL, wet.	S-20A	33-50/6"		
	SP SM	Tip: Dense, gray, slightly silty, fine to medium SAND, wet.	S-20B			
70		Very dense, gray, slightly silty, fine to medium SAND, wet. **(ADVANCE OUTWASH)**	S-21	20-31-36		
75		Very dense, gray, clean to slightly silty, fine to medium SAND, wet. Scattered coarse sand, fine gravel to ~1/4".	S-22	25-29-36		
		Very dense, gray, clean, fine to medium SAND, wet.	S-23A S-23B	33-50/5"		
80		Very dense, gray, stratified (1-4" beds), clean and slightly silty, fine to medium SAND, wet.	S-24	13-19-33		
85	SP	Dense, gray, stratified, clean, fine to medium SAND, wet. Scattered coarse sand and fine gravel to 1/4".	S-25	17-21-23		
90	SP SM					



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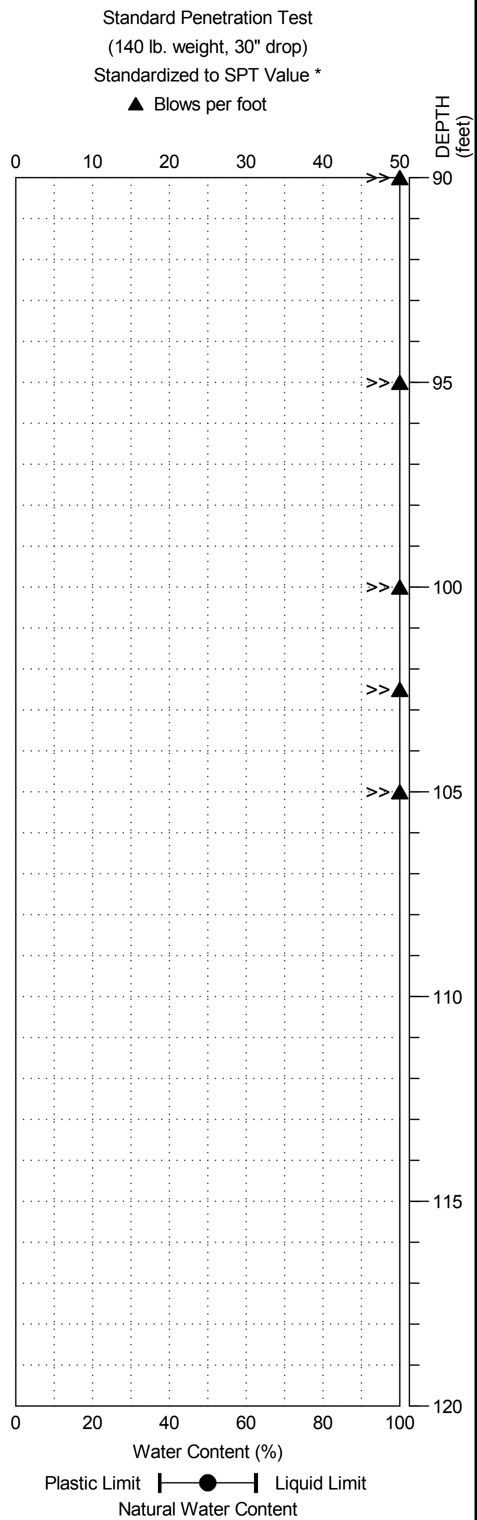
LOGGED BY: B. Thurber

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
90			Very dense, gray, slightly silty, fine SAND, wet.		S-26A	26-32-36		
		ML	Hard, gray, SILT, moist. Plastic. Scattered detrital organics. **(PRE-VASHON ALLUVIUM)**		S-26B			
95					S-27	20-29-32		
		SP SM						
100			Very dense, olive-gray, silty fine SAND, wet. With 1-2" beds of clean, fine to medium SAND and lenses of dark brown organics.		S-28	19-26-39		
			Very dense, gray, clean, fine to medium SAND,wet.		S-29A S-29B	36-50/5"		
105		SP SM	Very dense, dark gray, slightly silty, fine to medium SAND, wet. Scattered partly decomposed wood.		S-30A	19-29-38		
		CL	Hard, gray, silty CLAY, moist. With detrital organics.		S-30B			

Borehole terminated at 106.5' below ground surface.
Ground water encountered at ~28' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

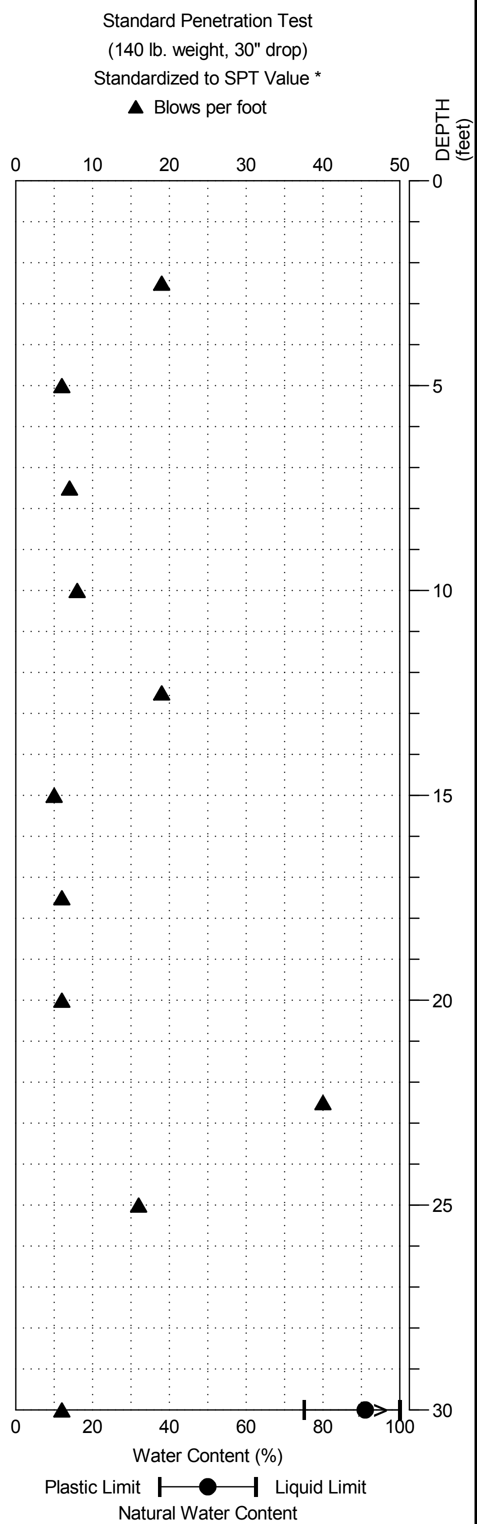
BORING:
BH-30

PROJECT NO.: 2015-061 FIGURE: A-31

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 25.91 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Medium dense, olive-brown, slightly gravelly, silty SAND, moist. **FILL)**				
		Medium dense, brown (upper 3"), then brownish-gray, slightly gravelly, silty SAND, moist. ~10% Refuse (fabric, partly decomposed wood), ~5% Decomposable. **(FILL WITH REFUSE)**	S-1	6-8-11		
5	SM	Loose, dark brown, slightly gravelly, silty SAND, moist. **(FILL)**	S-2	2-2-4		
		Loose, dark brown, slightly gravelly, silty SAND, moist. With partly decomposed organics. Refuse odor. ~15% Refuse, ~15% Decomposable. **(REFUSE)**	S-3	4-3-4		
10		Loose, dark brown, slightly gravelly, organic, silty SAND, moist. Partly decomposed wood, metal, glass. ~20% Refuse, ~15% Decomposable.	S-4	2-3-5		
		Brown, slightly gravelly, silty SAND, moist. Over broken gravel and wood (drove rock and wood).	S-5	12-12-7		
15		Loose, black and brown, REFUSE: blackened wood, plastic. With brown, silty SAND, moist. ~70% Refuse, ~60% Decomposable.	S-6	4-3-2		
		Poor recovery. Carry-down brown, silty SAND, moist.	S-7	3-3-3		
20		Poor recovery. Loose, black, wet, REFUSE: glass, firewood fragments, fine gravel, silty SAND, wet. ~50% REfuse, ~20% Decomposable.	S-8	4-3-3		∇
		4" slough over 2x2" rounded gravel, wood, cinders, glass, black fine organics. ~60% Refuse, ~40% Decomposable.	S-9	20-25-36		
25	OH	Medium stiff, brownish-gray, organic SILT and dark brown PEAT with layers of wood, moist. **(ALLUVIUM)**	S-10	3-4-12		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-31

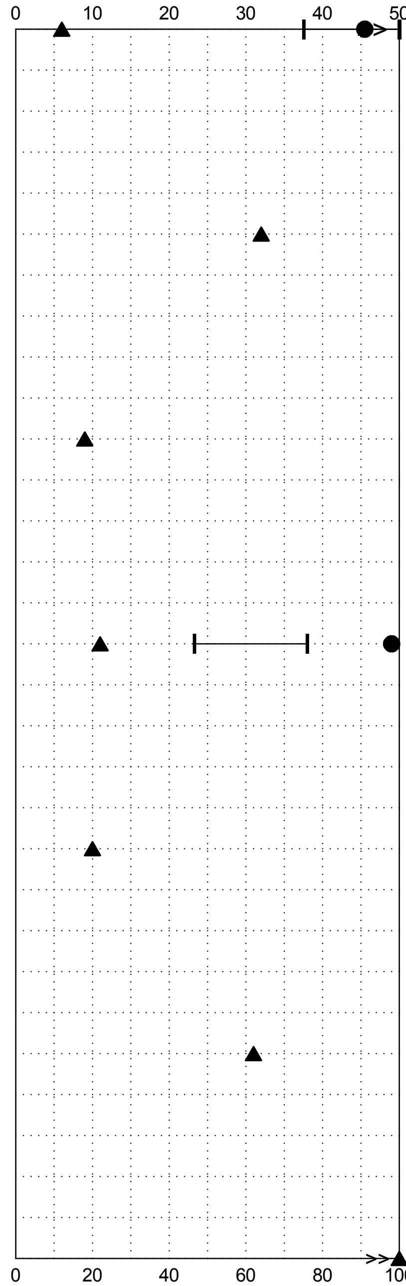
PROJECT NO.: 2015-061 FIGURE: A-32

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 25.91 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		Medium stiff, gray and brownish-gray, SILT with fine organic layers and layers of partly decomposed wood, moist.	S-11	3-3-3	OC AL
			S-12	Push	
35		Dark brown and reddish brown, partly decomposed WOOD, moist. Switched to mud-rotary for drilling below 35'.	S-13	8-12-20	
40		Poor recovery. Wood shreds and one 1" gravel. Driller reported abundant wood in cuttings, below ~30'.	S-14	3-4-5	
		Soft push.	S-15	Push	
45		Stiff, brownish-gray, SILT and organic SILT, moist. With abundant layers of partly decomposed wood.	S-16	4-5-6	OC AL
50		No recovery, despite new catcher.	NR	5-4-6	
	CL				
55		Hard, olive-gray and olive-brown, CLAY, moist. With scattered detrital organics and partly decomposed rootlets. **(PRE-VASHON ALLUVIUM)**	S-17	5-11-20	
	SM				
60					

Standard Penetration Test
(140 lb. weight, 30" drop)
Standardized to SPT Value *
▲ Blows per foot



Water Content (%)
Plastic Limit ├─●─┤ Liquid Limit
Natural Water Content

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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-31

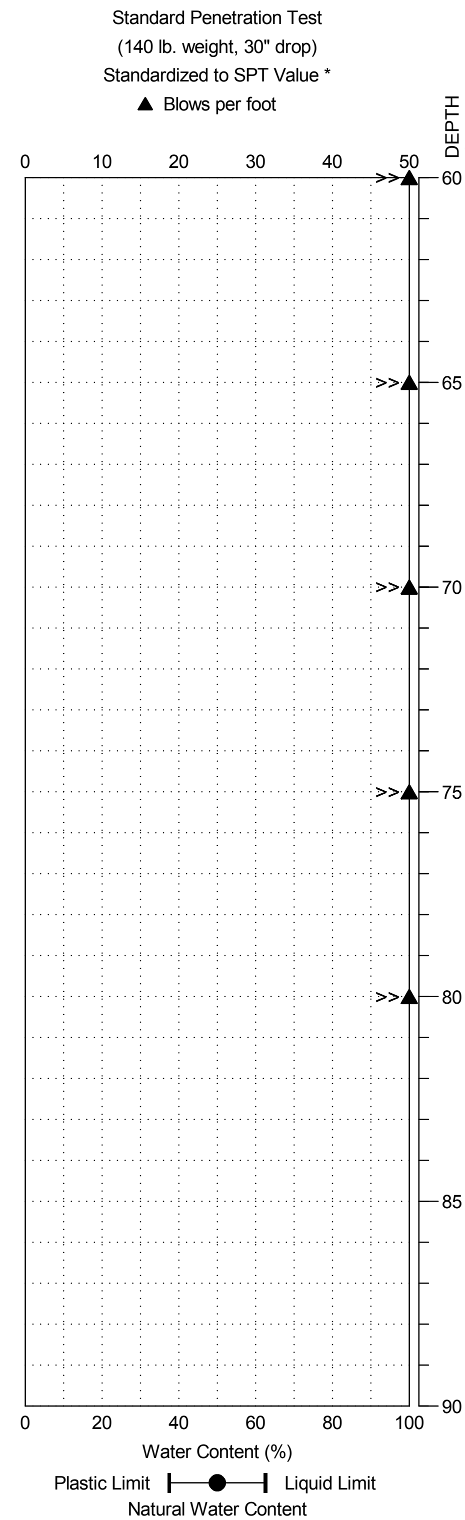
PROJECT NO.: 2015-061 FIGURE: A-32

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA & Mud Rotary
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 25.91 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
60		Very dense, bluish-gray, very silty, fine to medium SAND, moist. Scattered fine gravel. Non-stratified.	S-18	9-26-50/4"		
65	ML	Hard, olive-gray with dark brown, fine layers (organic rich), SILT, moist. Finely bedded. Scattered fine partly decomposed wood.	S-19	18-28-29		
70		Hard, olive-gray, SILT, moist. With two sand lenses. Grayish-green in 1/2" above sand contact.	S-20A	20-27-50/5"		
	SP	Very dense, gray, clean, fine to medium SAND, wet. Fine beds (<1 mm) in lower 3".	S-20B			
75		Very dense, gray, clean, fine SAND (top 4") then fine to medium SAND, wet. Slightly coarse sandy below 76'. Stratified; beds ~2-4".	S-21	22-34-46		
80		Very dense, gray, clean, fine to medium SAND, wet. Stratified, with some beds of fine to coarse sand.	S-22	48-48-50		

Borehore terminated at 81.5' below ground surface.
Ground water encountered at 20' during drilling.
Borehole abandoned with bentonite grout (2.5 batches x 40-45 gallons).



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

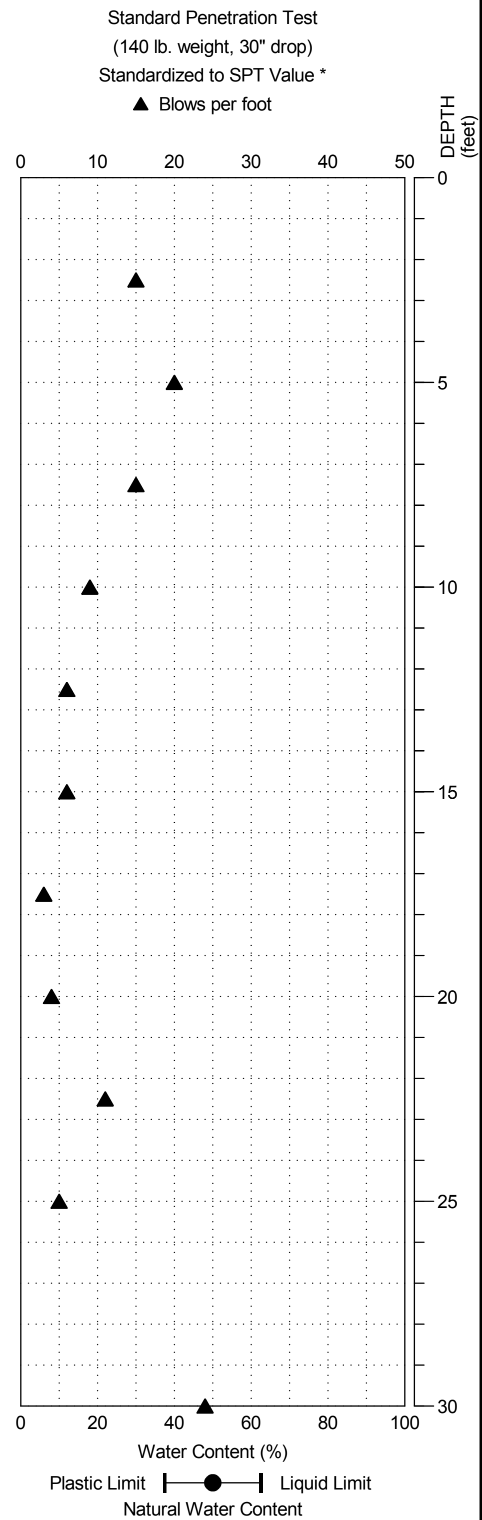
BORING: BH-31

PROJECT NO.: 2015-061 FIGURE: A-32

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 28.31 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Surface: Olive brown, gravelly, silty SAND, moist. **(FILL)**				
		Mediun dense, dark brown, gravelly, silty SAND, moist, with wood fragments, glass. Creosote odor. ~20% Refuse, ~10% Decomposable. **(REFUSE)**	S-1	6-7-8		
5		Poor recovery: Slough of brown, slightly gravelly, silty SAND, moist.	NR	7-9-11		
		Medium dense, blackish brown and brown, silty SAND and wood debris, cinders. Creosote odor. ~40% Refuse, ~25% Decomposable.	S-2	10-9-6		
10		Loose, dark brown, slightly gravelly, woody, silty SAND, moist. ~40% wood, scattered glass in tip, and woody fragments. ~40% Refuse, ~25% Decomposable.	S-3	10-6-3		
		Loose, dark olive-brown, silty SAND, moist and dark brown, organic sandy SILT, moist. ~35% Refuse, ~30% Decomposable.	S-4	3-3-3		
15		Loose, brown and blackish brown, slightly fine gravelly, sandy SILT, moist. With cinders. ~10% Refuse, <5% Decomposable.	S-5	3-3-3		
		Poor recovery: Slough of brown, slightly gravelly, silty SAND, wet.	NR	1-1-2		∇
20		Loose, dark brown, silty SAND, wet, with ~30% glass, over reddish brown and brown, silty SAND, wet. With ~5% glass. ~20% Refuse, <5% Decomposable.	S-6	3-2-2		
		Medium dense, brownish red, silty SAND, wet, cinders, scattered glass. ~50% Refuse, <5% Decomposable.	S-7	4-5-6		
25		Loose, dark brown, silty SAND, wet. Cinders. ~20% Refuse, <5% Decomposable.	S-8	3-2-3		
	PT					
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-32

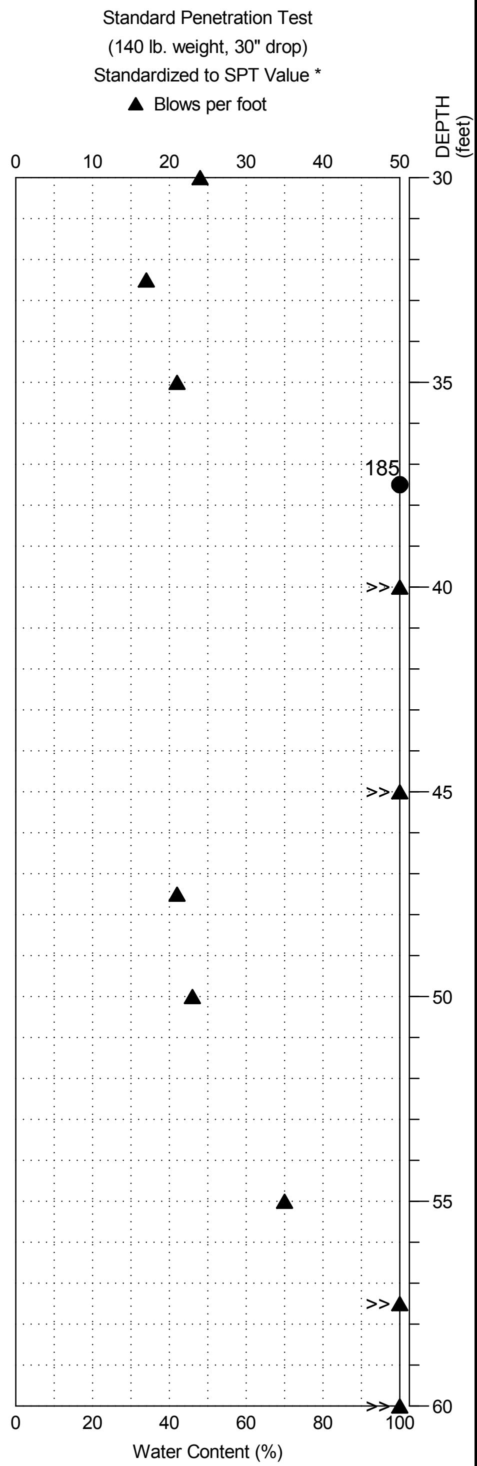
PAGE: 1 of 3

PROJECT NO.: 2015-061 FIGURE: A-33

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 28.31 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
30		No recovery, except 1/8" thick shred of wood.	NR	12-12-12	
		Very stiff, dark brown, PEAT, moist, with scattered wood fragments. **(ALLUVIUM)**	S-9	12-13-13	
35		Reddish brown, oxidizing to dark brown, woody PEAT, moist.	S-10	7-9-12	
		Shelby tube tip crumpled; chain link fence wire in tip.	S-11	Push	CN OC
40		Medium stiff, dark reddish brown, woody PEAT, moist. Sampler pounding on chain link fencing; blow counts overstated.	S-12	50/4"	
45		No recovery; sampler pounding on chain link fencing; blow counts overstated.	NR	50/3"	
	ML	Heavy wire fragment at top of sampler. Stiff, greenish gray, SILT, moist, with lenses of silty, fine to medium SAND, wet. Scattered partly decomposed woody fragments. Blow counts overstated.	S-13	12-15-18	
50	CL	Stiff, greenish gray, gray, and olive brown, CLAY, moist. Highly plastic. Piece of wire (chain link fencing) caught in tip; blow counts overstated.	S-14	8-9-14	
		Harder drilling below 51'.			
	ML SM	Gravelly drill action below ~54'.			
55		Dense, gray, silty, fine to medium SAND, wet, over light brown, non-plastic SILT, wet, over gray, slightly sandy, SILT (plastic), moist. Stiff bluish gray CLAY, moist, in tip.	S-15	12-15-20	
	SP	Dense to very dense, gray, clean, fine to medium SAND, wet, with silty, fine SAND, moist (lenses). **(ADVANCE OUTWASH)**	S-16A S-16B	23-50/6"	
60					



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-32

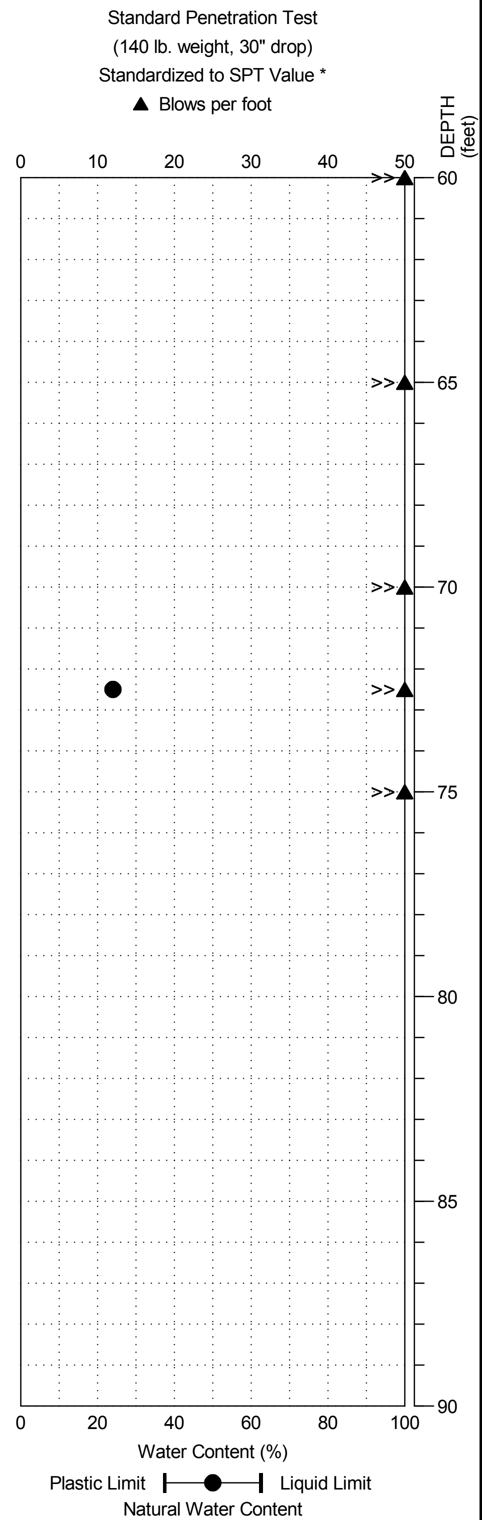
PROJECT NO.: 2015-061 FIGURE: A-33

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 28.31 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/24/2017
DATE COMPLETED: 5/24/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
60	SM ML	Very dense, gray, silty fine SAND, wet, grading to SILT, plastic (wet) and non-plastic (moist). 2x1/4" lenses of medium to coarse SAND.	S-17	18-28-30	
63	SP SM	Hard, dark brown, with a few tan deformed laminae, organic SILT, moist, with lenses of gray, slightly silty, fine to coarse SAND, wet. Gravel in sand lens at 66.2'. **(PRE-VASHON ALLUVIUM)**	S-18	18-30-50/5"	
70	ML	Hard, grayish brown, oxidized to olive-gray, fine sandy SILT, moist, with lenses of partly decomposed woody organics, grading to (lower ~6") brown, organic SILT, moist, with lenses of woody organics.	S-19	24-36-48	
72.5	ML SM	Dark brown and gray, sandy SILT, moist, over very dense, gray, clean, fine to medium SAND, wet.	S-20A S-20B	36-50/5"	DS GS
75	SP SM	Very dense, gray, slightly silty, interbedded, fine to medium, and fine to coarse SAND, wet. Dark brown, fine organics in <1mm lenses, in fine sand.	S-21	31-50/5"	

Borehole terminated at 75.9' below ground surface.
Ground water encountered at 17.5' during drilling.
Borehole abandoned with bentonite grout, with chips in upper ~3'.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

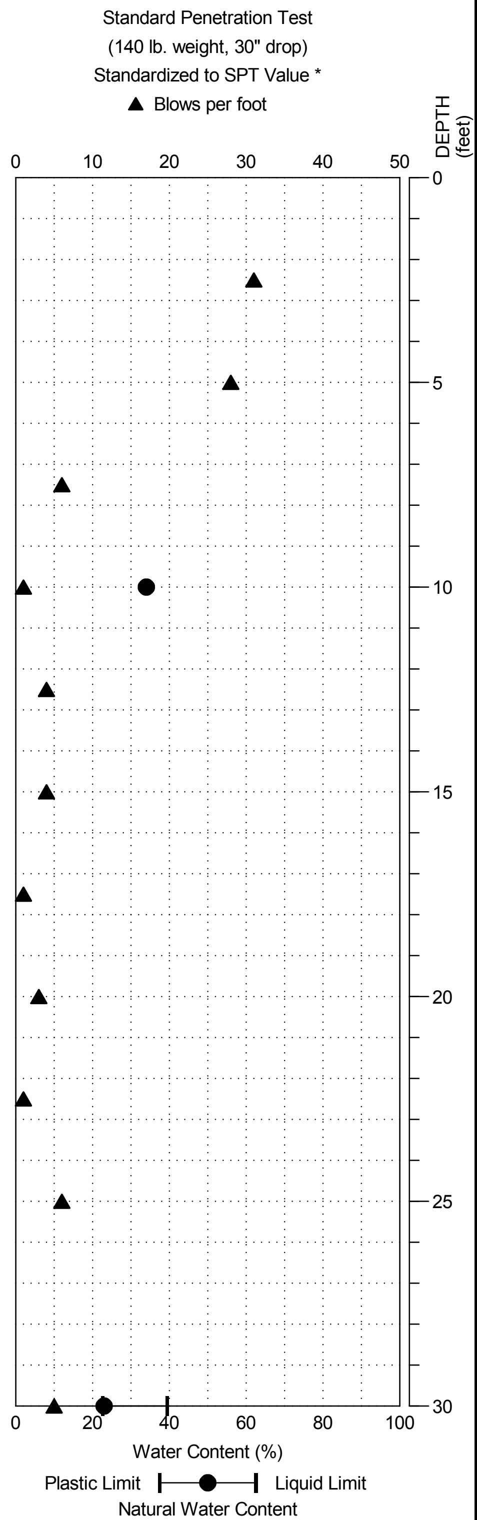
BORING:
BH-32

PROJECT NO.: 2015-061 FIGURE: A-33

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 30.11 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	GW	Gravel Access Road - crushed rock.				
	ML SM	Hard, brown, fine sandy SILT, moist. Scattered fine to medium gravel, nonplastic. **(FILL)**	S-1	16-19-12		
5		Medium dense, brown, silty, fine SAND, moist, layer of wood (~2") at 6', red staining at 6.2' (brick dust?). scattered fine gravel. ~40% Refuse, ~20% Decomposable. **(REFUSE)**	S-2	12-13-15		
		Loose, olive-gray to dark brown, silty, fine to coarse SAND, moist. Scattered fine gravel, small pieces of glass. ~10% Refuse, <5% Decomposable.	S-3	4-3-3		
10		Loose, dark brown to black with orange mottling, silty, fine to coarse SAND, moist. Scattered fine gravel, small piece of rubber, glass pieces. ~1% Refuse, 0% Decomposable.	S-4	1-0-1		
		Loose, dark brown to black, silty, fine to medium SAND, moist, wood fragments, metal wire, glass pieces, scattered fine gravel. ~20% Refuse, ~5% Decomposable.	S-5	1-2-2		
15		Loose, dark brown to black to olive-gray, silty, fine SAND, moist, cinder and brick fragments, wood fragments. ~25% Refuse, ~10% Decomposable.	S-6	1-3-1		
		Loose, dark brown to olive-brown with orange and black mottling, silty, fine to medium SAND, wet. Scattered fine gravel. glass, metal. ~5% Refuse, ~0% Decomposable.	S-7	1-0-1		
20		Loose, reddish-brown with black mottling, silty, fine to medium SAND, wet. Scattered fine to medium gravel, ceramic and glass pieces. ~10% Refuse, 0% Decomposable.	S-8	1-2-1		∇
		Loose, dark brown to black, silty, fine to coarse gravelly, fine to coarse SAND, wet, pieces of glass, cinder and brick. ~40% Refuse, <5% Decomposable.	S-9	1-0-1		
25	OH	Soft, dark brown, organic SILT, moist. Some wood fragments (~1%). **(ALLUVIUM)** 4" of slough (loose, black, silty, fine to coarse SAND).	S-10	2-3-3		
30						



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-33

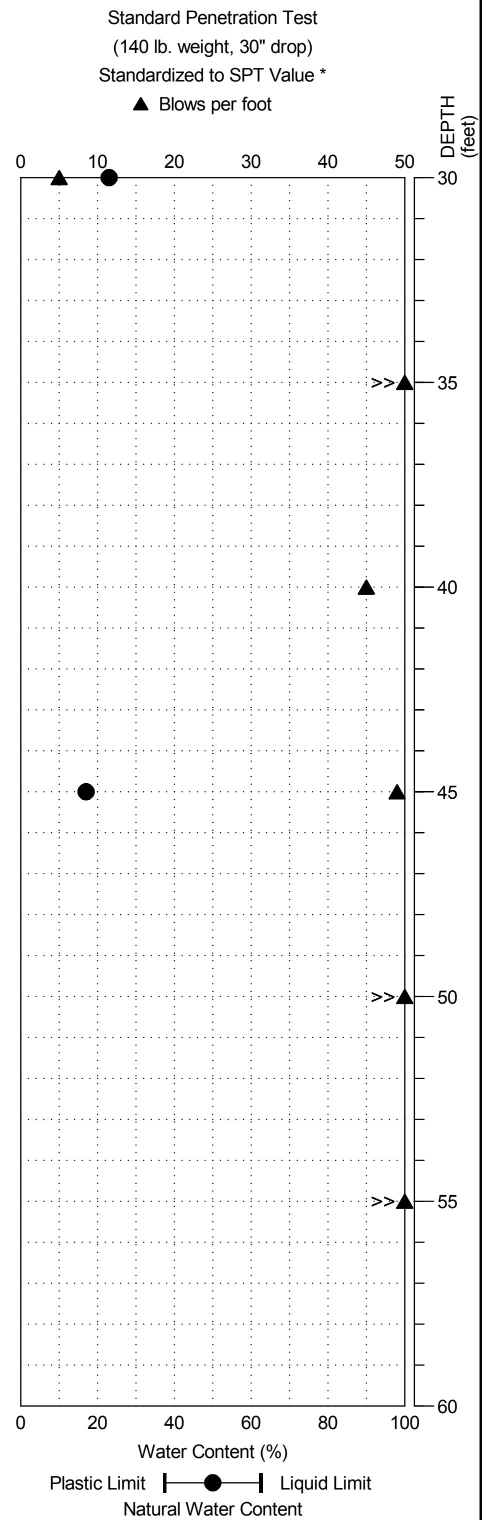
PROJECT NO.: 2015-061 FIGURE: A-34

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Mobile B-58 Truck Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 30.11 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: A. York

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30	CL	Soft, bluish-gray, CLAY, moist. Plastic. Scattered burnt wood fragments (<1% Decomposable).	S-11	3-2-3	AL	
35	ML	Hard, light brown with gray mottling, clayey SILT, moist, grading to orange-brown, fine sandy SILT, moist. Scattered fine to medium gravel, with silty, fine to medium SAND in bottom 3". **(GLACIOLACUSTRINE)**	S-12	6-24-27		
40	SP SM	Dense, light olive-brown, silty, fine to medium SAND, wet. Scattered fine gravel. **(ADVANCE OUTWASH)**	S-13	11-21-24		
45		Dense, light olive-brown to orange-brown, silty, fine to medium SAND, wet.	S-14	17-23-26		
50		Very dense, light olive-brown, silty, fine to medium SAND, wet.	S-15	16-39-50/6"		
55		Very dense, olive-gray, slightly silty, fine to medium SAND, wet.	S-16	11-22-29		

Borehole terminated at 56.6' below ground surface.
Ground water encountered at 22.5' during drilling.
Borehole abandoned with bentonite grout.



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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

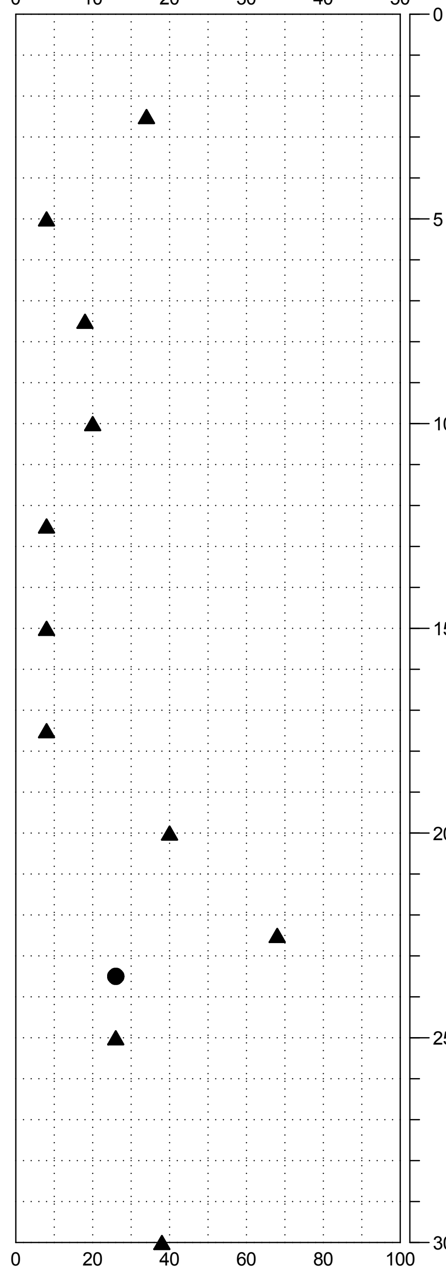
BORING:
BH-33

PROJECT NO.: 2015-061 FIGURE: A-34

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 30.40 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	Cap fill.				
		Medium dense, gray to olive-brown, fine gravelly, silty SAND, with ~2" sandy SILT, moist. 4 feet of soil before Refuse, per driller.	S-1	10-10-7		
		(FILL)				
5		Poor recovery. Tip: Black and rust-brown, blackened wood followed by gray, silty SAND, moist, (REFUSE with soil): ~80% Refuse, ~80% Decomposable.	S-2	2-2-2		
		(REFUSE)				
		Loose, black, slightly gravell, organic silty SAND, moist, with REFUSE: Cinders, burnt wood, brick. ~60% Refuse, ~15% Decomposable.	S-3	4-5-4		
10		Medium dense, dark, grayish-black, slightly gravelly, silty, fine to coarse SAND, moist, with REFUSE and organics, cinders. ~30% Refuse, ~10% Decomposable.	S-4	5-5-5		
		Poor recovery. Loose, brownish-red, silty SAND, moist (cinders), with scattered glass and ceramic. ~100% Refuse, ~0% Decomposable.	S-5	4-2-2		
15		Poor recovery. Loose, brownish-red, silty SAND, moist (cinders), with scattered glass and ceramic. ~100% Refuse, ~0% Decomposable.	S-6	3-2-2		
	OH	Soft, olive-brown, SILT, moist. With dark brownish-black, organic layers.	S-7	3-1-3		
		(ALLUVIUM)				
	MH	Very stiff, light olive-gray, elastic SILT, moist. Carry-down of broken red brick on top.				
20		Very stiff, light olive-gray with rust-mottling, SILT, moist.	S-8	9-9-11		
	CL ML	Very stiff, olive-brown and olive-gray, SILT and CLAY, moist. Disturbed: Carry-down of brick and wood along one side of sampler. Blow counts overstated.	S-9A / S-9B	13-22-30		
25		Very stiff, olive-brown and olive-gray, SILT and CLAY, moist. With sand parting at 25.5'.	S-10	3-5-8		
		Mixed bentonite grout for drilling below 30'.				
30						



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.
*Non-Standard Penetration Resistance (where applicable) was standardized to SPT N-Values using the method indicated in the attached Geotechnical Report.

HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

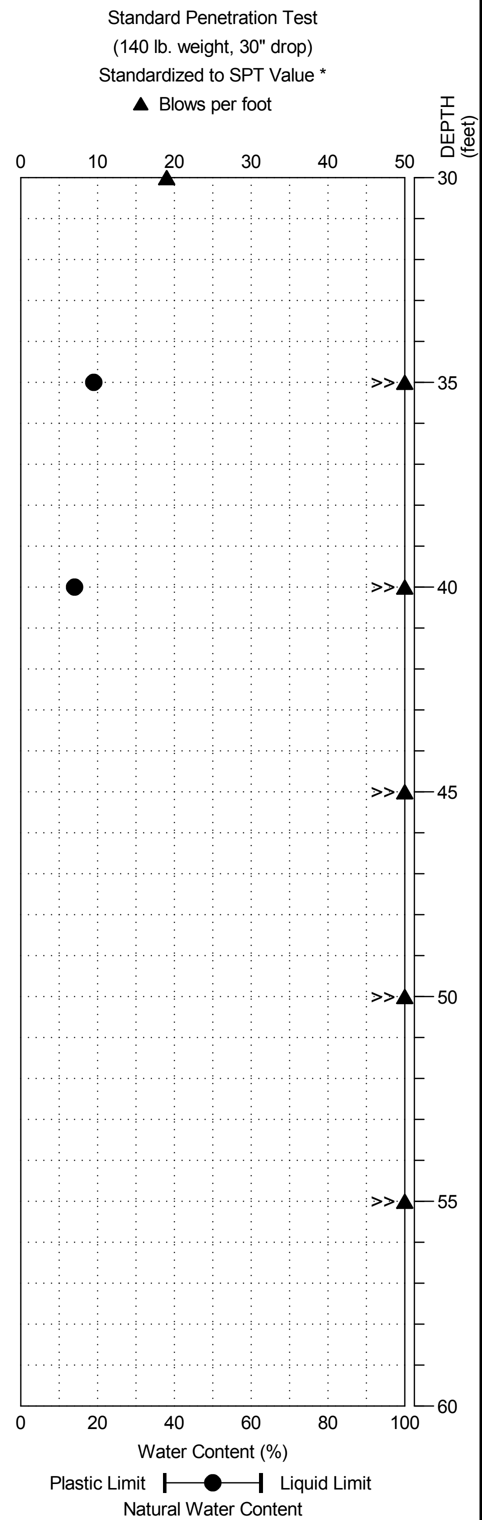
BORING:
BH-34

PROJECT NO.: 2015-061 FIGURE: A-35

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 30.40 ± feet

LOCATION: See Figure 2
DATE STARTED: 6/1/2017
DATE COMPLETED: 6/1/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30	CL	Very stiff, olive-brown and olive-gray, SILT and CLAY, moist. With rust-mottling below 31'.	S-11	5-6-13		
	SM	Grades to silty fine to medium SAND at tip.				
	SP SM	~6" of slough on top.				
35		Very dense, olive-brown, stratified, clean, fine to medium SAND; fine SAND and fine to coarse SAND with scattered fine gravel, wet. Two, 2" sandy SILT lenses at 35.7' and 36.3'. **(ADVANCE OUTWASH)**	S-12	10-20-34	GS	▽
40		Very dense, olive-brown, clean, fine to medium SAND, wet. Trace fine gravel, some fine SAND lenses, stratified. Rust-banding at ~41'.	S-13	18-28-34		
45		Very dense, olive-brown, clean and slightly silty, fine to coarse over fine to medium SAND, wet. Stratified. Fine sandy SILT in tip.	S-14	18-31-50/5"		
50		Very dense, olive-brown, slightly silty, fine to medium SAND, wet. Trace fine gravel, slight rust-banding below ~51'.	S-15	18-50/5"		
55		Very dense, olive-gray, slightly silty, fine gravelly, fine to coarse SAND, wet.	S-16	16-35-50/4"		
		Borehole terminated at 56.3' below ground surface. No apparent ground water until in sand below 34'. Borehole abandoned with bentonite grout.				
60						



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.
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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

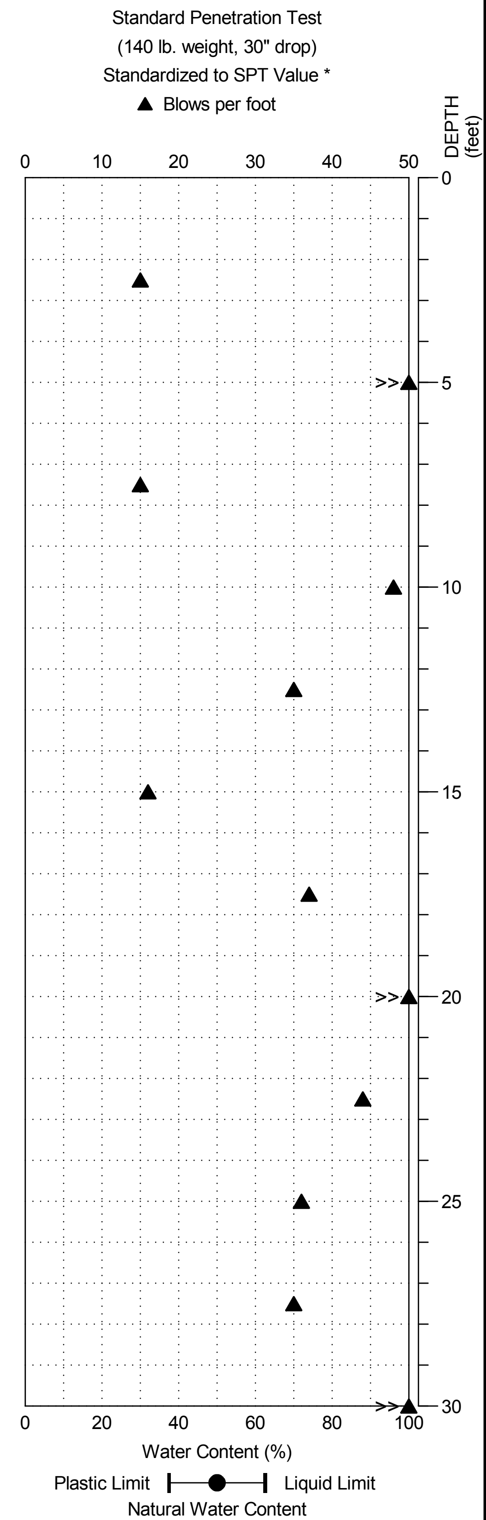
BORING:
BH-34

PROJECT NO.: 2015-061 FIGURE: A-35

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.43 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
0	SM	2' soil cap. **(FILL)**				
~3		Medium dense, dark gray, gravelly, silty SAND (50%) and REFUSE (50%), moist. Refuse: Glass, concrete, plastic, paper. ~50% Refuse, ~10% Decomposable. **(REFUSE)**	S-1	6-7-8		
5		Poor recovery: Drove rock/concrete. Slough of brown, slightly gravelly, silty SAND, moist.	S-2	12-25-30		
~7.5		Poor recovery: Medium dense, olive-brown, silty SAND, wet, and REFUSE. Refuse: Plastic, paper, glass. ~60% Refuse, ~25% Decomposable.	S-3	11-9-6		▽
10		No recovery. Cuttings from ~10-12.5': Grayish-black, silty SAND with REFUSE (plastic, paper).	NR	30-33-15		
~12.5		No recovery. **Strong landfill gas odor and meter shot up to 99% LEL when held above auger opening.**	NR	42-35-18		
15		**Up to 9% LEL when pulling sampler from 15'.** Poor recovery: Plastic bags/sheeting and partly decomposed wood. 100% Refuse, ~30% Decomposable.	S-4	6-7-9		
~17.5		Slough of Refuse over 18" of solid WOOD (log), wet. Growth rings at ~45.	S-5	7-12-25		
20		7" of compressed paper with wood fragments, trace fabric with silty SAND, over ~11" of wood. 100% Refuse, 95% Decomposable.	S-6	15-28-40		
~22	SP SM	Dense, gray and dark gray, slightly silty to silty, fine to medium SAND, wet. Scattered fine gravel, stratified. **(ADVANCE OUTWASH)**	S-7	23-23-21		
25		Dense, dark gray to gray, slightly silty to silty, fine to coarse SAND and fine to medium SAND, wet. Fine gravelly at 26-26.2'.	S-8	10-16-20		
~27.5		Dense, gray, slightly silty, fine to coarse SAND and fine to medium SAND, wet.	S-9A S-9B	25-33-21		
30						



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.

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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-35

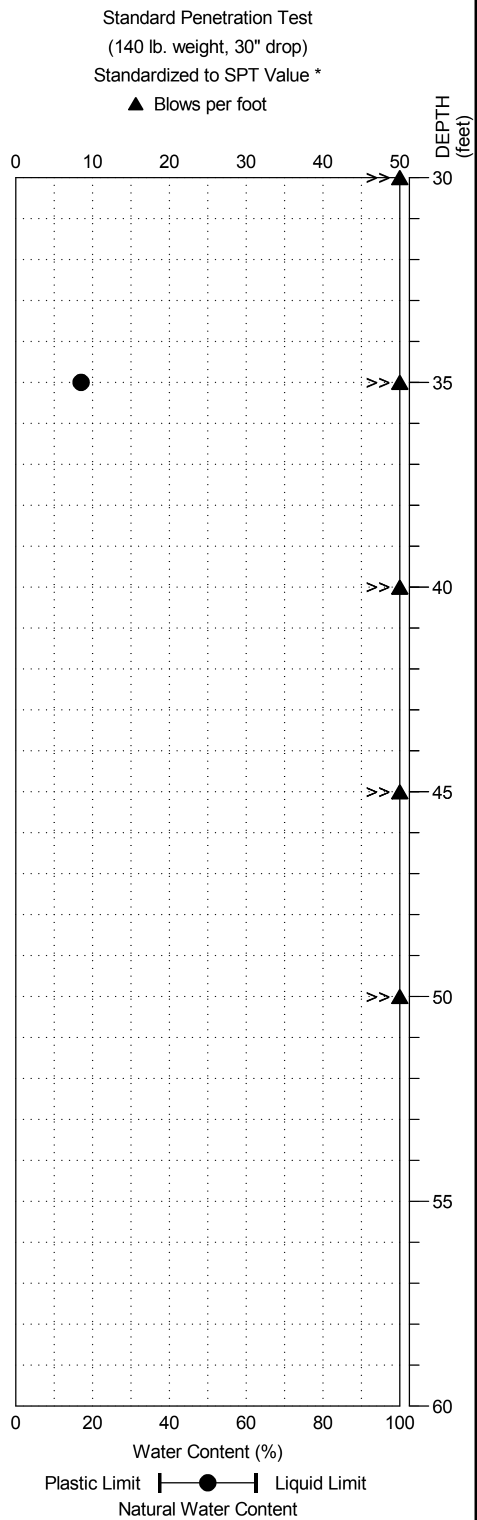
PROJECT NO.: 2015-061 FIGURE: A-36

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: CME 850 Tracked Rig, HSA
SAMPLING METHOD: SPT with Autohammer
SURFACE ELEVATION: 35.43 ± feet

LOCATION: See Figure 2
DATE STARTED: 5/30/2017
DATE COMPLETED: 5/30/2017
LOGGED BY: B. Thurber

DEPTH (feet)	DESCRIPTION	SAMPLE NUMBER	MEASURED PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	GROUNDWATER
30	Very dense, yellow-brown and olive-brown, stratified, slightly silty, fine to medium SAND, wet. Scattered fine gravel (</=3/8").	S-10	10-25-32		
35	Very dense, yellow-brown and olive-brown, stratified, slightly silty, fine to medium SAND, wet, with lenses of slightly fine gravelly, fine to coarse SAND, wet.	S-11	17-29-32		
40	Very dense, yellow-brown and olive-brown, stratified, slightly silty, fine to medium SAND, wet, with lenses of fine gravelly, fine to coarse SAND, wet, fine beds 1/8".	S-12	21-32-40		
45	Very dense, olive-brown, slightly silty, fine to medium SAND, wet, with two lenses of fine to coarse, stratified, beds 1"-4".	S-13	29-32-35		
50	Very dense, olive-brown, slightly silty, fine to coarse SAND, wet, with one lens of silty, fine to medium SAND, moist.	S-14	24-50/5"		

Refusal on wood at 22'. Moved south 6'. Abundant Refuse in cuttings, very little soil.
BH-35a: Refusal on wood at 21'.
BH-35b: at 11' NE of BH-35 stake/initial borehole.
Refuse at 4': Plastic, paper, wire in olive-gray, silty SAND, moist, wet cuttings when drilling below ~18'.
Borehole terminated at 51' below ground surface.
Ground water encountered at 7' during drilling.
Borehole abandoned with bentonite grout and chips.



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.
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HWA GEOSCIENCES INC.

PROJECT EVERGREEN
36th STREET & RIVERSIDE DRIVE
EVERETT, WASHINGTON

BORING:
BH-35

PROJECT NO.: 2015-061 FIGURE: A-36

APPENDIX B

GEOENGINEERS PREVIOUS INVESTIGATIONS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	CC	Cement Concrete
	AC	Asphalt Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Measured groundwater level in exploration, well, or piezometer

Groundwater observed at time of exploration

Perched water observed at time of exploration

Measured free product in well or piezometer

Stratigraphic Contact

Distinct contact between soil strata or geologic units

Gradual change between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Date(s) Drilled	01/17/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	55	Surface Elevation (ft)	49.2	Groundwater Elevation (ft)	19.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307093.059 355485.7917

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0						SM	2 to 3 inches root mass			
								Gray and brown silty fine to medium sand with occasional gravel (loose to medium dense, moist) (fill)			
-45		5	17	1					12		
	5										
-40		15	6	2				Occasional wood chips			DIPRA Pts. = 2
	10										
-35		8	5	3							
	15						MSW	Refuse (decayed paper, glass fragments, plastic, wood, cloth, rubber intermixed with gray/black silty fine to medium sand)			
-30		0	8	4							
	20										
-25		1	16	5							
	25										
-20		0	7	6	▼						
	30										
		4	9	7							
-15		1	18	8							
	35										
							SP-SM	Gray fine to medium sand with silt and occasional gravel (very dense, wet) (transitional deposits)			
-10		18	59	9					18		%F=5
	40										

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI- 1

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-2
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	SAMPLES: Interval / Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40										
5	45	14	86	10							
0	50	12	77	11							
-5	55	15	89	12							
-10	60										
-15	65										
-20	70										
-25	75										
-30	80										
-35	85										
-40											

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LOG OF BORING GEI- 1 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-2

DRAFT

Date(s) Drilled	11-30-07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	60	Surface Elevation (ft)	49.2	Groundwater Elevation (ft)	31.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307097.663 355794.4722

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							TS	3 to 4 inches dark brown silty fine to medium sand (loose, moist) (topsoil)			
								SM	Grayish brown silty fine to medium sand with occasional gravel (loose to medium dense, moist) (fill)			
45			13	24	1					14		
40	10		12	11	2				Occasional brick fragments			
35	15		8	8	3							
								MSW	Refuse (decayed wood chips, glass fragments, paper, plastic intermixed with black silty sand)			
30	20		7	9	4	▼						
25	25		2	14	5							
20	30		8	5	6							
15	35		9	5	7			SM	Gray silty fine to medium sand (loose, wet) (alluvial deposits)			
10	40		14	66	8			SP-SM				

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI- 2

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40								Gray and black fine to coarse sand with silt and occasional gravel (very dense, wet) (transitional deposits)			
5	45		15	58	9					14		%F=8
0	50		15	63	10				Becomes light brown and gray			
								SP-SM	Yellowish gray fine to medium sand with silt (dense to very dense, wet)			
-5	55		15	43	11					21		%F=7
-10	60		18	79	12							
-15	65											
-20	70											
-25	75											
-30	80											
-35	85											
-40												

V6_GTBORING W:\EVERETT\PROJECTS\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI- 2 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-3

DRAFT

Date(s) Drilled		Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	65	Surface Elevation (ft)	47.1	Groundwater Elevation (ft)	13.1
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307235.568 355662.1187

Depth feet (Elevation feet)	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
0					SOD	4 inches sod mat			
					SM	Brownish gray silty fine sand with occasional gravel (very loose, wet) (fill)			
~4	18	P	1				17		
~7					SM	Gray silty fine to medium sand with occasional coarse sand and gravel (medium dense, moist) (fill)			
~9	0	40	2						
~11.5	17	16	3						
~13					MSW	Refuse (wood debris, glass, plastic, paper)			
~14	7	16	4						
~19	7	12	5						
~24	5	6	6						
~29	5	22	7						
~34	1	16	8	▼					
~35					MSW	Refuse (dark brown fiberous, partially decayed wood/organic matter with brick fragments, plastic and gray silty fine sand)			
~36.5	8	6	9						
~38					WD	Dark brown wood chips and organic matter with occasional gravel (stiff, moist to wet)			
~39	3	13	10						
40									

Elevation scale: -45 (depth ~2), -40, -35, -30, -25, -20, -15, -10 (at 5-ft intervals). Depth scale: 0, 5, 10, 15, 20, 25, 30, 35, 40.

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI- 3

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-4
Sheet 1 of 2

Elevation feet	Depth feet	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40	18	18	11						
5						SP/SM	Gray silty fine to medium sand with occasional gravel interlayered with brown, white, black and gray medium to coarse sand (loose to medium dense, moist to wet) (alluvial deposits)			
		18	52*	12		SP		13		%F=5
	45						Brown and gray sand with occasional gravel (medium dense, wet) (transitional deposits)			
0						SP-SM	Brownish gray fine to medium sand with silt (dense, wet)			
		17	32	13				23		%F=4.5 *2 feet of heave Blow count may not be representative
	50									
-5						SP	Gray and brown fine to medium sand with trace silt (dense, wet)			
		14	45	14						
	55									
-10										
		18	78	15						
	60									
-15										
		18	93/10"	16						
	65									

LOG OF BORING GEI- 3 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-4
Sheet 2 of 2

DRAFT

Date(s) Drilled	01/02/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	42.0	Groundwater Elevation (ft)	9
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307418.325 355473.3623

SAMPLES

Sample Number	Recovered (in)	Blows/foot	Moisture Content %
1	15	8	18
2	9	8	
3	10	10	
4	5	14	
5	7	14	
6	2	17	
7	9	8	
8	8	21	
9	3	7	

MATERIAL DESCRIPTION

Group Symbol	Material Description
SOD	2 inches sod/root mass
SM	Grayish brown silty fine to medium sand with occasional gravel (loose, moist) (fill)
MSW	Refuse (partially decayed wood chips and asphalt intermixed with dark brown silty fine to medium sand with occasional gravel)
	Contains metal and glass fragments, cloth, partially decayed wood chips, plastic, paper

Elevation feet: 40, 35, 30, 25, 20, 15, 10, 5

Depth feet: 0, 5, 10, 15, 20, 25, 30, 35, 40

OTHER TESTS AND NOTES

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI- 4

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Depth feet	Elevation feet	Samples: Recovered (in)	Blows/foot	Sample Number	Group Symbol	Material Description	Moisture Content %	Dry Unit Weight, lbs/ft³	Other Tests and Notes
40	2								
42	0								
45	-3	4	7	10					
47	-5								
50	-8	0	8	11					
50	-8				PT	Dark brown and black peat (stiff, wet) (alluvial deposits)			
52	-10	12	15	12					
53	-11				OL	Dark brown organic silt with occasional wood fragments (stiff, wet)			
55	-13	18	9	13					
57	-15	8	47*	14					*Wood in sample, blow count not representative
57.5	-15.5				ML	Gray silt with occasional fine sand (stiff, wet)			
60	-18	18	12	15			26		
62	-20				SP	Gray, black and white fine to medium sand with trace of silt (very dense, wet) (transitional deposits)			
65	-23	15	57	16			19		%F=2
70	-28	16	64	17					
75	-33	15	66	18					
80	-38	16	80	19					
85	-43								

LOG OF BORING GEI- 4 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-5
Sheet 2 of 2

Date(s) Drilled	12/11/08	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	60	Surface Elevation (ft)	36.6	Groundwater Elevation (ft)	24.1
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307414.198 355784.28

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SOD	2 inches sod mat			
35								SM	Dark gray silty fine to medium sand with gravel (medium dense, moist) (fill)			
			9	55	1			MSW	Refuse (paper, cloth, plastic, wood, glass, with silty sand and occasional gravel)			
30	5											
			10	6	2							
25	10					▼						
			7	2	3							
20	15											
			0	8	4							
15	20											
			4	7	5							
10	25											
			15	16	6				Contains brick fragments			
5	30		8	17	7							
			3	15	8							
	35							PT	Reddish brown and dark brown fiberous wood and peat (stiff, moist to wet)			
0			12	33*	9							*Wood in sampler (cedar) Blow count not representative
	40		0	4	10							

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI- 5

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Elevation feet	Depth feet	SAMPLES: Interval	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40											
-5												
			12	41	11			SP-SM	Brown fine to coarse sand with silt and occasional gravel (dense, wet) (transitional deposits)	13		%F=14
	45											
-10												
			17	40	12							
	50											
-15								SP	Brown and gray fine to medium sand (very dense, wet)			
			17	94/10"	13							
	55											
-20												
			15	67	14							
	60											

Scale continues: -25, 65, -30, 70, -35, 75, -40, 80, -45, 85, -50

LOG OF BORING GEI- 5 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-6
Sheet 2 of 2

DRAFT

Date(s) Drilled	11/14/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	58.5	Surface Elevation (ft)	43.0	Groundwater Elevation (ft)	13
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307184.135 356477.5086

Elevation feet	Depth feet	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SOD	2 to 3 inches sod			
						SM	Brown and gray silty fine to coarse sand with gravel (loose, wet) (fill)			
40		15	9	1				7		DIPRA Pts. = 4
	5									
35		5	6	2			Contains occasional timber debris			
						MSW	Refuse (paper, plastic intermixed with grayish brown silty fine to coarse sand and gravel)			
	10									
30		8	3	3						
	15									
						ML	Gray/brown clayey silt with trace organics (stiff, moist) (alluvial deposits)			
25		18	14	4				30		
	20									
						ML/SM	Gray silt with lenses of gray silty fine to medium sand (stiff/medium dense, moist to wet)			
20		7	15	5						
	25									
						SM	Gray silty fine to coarse sand with occasional gravel (medium dense, wet)			
15		12	21	6						Driller added water to hole
					∇					1.5 foot of heave after removing sample
	30									
						SM	Gray silty fine to medium sand with 3 inch lens of silty gravel (dense, wet) (transitional deposits)			
10		12	44	7						
	35									
						SM	Brown/gray silty fine to coarse sand (dense, wet)			
5		16	47	8						
	40									

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI- 6

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-7
Sheet 1 of 2

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40							SP-SM	Gray, black and white fine to coarse sand with silt (very dense, wet)			
0			18	50/5"	9							
	45											
-5			15	50/5.5"	10							
	50		13	50/5"	11							
-10												
	55											
-15			8	50/5"	12							
	60											
-20												
	65											
-25												
	70											
-30												
	75											
-35												
	80											
-40												
	85											
-45												

LOG OF BORING GEI- 6 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	11/08/06	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	66	Surface Elevation (ft)	40.7	Groundwater Elevation (ft)	30.7
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307243.285 356715.0401

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
40	0						GP	6 inches of fine to coarse gravel			
							SP-SM	Brown fine to medium sand with silt and occasional gravel (loose to very loose, moist) (fill)			
35	5	■	18	3	1				13		
							MSW	Refuse (wire, glass, drain tile, intermixed with silty fine to medium sand and organic matter)			
30	10	■	13	15	2	▽					
25	15	■	6	3	3						
							ML	Gray and brown clayey silt with trace organics (medium stiff, moist) (alluvial deposits)			
20	20	■	18	5	4						
15	25	■	18	7	5				36		
10	30	■	18	14	6						
							SP-SM	Brown/gray fine to medium sand with silt (medium dense, moist)			
5	35	■		13	7						
							SM	Brown/gray silty fine to coarse sand with occasional gravel with thin lens of silt (dense, moist) (transitional deposits)			Driller added water to hole
	40	■	13	47	8						

Note: See Figure A-1 for explanation of symbols.

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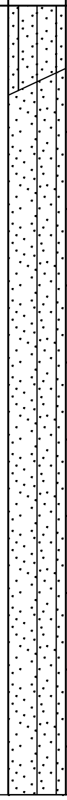
LOG OF BORING GEI- 7

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-8
Sheet 1 of 2

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
0	40											
								SP-SM	Gray, black and white fine to coarse sand with silt (very dense, wet)			
-5	45		18	64	9							1-foot of heave in auger
-10	50		18	57	10							
-15	55		16	76	11							
-20	60		18	83	12							
-25	65		18	71	13							
-30	70											
-35	75											
-40	80											
-45	85											



LOG OF BORING GEI- 7 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	01/23/08	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	6-inch ID, 10-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	59.5	Surface Elevation (ft)	36.5	Groundwater Elevation (ft)	8.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307538.075 356446.7259

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
36.5	0							SOD	3 inches sod mat			
								SM	Dark brown silty fine to medium sand with occasional gravel (medium dense, moist) (fill)			
		■	12	33	1							
	4							MSW	Refuse (wood fragments, metal, glass, brick, plaster, intermixed with dark brown/black silty fine to medium sand)			
		■	9	14	2							
		■	7	20	3							
		■	8	3	4							
		■	8	11	5							
	27.5							PT	Dark brown peat, fiberous chips (stiff, wet) (wood waste?)			
						▼						
		■	12	10	6							
		■	1	12	7							
		■	18	10	8							
		□	20		9							Vibrating wire piezometer installed at Elevation -0.1 feet
		■	10	21	10				Becomes very stiff	209		
	39							OL	Gray organic silt with sand (very stiff, moist to wet)			

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI- 8

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-9
Sheet 1 of 2

Elevation feet	Depth feet	Samples: Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40	18	24	11a 11b			(alluvial deposits?)			
-5						SP-SM	Gray and brown fine to medium sand with silt (dense, wet) (transitional deposits)			
		18	42	12				19		%F=8
	45									
-10						SM	Gray silty fine to coarse sand (very dense, wet)			
		16	79	13				16		%F=14
	50									
-15						SP	Gray fine to medium sand with trace silt (very dense, wet)			
		16	64	14						
	55									
-20										
		11	50/5"	15						
	60									

Sondex settlement system and vibrating wire piezometer installed upon completion

Depth scale: 60, 65, 70, 75, 80, 85; Elevation scale: -25, -30, -35, -40, -45, -50

LOG OF BORING GEI- 8 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	12/10/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	65	Surface Elevation (ft)	29.6	Groundwater Elevation (ft)	12.6
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307578.556 356709.629

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					AC	8 inches asphalt concrete			
						CR	8 inches crushed rock base coarse			
						SM	Gray silty fine to medium sand with occasional gravel and trace organic matter (medium dense, moist) (fill)			
25	5	7	27	1				10		
						MSW	Refuse (dark gray/black wood debris, plastic, glass, in silty sand with gravel matrix)			
20	10	5	6	2						
15	15	15	5	3	▼					
10	20	4	8	4						
5	25	4	19	5						
						PT	Brown peat (soft, wet) (alluvial deposits)			
0	30	18	3	6						
						OL	Bluish gray organic clay (stiff, moist)			
-5	35	14	15	7				29		
						SM	Gray silty fine to coarse sand with occasional gravel (dense, wet) (older alluvium)			
-10	40	18	30	8						

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI- 9

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-10

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40							SP-SM	Brown, gray, white and black fine to medium sand with silt (dense to very dense, wet) (transitional deposits)			
-15	45		18	41	9					18		%F=6
-20	50		18	65	10							
-25	55		15	61	11							
-30	60		16	76	12							
								SP-SM	Gray silty fine to medium sand with silt and thin lens of gray silt with organic matter (very dense, wet)			
-35	65		16	56	13							
-40	70											
-45	75											
-50	80											
-55	85											
-60												

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI- 9 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-10
Sheet 2 of 2

DRAFT

Date(s) Drilled	01/15/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	29.8	Groundwater Elevation (ft)	8.8
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307290.028 354743.6518

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SM	3 inches root mass			
							Gray silty fine to medium sand (loose, moist) (fill)			
		8	5	1				19		
-25	5									
						MSW	Refuse (gray silty medium sand intermixed with partially decayed wood fragments, plastic, glass, and metal)			
		5	11	2						
-20	10									
		0	15	3						
-15	15									
		0	12	4						
-10	20									
		1	10	5	▼					
		3	7	6						
-5	25									
		0	10	7						
0	30					PT	Dark brown peat intermixed with wood fragments (very soft, wet) (alluvial deposits)			
		18	1	8				113		
		16	1	9						
-5	35									
		22		10				448	12	
-10	40									

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-10

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-11
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40	18	1	11	OL	Gray organic silt with occasional fine sand (very soft, wet)			
		24		12			44	78	
-15	45								
		18	0	13					
-20	50								
					SM	Gray silty fine to medium sand (medium dense, wet)			
		18	24	14			22		%F=25
-25	55								Drill mud added to hole
					SP	Gray fine to coarse sand with occasional gravel (very dense, wet) (transitional deposits)			
		14	95	15					
-30	60								
		14	90/9"	16					
-35	65								
		14	90/10"	17		Becomes fine to medium sand			2 feet heave
-40	70								
-45	75								
-50	80								
-55	85								
-60									

V6_GTBORING W:\EVERETT\PROJECTS\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-10 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-11
Sheet 2 of 2

DRAFT

Date(s) Drilled	11/19/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	65	Surface Elevation (ft)	33.3	Groundwater Elevation (ft)	19.8
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307277.166 354998.4996

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0						GM	12 inches gray to brown silty fine to coarse gravel			
							SM	Brown silty fine to coarse sand with gravel (loose, moist) (fill)			
30		■	12	4	1				15		
	5										
							MSW	Refuse (paper, plastic, wood, metal with zones of gray/brown silty sand with gravel)			
25		■	16	7	2						
	10										
20		■	8	46*	3	▼					*Large wood pieces in sample, blowcount may not be representative
	15										
15		■	4	37*	4						*Large wood pieces in sample, blowcount may not be representative
	20										
10		■	8	20	5						
	25										
5		■	13	6	6						
	30										
0		■	2	7	7						
	35										
							PT	Brown peat and decayed wood chips (soft, moist) (wood waste) (alluvial deposits)			
-5		■	0	3	8						
	40										

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-11

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-12
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40	12	4	9					334		
-10		15	14	10a / 10b			SP-SM	Brown fine to coarse sand with silt and occasional gravel (medium dense, wet) (older alluvium)	15		%F=12
	45										
-15		15	24	11					19		%F=7
	50										
							SP-SM	Gray, black and white fine to coarse sand with silt (very dense, wet) (transitional deposits)			
-20		16	60	12							
	55										
-25		14	55	13							
	60										
-30		16	86/11"	14							
	65										
-35	70										
-40	75										
-45	80										
-50	85										
-55											

LOG OF BORING GEI-11 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-12
Sheet 2 of 2

DRAFT

Date(s) Drilled	11/20/08	Logged By	CMK/SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	34.0	Groundwater Elevation (ft)	30.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307332.419 355185.4013

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0						SOD	2 to 3 inches sod			
							SM	Gray silty fine to medium sand with occasional gravel (loose, moist) (fill)			
-30		4	5	1	▽		MSW	Refuse (plastic, wood chips, metal debris intermixed with silty fine sand and gravel)			
	5										
-25		12	21	2							
	10										
-20		7	9	3							
	15										
-15		1	7	4				(increasing wood debris, timbers)			
	20						MSW	Refuse (decayed wood fragments, newspaper, plastics, glass)			
		6	8	5							
-10		3	6	6							
	25										
-5		1	9	7							
	30										
		1	7	8							
0		1		9							
	35										
		7	11	10							
-5		4	8	11							
	40										

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-12

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number
-10	45	0	6	12
		0	3	13
-15	50	0	3	14
		1	7	15
-20	55	13	4	16
-25	60	18	36	17
-30	65	12	29	18
-35	70	15	46	19
-40	75	18	51	20
-45	80	18	52	21

Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
PT	Dark brown peat (medium stiff, wet) (alluvial deposits)	189		
SM/ML	Gray silty fine to medium sand with trace of organic silt interlayered with gray clayey silt (loose/soft to medium stiff, moist)			
SM	Gray silty fine to medium sand with occasional gravel and wood fragments (dense, moist) (transitional deposits)			
SP	Gray fine to medium sand with trace of silt and occasional gravel (dense, moist)			
SM/ML	Gray silty fine sand with occasional fine gravel interlayered with brown silt (very dense/hard, moist)			

LOG OF BORING GEI-12 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-13
Sheet 2 of 2

DRAFT

Date(s) Drilled	12/31/07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	85	Surface Elevation (ft)	37.3	Groundwater Elevation (ft)	5.3
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307477.728 355375.8743

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SOD	0 to 2 inches sod layer			
								SM	Dark brown silty fine to medium sand (loose to medium dense, moist) (fill)			
-35												
			7	4	1			MSW	Refuse (dark gray silty fine to medium sand with decayed wood chips, brick fragments, plastic, and metal debris)			
	5											
-30												
			10	9	2							
	10											
-25												
			11	15	3							
	15											
-20												
			9	7	4							
	20											
-15												
			8	13	5							
	25											
-10												
			12	32	6							
	30											
-5						▼						
			6	19	7							
	35											
0												
			12	14	8							
	40											

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-13

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-14
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Interval / Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40										
-5							OL/PT	Dark brown peat interlayered with gray to brown organic silt (soft, wet) (alluvial deposits)			
		11	3	9					247		
	45										
		18	4	10					106		
-10											
		18	2	11				Becomes very soft			
	50										
		13	2	12							
-15											
		18	1	13							
	55										
		24		14					78	56	MD, CS
-20							PT	Dark brown peat (stiff, wet)			
		18	10	15							
	60	13	44	16			SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense to dense, wet) (transitional deposits)			
-25											
		12	20	17					21		%F=6
	65										
-30							SP	Gray fine to medium sand with occasional gravel (very dense, wet)			
		14	58	18							
	70										
-35											
		15	49	19				Grades with trace silt			
	75										
-40							ML	Gray clayey silt with trace organic matter (hard, wet)			
		10	62	20							
	80										
-45											
		18	67	21							
	85										
-50											

LOG OF BORING GEI-13 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	01/03/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	6-inch ID, 10-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	38.6	Groundwater Elevation (ft)	28.6
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307514.427 355489.7253

Elevation feet	Depth feet	SAMPLES: Interval Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0						SM	2 inches root mass			
								Gray silty fine to medium sand with occasional gravel and trace organic matter (medium dense, moist) (fill)			
35		15	14	1					14		%F=25
	5										
							MSW	Refuse (partially decayed wood fragments, plastics, paper, glass and metal debris with black silty sand)			
30		3	5	2							
	10				▼						
25		8	10	3							
	15										
20		7	12	4							
	20										
15		5	24	5							
	25										
10		2	7	6							
	30										
5		3	10	7							
	35										
0		3	12	8							
	40										

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-14

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project

Project Location: Everett, Washington

Project Number: 6191-002-08

Figure A-15

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40										
-5		15	64	9				Wood debris/log			
	45										
-10		10	8	10							
	50										
							PT	Dark brown peat (soft, wet)			
-15		16	3	11					184		
	55										
		5	*	12			OL	Dark brown organic silt (soft, wet)			*Sampler was dropped 10 feet above sample Blow count not available Vibrating wire piezometer installed at Elevation -17.7 feet
-20		8	6	13				Grades to gray and to medium stiff			
	60										
		18	18	14			PT	Dark brown peat (very stiff, wet) (alluvial deposits)			
-25		18	31	15			SP-SM	Gray fine to coarse sand with silt (dense, wet) (transitional deposits)	14		%F=10
	65										
							SP-SM	Gray fine to medium sand with silt and trace organic matter (dense, wet)			
-30		18	41	16					24		%F=10
	70										
-35		14	46	17							
	75						ML	Gray silt (hard, wet)			
-40		18	50	18							
	80							Sondex settlement system and vibrating wire piezometer installed upon completion			
-45											
	85										
-50											

LOG OF BORING GEI-14 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-15
Sheet 2 of 2

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

Date(s) Drilled	12/26/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	35	Surface Elevation (ft)	36.3	Groundwater Elevation (ft)	12.3
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307514.611 355771.8957

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
36.3	0							SOD	4 inches of sod mat			
								SM	Dark brown silty fine to medium sand with occasional gravel and trace organic matter (loose, moist) (fill)			
	~4	■	17	4	1					21		
	6							MSW	Refuse (glass, metal, concrete rubble, wire, cloth, paper, plastic, and wood intermixed with dark brown/black silty fine to medium sand)			
	~9	■	6	4	2							
	~14	■	0	4	3							
	~19	■	9	24	4				Concrete debris			Hard drilling
	~24	■	12	17	5	▼						
	~26.5	■	16	17	6							
	~29	■	16	12	7							
	~34	■	0	64	8							Refusal at 34 feet in metal/wire
	35											

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-15a

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-16a
Sheet 1 of 1

DRAFT

Date(s) Drilled	12/26/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	36.3	Groundwater Elevation (ft)	12.3
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307514.611 355771.8957

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SM	Dark brown silty fine to medium sand with occasional gravel (loose, moist) (fill)*			*Soil descriptions based on conditions encountered in GEI-15a
35												
	5											
30								MSW	Refuse (glass, metal, wire, cloth, paper, plastic, and wood intermixed with dark brown/black silty fine to medium sand)*			
	10											
25												
	15											
20												
	20											
15												
						▼						
	25											
10												
	30											
5												
			12	10	9							
	35											
0								PT	Reddish brown fiberous peat (medium stiff, moist to wet) (alluvial deposits)			
			18	8	10							
	40											

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-15b

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-16b
Sheet 1 of 2

Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
40–42.5	17	7	11					
42.5				OL/PT	Reddish brown fiberous peat interlayered with gray organic silt (soft to medium stiff, moist to wet)			
	18	4	12					
	15	12	13a, 13b					
47				SM	Brown silty fine to coarse sand with occasional gravel (medium dense, wet)			
	18	16	14			17		%F=14
51				SP-SM	Gray and brown fine to medium sand with silt (dense to very dense, wet) (transitional deposits)			
	18	71	15					Drill mud added to hole
	12	41	16					
61				SP-SM	Gray fine to medium sand with silt (dense to very dense, wet)			
	14	47	17			15		%F=10
70	18	69	18					

Elevation feet: -5, -10, -15, -20, -25, -30, -35, -40, -45, -50
Depth feet: 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

LOG OF BORING GEI-15b (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	12/27/07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	6-inch ID, 10-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	60	Surface Elevation (ft)	32.9	Groundwater Elevation (ft)	9.9
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307513.444 355884.3567

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0				SM	Gray and brown silty fine to coarse sand with occasional gravel (medium dense to dense, moist) (fill)			
30		11	44	1					
	5				MSW	Refuse (glass fragments, plastic, paper, brick fragments, decayed wood intermixed with silty fine to coarse sand with occasional gravel)			
25		10	8	2					
	10								
20		10	30	3					
	15								
15		11	10	4					
	20								
10		7	15	5					
	25								
5		6	27	6					
	30				PT	Brown peat with partially decayed wood (medium stiff, wet) (alluvial deposits)			
0		6	14	7			199		
	35	7	8	8					Vibrating wire piezomenter installed at Elevation -2.6 feet
-5		11	6	9	SM	Yellowish brown silty fine to medium sand with occasional gravel (loose, wet)			
	40								

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-16

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-17
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	40											Drill mud added to hole
-10								SP-SM	Gray fine to coarse sand with silt (dense, wet) (transitional deposits)			
		■	14	45	10					18		%F=9
	45											
-15		■	16	47	11							
	50											
-20		■	15	60	12							
	55								Becomes fine to medium and very dense			
-25		■	17	72	13							
	60								Sondex settlement system and vibrating wire piezometer installed upon completion			
-30												
	65											
-35												
	70											
-40												
	75											
-45												
	80											
-50												
	85											
-55												

LOG OF BORING GEI-16 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	11/15/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	89	Surface Elevation (ft)	35.7	Groundwater Elevation (ft)	19.7
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307464.621 356143.2087

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
35	0					SOD	0 to 3 inches sod			
						SM	Brown/black silty fine to coarse sand with gravel and organic matter (medium dense, moist to wet)			
		16	20	1						
30	5					MSW	Refuse (paper, plastic, cloth tile, glass, metal) intermixed with gray silty fine to coarse sand with occasional gravel			
		16	7	2						
25	10									
		6	6	3						
20	15				▼					
		8	5	4						
15	20									
		8	48	5						
10	25									
		4	2	6			Contains increasing wood content (chips, timber)			
5	30									
		8	15	7						
0	35					SP-SM	Gray/black fine to coarse sand with silt (medium dense, wet) (transitional deposits)			
		18	20	8						4 feet heave
	40									Drill mud added to hole

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-17

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-18
Sheet 1 of 2

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
-5	40	16	24	9			27		%F=6
		18	58	10		Grades to very dense			
-10	45								Water added to hole
		11	19	11					1 foot heave Blowcount not representative
-15	50	17	53	12					
		13	58	13					
-20	55								
		16	71	14					
-25	60								
		16	70	15					
-30	65								
		16	42	16a 16b	OH	Brown gray organic clay (hard, moist)	33 27		AL
-35	70				SP-SM	Gray fine to medium sand with silt (very dense, wet)			
		18	52	17			20		%F=12
-40	75								
		18	73	18	ML	Gray silt with fine sand (hard, moist)			
-45	80				SP	Gray fine sand (dense, wet)			
		18	37	19					
-50	85				SP-SM	Gray fine to medium sand with silt (very dense, wet)			
		16	83/11.5"	20					

LOG OF BORING GEI-17 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	12/04/07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	75	Surface Elevation (ft)	36.0	Groundwater Elevation (ft)	33
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307533.733 356299.3945

Elevation feet	Depth feet	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SM	2 to 3 inches root mass Dark gray silty fine to medium sand with trace organic matter (loose, moist) (fill)			
35										
					▼					
		2	8	1		MSW	Refuse (black organic silt, glass fragments, decayed wood, plastic, and brick)			
	5									
30										
		3	3	2						
	10									
25										
		2	5	3						
	15									
20										
		8	10	4						
	20									
15										
		16	12	5						
	25									
10										
		14	16	6						
	30									
5										
		15	9	7		PT	Brown peat with partially decayed wood chips (medium stiff to stiff, wet) (alluvial deposits)	199		
	35									
0										
		15	5	8						
	40									

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-18

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Depth (feet)	Elevation (feet)	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
40						OL	Gray organic silt (medium stiff, moist)			
	-5	18	P	9						
		18	14	10		SM	Gray silty fine sand (medium dense, wet)			
45	-10									
						SP	Brown and gray fine to medium sand (medium dense, wet)			
		15	12	11						
50	-15									
		18	22	12						Water added to hole
55	-20									
						SP	Brown and gray fine to medium sand (dense to very dense, wet) (transitional deposits)			
		18	47	13						
60	-25									
		18	57	14						
65	-30									
		0	50	15						
70	-35									
		15	53	16						
75	-40									
80	-45									
85	-50									

LOG OF BORING GEI-18 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-19

Date(s) Drilled	01/16/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	26.3	Groundwater Elevation (ft)	8.3
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307466.094 354846.2499

MATERIAL DESCRIPTION

Depth feet	Elevation feet	Group Symbol	Material Description
0	26.3	SOD	3 to 4 inches root mass/sod
		SM	Gray silty fine to medium sand with occasional gravel (medium dense, moist) (fill)
9		MSW	Refuse (rubber tires, wood chips, paper, plastic, metal, copper wire, intermixed with dark brown silty fine to medium sand)
32		PT	Brown peat (soft, wet) (alluvial deposits)
38		OL	Gray organic silt with occasional fine sand (very soft, wet)

Water level symbol (▼) shown at approximately 18 feet depth.

SAMPLES

Depth (ft, approx.)	Recovered (in)	Blows/foot	Sample Number	Moisture Content %	Dry Unit Weight, lbs/ft³	Other Tests and Notes
3.5–5	14	17	1	11		DIPRA Pts. = 3
8.5–9	7	50/3"	2			
13.5–15	6	11	3			
18.5–20	5	7	4			
23.5–25	6	10	5			
28.5–30	5	20	6			
33.5–35	18	3	7	133		
36–37.5	18	4	8			
38.5–40	18	P	9	54		

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-19

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

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DRAFT

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40											
-15			18	P	10							Drill mud added to hole
			18	P	11							
	45											
-20								SP	Gray fine to medium sand (medium dense, wet) (transitional deposits)			
			18	26	12							
	50											
-25												
			0	34	13				Becomes dense with occasional gravel			
	55											
-30												
			14	37	14							
	60											
-35								SP	Gray medium to coarse sand with occasional gravel (very dense, wet)			
			10	65	15							
	65											
-40												
			16	48	16			ML	Gray silt (hard, wet)			
	70											
-45												
	75											
-50												
	80											
-55												
	85											
-60												

LOG OF BORING GEI-19 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	11/19/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	90	Surface Elevation (ft)	31.2	Groundwater Elevation (ft)	5.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307520.345 355113.1103

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					GM	Gray silty gravel with sand (gravel surfacing)			
30						SM	Gray silty fine to coarse sand with occasional gravel and trace organics (wood chips) (medium dense, moist) (fill)			
		8	14	1						
	5									
25						MSW	Refuse (plastic, wood and timber debris, metal pipe intermixed with zones of gray/black silty sand)			
		3	11	2						
	10									
20										
		2	5	3						
	15									
15										
		3	6	4						
	20									
10										
		0	50/3"	5						
	25				▼					
5		6	8	6						
		6	24	7						
	30									
0						WD	Wood (partially decayed pieces and chips) (medium stiff to stiff, wet) (wood waste?)			
		3	6	8						
	35									
-5										
		6	12	9						
	40									

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-20

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

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Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	Material Description	Moisture Content %	Dry Unit Weight, lbs/ft³	Other Tests and Notes
-10									
		0	8	10					
	45				OL	Gray organic silt with occasional wood chips (very soft to soft, wet) (alluvial deposits)			
-15		18	2	11			46		
		0	2	12					
	50								
-20		0	16	13					
					SP-SM	Gray fine to medium sand with silt (medium dense to dense, wet) (transitional deposits)			
		12	25	14			26		%F=9
	55								
-25									
		12	37	15					
	60								
-30									
		11	34	16					
	65								
-35									
		12	8	17a			23		
				17b	OL	Gray organic silt interlayered with brown peat (medium stiff to stiff, moist to wet)			
	70								
-40									
					SP/SM	Gray fine to coarse sand with silt, with layers of silty fine sand (dense, wet)			
		18	37	18					
	75								
-45									
		18	27	19			17		%F=18
	80								
-50					SM	Gray silty fine to medium sand (very dense, wet)			
		16	53	20					
	85								
-55									
			59	21					
	90								

LOG OF BORING GEI-20 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-21
Sheet 2 of 2

Date(s) Drilled	11-30-07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	90	Surface Elevation (ft)	34.2	Groundwater Elevation (ft)	7.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307645.616 355393.0916

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SOD	3 inches grass/sod			
								SM	Gray silty fine to coarse sand with occasional gravel (dense, moist) (fill)			
30	5	■	2	6	1			MSW	Refuse (paper, glass, plastic, metal, wire, wood fragments intermixed with brown and gray silty fine to medium sand with occasional gravel)			
25	10	■	9	3	2							
20	15	■	3	6	3							
15	20	■	7	8	4							
10	25	■	6	13	5	▼						
5	30	■	3	55	6							
0	35	■	0	6	7			OL	Gray and brown organic silt with lenses of brown peat and occasional wood fragments (medium stiff, wet) (alluvial deposits)			
-5	40	■	15	2	8							

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-21

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
		18	4	9					
-10	45	18	7	10	PT	Brown peat (medium stiff, wet)	170		
					ML	Gray silt (medium stiff, wet)			
		18	4	11		Brownish gray organic silt?	55		
-15	50	18	5	12					
-20	55	15	*	13					*Sampler was dropped 15 feet above sample Blow count not available
					SM	Gray silty fine sand (medium dense, wet)			
		16	12	14			28		%F=17
					SP	Gray fine to medium sand with occasional decayed wood fragments (medium dense, wet)			
-25	60	12	18	15					
-30	65	6	30	16		Becomes dense			
					ML	Gray silt with occasional wood fragments (very soft, wet)			
-35	70	18	1	17					
		24	P	18					
					PT	Dark brown peat (stiff, moist)			
-40	75	18	34	19a 19b					
					SM	Dark brown silty fine to medium sand (dense, wet)			
					ML	Gray silt (hard, wet) (transitional deposits)			
-45	80	0	50/5"	20					
		18	84	21					
-50	85	18	65	22b 22a					
					SP	Gray fine to medium sand (very dense, wet)			
-55	90	18	65	23a 23b					
					ML	Gray silt (hard, wet)			

LOG OF BORING GEI-21 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-22
Sheet 2 of 2

DRAFT

Date(s) Drilled	11/21/07	Logged By	CMK/SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	30.7	Groundwater Elevation (ft)	-17.3
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307802.907 355345.0083

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
30	0				SOD	2 inches sod			
					SM	Brown silty fine sand (loose to medium dense, moist) (fill)			
					MSW	Refuse (paper, wood, glass, plastic, brick, metal wire)			
		10	10	1					
25	5								
		8	9	2					
20	10								
		11	17	3					
15	15								
		1	10	4					
10	20	3	27	5					
		3	21	6					
5	25				PT	Dark brown peat (soft, wet) (alluvial deposits)			
		14	2	7			129		
0	30				OH	Gray organic clay with occasional wood fragments (soft, moist)			
		18	2	8			45		AL
-5	35				OH	Brown organic clay (medium stiff, moist)			
	40	18	7	9			135		AL

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-22

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
-10	40					ML	Dark gray silt with occasional fine to medium sand and occasional decayed wood pieces (very soft, moist)			
		18	0	10				30		
-15	45					SP	Gray fine to medium sand with trace silt and occasional decayed wood pieces (very loose, wet)			
		15	0	11	▽					
-20	50					SM	Gray silty fine to medium sand (medium dense to dense, wet) (transitional deposits)			
		18	18	12				24		%F=14
-25	55	11	35	13						
-30	60	13	*12	14						*Blow count not representative
-35	65	12	39	15		SP-SM	Gray fine to medium sand with silt (dense, wet)	24		%F=5
-40	70					SP	Gray fine to medium sand with trace silt and occasional fine gravel (very dense, wet)			
		18	50/6"	16						
-45	75	14	63	17						
-50	80									
-55	85									

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-22 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-23
Sheet 2 of 2

DRAFT

Date(s) Drilled	11/26/07-11/27/07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	105	Surface Elevation (ft)	34.2	Groundwater Elevation (ft)	21.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307744.688 355497.4153

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SOD	4 to 6 inches sod/topsoil			
								SM	Brown silty fine to medium sand with occasional gravel (medium dense, moist) (fill)			
								MSW	Refuse (dark organic silty fine sand with partially decayed wood chips, plastics, pvc fragments, and paper)			
-30	5	■	16	7	1							
-25	10	■	12	8	2							
-20	15	■	4	8	3	∇						
-15	20	■	2	7	4							
-10	25	■	1	14	5							
		■	3	10	6			SM	Gray silty fine to medium sand with decayed wood chips and occasional gravel (medium dense, wet) (alluvial deposits)			
-5	30	■	8	16	7							
								ML	Gray silt with occasional fine sand and decayed wood fragment (soft, wet)			
-0	35	■	0	9	8							
		■	16	4	9							
-5	40	■	16	0	10					106		

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-23

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project

Project Location: Everett, Washington

Project Number: 6191-002-08

Figure A-24

DRAFT

Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	Grades to very soft			
PT	Brown peat with occasional partially decayed wood chips (soft to medium stiff, wet)	386		
ML	Gray silt with decayed wood fragments (very soft, wet)			
SM	Gray silty fine sand (medium dense, wet)			
SP	Gray fine to medium sand with trace silt (medium dense to dense, wet)			
ML	Gray silt with occasional fine to medium sand and occasional wood fragments (soft, wet)			
SM	Brown to gray silty fine to medium sand (loose, wet)			
SP/OL	Brown organic silt interlayered with gray fine to medium sand (dense/hard, moist)			
SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, wet)			*Blow count not representative

SAMPLES

Recovered (in)	Blows/foot	Sample Number
18	5	11
18	2	12
18	0	13
18	0	14
24	P	15
3	21	16
14	30	17
10	14	18
18	3	19
24	P	20
14	5	21
18	44	22
8	*22	23

Depth feet: 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

Elevation feet: -10, -15, -20, -25, -30, -35, -40, -45, -50, -55

LOG OF BORING GEI-23 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-24
Sheet 2 of 3

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Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	90											
-60	95	■	14	38	24			SP	Gray fine to coarse sand with trace silt and occasional gravel (dense, wet)			
-65	100	■	16	39	25			ML	Gray silt with fine sand (hard, wet)			
-70	105	■	15	49	26			ML	Gray silt with 2 inch layer of gray fine to medium sand (hard, moist)			
-75	110											
-80	115											
-85	120											
-90	125											
-95	130											
-100	135											
-105												

LOG OF BORING GEI-23 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	12/12/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	34.6	Groundwater Elevation (ft)	14.6
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307688.922 355739.6074

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SOD	3 inches sod mat			
								SM	Dark brown silty fine to medium sand with occasional gravel (medium dense, moist) (fill)			
								MSW	Refuse (wood debris, paper, plastic, cloth, wire, glass intermixed with dark gray to black silty sand with gravel)			
		■	14	7	1							
-30	5											
		■	10	12	2							
-25	10											
		■	3	10	3							
-20	15											
		■	0	26	4							
-15	20					▼						
		■	5	34	5							
-10	25											
		■	3	11	6							
-5	30											
		■	9	34	7							
		■	16	10	8							
-0	35											
		■	8	50/4"	9							
-5	40											

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-24

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project

Project Location: Everett, Washington

Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40								
					PT	Reddish brown fiberous peat (stiff, moist to wet) (alluvial deposits)			
		17	9	10					
-10	45								
					OL/PT	Gray organic silt interlayered with fiberous peat (very soft, wet)			
		6	P	11			143		
-15	50								
		11	P	12					
		18	1	13					
-20	55								
		18	P	14					
-25	60								
					SM	White, black, and gray silty fine to medium sand (dense, wet) (transitional deposits)			
		17	31	15					
-30	65								
		16	40	16a 16b 16c	OL	Brown organic silt (very stiff, moist)			
-35	70				ML	Gray silt (hard, moist)			
		16	50	17					
-40	75								
					SP-SM	Gray fine to medium sand with silt (very dense, wet)			
		18	64	18			17		%F=9
-45	80								
-50	85								
-55									

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-24 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-25
Sheet 2 of 2

Date(s) Drilled	12/13/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	75	Surface Elevation (ft)	30.3	Groundwater Elevation (ft)	7.3
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307827.57 355759.8592

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
30	0							SOD	3 inches sod mat			
								SM	Gray silty fine to medium sand with occasional gravel (medium dense, moist) (fill)			
								MSW	Refuse (paper, plastic, wire, glass and wood debris intermixed with black/gray silty sand with gravel			
			18	26	1							
25	5											
			7	6	2							
20	10											
			5	17	3							
15	15											
			0	5	4							
10	20											
			2	2	5							
						▼						
			1	10	6							
5	25											
			7	26	7							
0	30											
								OL/PT	Brown and red fiberous peat interlayered with gray organic silt (soft, wet) (alluvial deposits)			
			18	2	8					169		
-5	35											
			18	P	9							
	40											

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-25

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
-10	40					ML	Gray silt with fine sand and trace organics (soft, wet)			
		17	2	10						
-15	45					SM	Gray silty fine sand (medium dense, wet)			
		17	11	11				28		%F=16
-20	50					ML	Gray silt with fine sand and thin 1/4-inch thick organic layers (very stiff, wet) (transitional deposits)			
		18	30	12						
-25	55					SP-SM	Gray fine to medium sand with silt and trace organics (dense, moist to wet)			
		18	41	13						
-30	60					SM	Gray silty fine to medium sand (dense to very dense, wet)			
		16	*10	14				27		%F=15 *Blow count not representative
-35	65									
		16	58	15						
-40	70									
		16	37	16						
-45	75									
-50	80									
-55	85									

LOG OF BORING GEI-25 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-26
Sheet 2 of 2

Date(s) Drilled	12/19/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	31.8	Groundwater Elevation (ft)	23.8
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307681.491 355897.9744

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SOD	4 inches sod mat			
30								SM	Brown silty fine to medium sand with occasional gravel (medium dense, moist) (fill)			
	5	■	15	16	1							
25						▽		MSW	Refuse (wood debris, paper, plastic, metal, glass intermixed with silty sand)			
	10	■	0	4	2							
20												
	15	■	5	5	3							
15												
	20	■	4	16	4							
10												
	25	■	0	5	5							
5												
	30	■	12	4	6							
0												
	35	■	18	51	7			PT	Brown fiberous peat (very soft to soft, moist) (alluvial deposits)			
-5												
	40	■	0	1	8							

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-26

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40	22	P	9					
-10		16	10	10					
	45								
-15					OL	Gray organic silt with fiberous organic matter (very soft, wet)			
		17	P	11			88		
	50								
-20									Water added to hole
		18	29	12a 12b	SP-SM	Gray fine sand with silt (dense, wet) (transitional deposit)			
	55								
-25									
		18	42	13					
	60								
-30									
		18	49	14a 14b	ML	Gray clayey silt with trace organic matter (hard, moist)			
	65								
-35					SP-SM/ML	Gray fine sand with silt interlayered with brown silt (very dense, hard, wet)			
		15	54	15					
	70								
-40									
	75								
-45									
	80								
-50									
	85								
-55									

LOG OF BORING GEI-26 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	12/20/08	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	37.2	Groundwater Elevation (ft)	10.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307674.723 356101.0564

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0				SOD	5 inches sod mat			
35					SM	Brown silty fine to medium sand with occasional gravel (medium dense to dense, moist to wet) (fill)			
		12	35	1			17		
	5								
30					SP	Gray fine sand with occasional gravel (medium dense, moist) (fill)			
		12	11	2					DIPRA Pts. = 2
	10								
25					SM	Brown silty fine sand with occasional gravel (loose, wet) (fill)			
		1	9	3					
	15								
20					MSW	Refuse (metal, brick, wood, plastic, and glass intermixed with black silty sand with gravel)			
		14	15	4					
	20								
15									
		18	14	5					
	25								
10									
		1	24	6					
	30								
5									
		15	22	7					
	35								
0					PT	Brown/black fiberous peat (medium stiff to stiff, wet) (alluvial deposits)			
		14	5	8			39		
	40								

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-27

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40									
-5										
		18	14	9						
	45									
-10										
		18	7	10a 10b						
						OL	Gray organic silt (medium stiff, moist)			
	50									
-15										
		18	5	11				141		
	55									
						SM/ML	Gray silty fine to medium sand to fine to medium sandy silt (medium dense, wet)			
-20										
		17	15	12						
	60									Water added to hole
						SP-SM	Gray fine to medium sand with silt (dense to very dense, wet) (transitional deposits)			
-25										
		18	58	13						
	65									
-30										
		18	47	14						
	70									
						ML	Gray silt (hard, wet)			
-35										
		18	42	15						
	75									
						SP-SM	Gray fine sand with silt (very dense, wet)			
-40										
		17	75	16						
	80									
-45										
	85									
-50										

LOG OF BORING GEI-27 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	12/10/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	35.9	Groundwater Elevation (ft)	8.9
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307699.834 356309.4833

Depth feet	Recovered (in)	Blows/foot	Sample Number	Moisture Content %
~4	13	15	1	13
~9	2	15	2	
~14	18	10	3	
~19	12	15	4	
~24	13	10	5	
~29	7	4	6	
~34	16	6	7	
~39	13	11	8	

Group Symbol	MATERIAL DESCRIPTION
AC	2 inches asphalt concrete
GP-GM	1 foot gray/brown angular crushed rock with silt
SM	Gray silty fine to medium sand with occasional gravel (medium dense, moist) (fill)
MSW	Refuse (wood, metal debris, concrete, glass, and brick fragments intermixed with brown/black silty fine sand with gravel)
OL/PT	Brown/black organic silt with fiberous organic matter (medium stiff, wet) (alluvial deposits)

Column headings: Elevation feet; Depth feet; SAMPLES (Interval, Recovered (in), Blows/foot, Sub-Sample Sample Number); Water Level; Graphic Log; Group Symbol; MATERIAL DESCRIPTION; Moisture Content %; Dry Unit Weight, lbs/ft³; OTHER TESTS AND NOTES

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-28

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
-5	40									
		13	4	9				45		
-10	45									
		18	13	10						
-15	50									
						PT	Brown to dark brown peat (stiff, moist)			
		18	14	11				101		
-20	55									
						SM	Gray silty fine sand (medium dense, wet)			
		18	18	12						
-25	60									
						SP-SM	Gray fine to medium sand with silt (very dense, wet) transitional deposit)			
		12	77/11"	13						
-30	65									
						ML	Gray silt (hard, moist)			
		18	69	14						
-35	70									
						SP-SM	Gray fine sand with silt (very dense, wet)			
		18	68	15						
-40	75									
		13	82	16						
-45	80									
-50	85									

LOG OF BORING GEI-28 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-29
Sheet 2 of 2

Date(s) Drilled	01/24/08	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	34.4	Groundwater Elevation (ft)	10.9
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307663.766 356481.0287

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							GM	Silty fine to coarse gravel (dense, moist) (fill)			
								SM	Gray silty fine to medium sand with gravel (fill)			
								MSW	Refuse (brick, glass, metal, wood, and asphalt debris intermixed with gray/black silty fine to medium sand with gravel)			
-30	5		15	14	1							
-25	10		9	17	2							
-20	15		4	46	3							
-15	20		5	4	4							
-10	25		3	6	5	▼						
-5	30		8	7	6							
0	35		8	14	7							
-5	40		7	10	8							

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-29

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	SAMPLES: Interval / Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample / Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40						OL/PT	Dark brown peat with wood fragments interlayered with organic silt (medium stiff to stiff, wet) (alluvial deposits)			
-10	45	14	5	9					48		
		17	17	10a 10b							
							SM	Gray silty fine to medium sand (medium dense, wet)			Drill mud added to hole
-15	50	18	6	11			SM	White, black, gray, and orange silty fine to coarse sand (loose, wet)	11		%F=14
							SM	Reddish brown with gray silty fine sand (very dense, wet) (transitional deposits)			
-20	55	14	67	12							
							SP-SM	Gray fine to coarse sand with silt (very dense, wet)			
-25	60	15	67	13							
							ML	Gray silt with occasional fine sand layers (hard, wet)			
-30	65	14	40	14							
							ML/SP-SM	Gray fine sand with silt layers (very dense/hard, wet)			
-35	70	15	54	15							
-40	75										
-45	80										
-50	85										
-55											

LOG OF BORING GEI-29 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-30
Sheet 2 of 2

DRAFT

Date(s) Drilled	12/07/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	25	Surface Elevation (ft)	32.7	Groundwater Elevation (ft)	10.7
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307746.628 356594.3583

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					AC	6 inches asphalt concrete			
						GP-GM	Dark gray/black crushed rock base course			
30						GM	Dark gray/black silty fine to coarse gravel with sand (loose, moist) (fill)			
		9	4	1						
	5					MSW	Refuse (dark gray/black silty fine sand with gravel intermixed with glass, brick, wood, and metal debris)			
25		9	6	2						
	10									
20		4	2	3						
	15									
15		12	8	4						
	20									
					▼					
10		9	50/3"	5						
	25						Boring refusal on obstruction			
5										
	30									
0										
	35									
-5										
	40									

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-30a

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-31a
Sheet 1 of 1

Date(s) Drilled	12/07/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	74.5	Surface Elevation (ft)	32.8	Groundwater Elevation (ft)	10.8
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307745.227 356584.7671

Elevation feet	Depth feet	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					AC	6 inches asphalt concrete*			* Soil descriptions based on conditions encountered in GEI-30a
						GP-GM	Dark gray/black crushed rock base course*			
30						GM	Dark gray/black silty fine to coarse gravel with sand (loose, moist) (fill)*			
	5					MSW	Refuse (dark gray/black silty fine sand with gravel with glass, brick, wood intermixed and metal debris)*			
25										
	10									
20										
	15									
15		14	3	4						
	20				▼					
10		5	5	5						
	25									
5		6	5	6						
	30									Water added to hole
0		8	4	7						
	35									
						WD	Wood			Driller notes drilling through wood 37 to 38 feet
-5		15	1	8		OL	Gray organic silt/clay with brown fiberous wood pieces (very soft, moist to wet) (alluvial deposits)	148		
	40									

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-30b

GeoEngineers

Project: Everett Riverfront Redevelopment Project

Project Location: Everett, Washington

Project Number: 6191-002-08

Figure A-31b

DRAFT

Samples: Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
7	12	9	OL/PT	Brown fiberous organic material and brown organic silt (medium stiff, wet)			
			WD	Wood/log			
			PT	Peat (stiff, moist to wet)			
16	22	10a					
		10b	SP-SM	White/black/gray fine to coarse sand with silt and occasional gravel (dense, wet) (transitional deposits)			
18	38	11					
18	25	12					
18	42	13					
18	79/10"	14					
17	50/5"	15					

Depth feet: 40, 45, 50, 55, 60, 65, 70, 75, 80, 85
Elevation feet: -10, -15, -20, -25, -30, -35, -40, -45, -50, -55

LOG OF BORING GEI-30b (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-31b
Sheet 2 of 2

DRAFT

Date(s) Drilled	12/03/07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	79.5	Surface Elevation (ft)	29.5	Groundwater Elevation (ft)	11.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307882.689 356732.513

Elevation feet	Depth feet	SAMPLES: Interval	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							AC	1.5 to 2 inches asphalt concrete pavement			
								SM	Gray silty fine to coarse sand with occasional gravel (medium dense, moist) (fill)			
-25	5		18	16	1					14		
-20	10		10	3	2			MSW	Refuse (glass, paper, brick, wood chips, and plastic intermixed with silty fine to medium sand and occasional gravel)			
-15	15		5	6	3							
-10	20		3	2	4	▼						
-5	25		5	4	5							
0	30		5	1	6							
-5	35		2	3	7							
-10	40		1	7	8							

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-31

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40									
						ML	Gray silt with occasional decayed wood fragments (soft, wet) (alluvial deposits)			
-15	45	18	2	9						
-20	50	4	2	10						
		24	P	11						
-25	55	18	6	12						
-30	60	18	9	13		SP-SM	Gray fine to medium sand with silt and thin layers of gray silt (loose, wet)			
						SP	Gray fine to medium sand with trace silt (dense, wet) (transitional deposits)			
-35	65	18	47	14						
-40	70	18	49	15a 15b		ML	Gray silt (hard, wet)			
						SP-SM	Gray fine to medium sand with silt and occasional gravel (dense to very dense, wet)			
-45	75	14	37	16				21		%F=8
-50	80	10	50/5"	17						
-55	85									
-60										

LOG OF BORING GEI-31 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-32
Sheet 2 of 2

DRAFT

Date(s) Drilled	01/08/08, 01/10/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	75	Surface Elevation (ft)	22.2	Groundwater Elevation (ft)	3.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307519.927 354589.3891

Depth feet	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %
0	SOD	0 to 2 inches sod layer	
0	SM	Brown silty fine to coarse sand with occasional gravel (loose, moist) (fill)	
3	MSW	Refuse (decayed wood, paper, plastic, and glass intermixed with silty sand with occasional gravel	
28	PT	Dark brown peat (soft, wet) (alluvial deposits)	389
35	ML	Gray organic silt with occasional fine sand (very soft, wet)	49

Sample Number	Recovered (in)	Blows/foot	Moisture Content %
1	6	7	
2	5	7	
3	4	3	
4	0	6	
5	5	2	
6	0	7	
7	14	3	389
8	16	3	
9	0	3	
10	18	P	49

Water level symbol at approximately 19 feet depth.

Elevation feet: 20, 15, 10, 5, 0, -5, -10, -15. Depth feet: 0, 5, 10, 15, 20, 25, 30, 35, 40.

OTHER TESTS AND NOTES

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-32

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-33
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40									
		24	P	11						
-20										
		18	7	12						
	45									Drill mud added to hole
-25						SP	Gray fine to medium sand with trace silt (medium dense, wet) (transitional deposits)			
		18	15	13				24		%F=4
	50									
-30										
		18	34*	14						3 feet heave *Blow count may not be representative
	55									
-35										
		15	27	15						
	60									
-40										
		12	30	16						
	65						Becomes dense			
-45										
		12	39	17						
	70									
-50										
		0	44	18						
	75									
-55										
	80									
-60										
	85									
-65										

LOG OF BORING GEI-32 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-33

Date(s) Drilled	01/11/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	23.0	Groundwater Elevation (ft)	-13
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307605.302 354774.8094

Elevation feet	Depth feet	SAMPLES: Interval	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0							SOD	0 to 3 inches sod/root mass			
								SM	Gray/brown silty fine to medium sand with occasional gravel (loose, moist) (fill)			
20			9	4	1					25		
	5											
								MSW	Refuse (plastic, glass, metal, wire, charcoal, and wood chips intermixed with gray silty fine to medium sand)			
15			3	9	2							
	10											
10			6	8	3							
	15											
5			6	16	4							
	20											
0			2	10	5							
	25											
-5			5	6	6							
	30											
								PT	Brown peat (soft, most) (alluvial deposits)			
-10			0	4	7							
	35					▼						
								ML	Gray silt with occasional wood fragments (very soft, wet)			
-15			6	1	8					57		
	40											

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-33

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-34

Recovered (in)	Blows/foot	Sample Number	Group Symbol	Material Description	Moisture Content %	Other Tests and Notes
18	7	9				
			SP-SM	Gray fine to medium sand with silt (loose to medium dense, wet)		
18	11	10			25	%F=6 Drill mud added to hole
18	32	11	SM	Gray silty fine to medium sand (dense, wet) (transitional deposits)	25	%F=27
10	34	12				
0	30	13				
16	39	14	SP-SM	Grades to sand with silt		
12	39	15			20	%F=7
13	31	16				

LOG OF BORING GEI-33 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	01/14/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	25.5	Groundwater Elevation (ft)	2.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307717.099 355037.6745

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample / Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
25	0							SOD	0 to 3 inches sod/root mass			
								SM	Gray silty fine to medium sand with occasional wood chips (loose, moist) (fill)			
		■	15	7	1					20		
20	5											
								MSW	Refuse (partially decayed wood, paper, plastic, rubber, and copper wire intermixed with yellow and black silty fine sand			
		■	3	11	2							
15	10											
		■	3	12	3							
10	15											
		■	3	7	4							
5	20											
		■	4	3	5	▼						
0	25											
		■	1	2	6							
-5	30											
		■	6	5	7							
-10	35											
								ML	Gray silt with occasional partially decayed wood fragments (very soft, wet) (alluvial deposits)			
		■	15	0	8					74		
	40											

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-34

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-35
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
-15	40									
		16	0	9		SM	Gray silty fine sand with occasional wood fragments (very loose, wet)			
-20	45									
		16	16	10		SM	Gray silty fine to medium sand (medium dense, wet) (transitional deposits?)	27		%F=16
-25	50									
		14	22	11						
-30	55									
		16	18	12						
-35	60					SP-SM	Gray sand with silt (dense to very dense, wet)			
		15	30	13				25		%F=9
-40	65									
		12	48	14						
-45	70									
		12	57	15						
-50	75									
		12	61	16						
-55	80									
-60	85									

LOG OF BORING GEI-34 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	11/28/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	29.1	Groundwater Elevation (ft)	-1.9
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307860.93 355500.9625

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0				SOD	4 inches sod mat			
					SM	Gray silty fine to coarse sand with gravel and organics (medium dense, moist) (fill)			Water added to hole
25		14	16	1					
	5								
					MSW	Refuse (foam, glass, cloth, plastic, twine, wood, paper, and wire intermixed with gray silty fine to medium sand with gravel)			
20		7	15	2					
	10								
15		8	50/6"	3					
	15								
10		0	12	4					
	20								
5		4	8	5					
	25								
0		0	3	6					
	30								
		0	2	7		(Water level ▼)			
-5		0	3	8		Contains increasing organic silt and fiberous wood			
	35	24		9					
		0	5	10					
					ML	Gray clayey silt with organic matter (medium stiff, wet) (alluvial deposits)			
-10		18	4	11					
	40								

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-35

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-36
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Samples: Recovered (in)	Samples: Blows/foot	Samples: Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40					SM	Gray silty fine sand with organic matter (loose, wet)			
-15	45	18	4	12				30		%F=49
-20	50	18	5	13						
						SM	Gray silty fine to medium sand (medium dense, wet) (transitional deposits)			
-25	55	18	25	14						
						SP	Gray fine to medium sand with trace silt (medium dense to very dense, wet)			
-30	60	8	21	15				24		%F=4
-35	65	12	57	16						
						SP-SM	Gray fine sand with silt and wood debris (dense, wet)			
-40	70	14	*18	17				23		%F=6 *Blow count not representative
						SP-SM	Gray fine to medium sand with silt (dense to very dense, wet)			
-45	75	18	76	18						
-50	80	17	30	19						
-55	85									
-60										

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-35 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-36
Sheet 2 of 2

DRAFT

Date(s) Drilled	12/17/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	6-inch ID, 10-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	26.9	Groundwater Elevation (ft)	8.9
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307931.443 355756.0688

Depth feet	Group Symbol	MATERIAL DESCRIPTION
0	SOD	3 inches sod mat
	SM	Dark gray to black silty fine to medium sand with gravel (medium dense, moist) (fill)
5	MSW	Refuse (paper, cloth, wood, and plastic intermixed with gray/black silty fine to medium sand with gravel)
~28	OL	Gray organic silt with organic matter (very soft, wet) (alluvial deposits)

Approx. Depth feet	Recovered (in)	Blows/foot	Sample Number	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
~3.5	15	17	1			
~8.5	10	4	2			
~13.5	4	7	3			
~18.5	0	4	4			
~23.5	1	2	5			
~26	0	3	6			
~28.5	18	2	7			
~31	18	P	8			
~32.5	24	P	9	389	15	CS
~38.5	18	P	10			

Water level: ▼ at approximately 18 feet depth.

Elevation feet: 25 to -10; Depth feet: 0 to 40

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-36

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-37
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40											
-15								SP-SM	Gray, white, and black fine to medium sand with silt (medium dense, wet)			
		■	18	17	11					17		%F=5
	45											
-20								SP-SM	Gray, white, and black fine to medium sand with silt (dense, wet) (transitional deposits)			
		■	12	38	12							
	50											
-25												
		■	12	28	13					17		%F=7
	55											
-30												
		■	14	34	14							
	60											
-35												
		■	14	51	15				Becomes very dense			
	65											
-40												
		■	12	64	16							
	70								Sondex settlement system installed upon completion			
-45												
	75											
-50												
	80											
-55												
	85											
-60												

LOG OF BORING GEI-36 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	01/18/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	78.5	Surface Elevation (ft)	29.4	Groundwater Elevation (ft)	16.4
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307949.578 355881.6467

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0				SOD	2 to 3 inches sod/root mass			
					SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, moist) (fill)			
-25	5	15	11	1			11		
					SM	Gray silty fine sand with occasional gravel (loose, moist) (fill)			
-20	10	10	6	2					
					MSW	Refuse (paper and wood chips intermixed with silty sand/sandy silt)			
-15	15	6	13	3					
-10	20	5	2	4					
-5	25	0	7	5					
					ML	Gray silt with occasional wood chips (very soft to soft, wet) (alluvial deposits)			
0	30	6	3	6					
-5	35	18	P	7		Becomes very soft			
		24	P	8			135	37	Vibrating wire piezometer installed at Elevation -5.6 feet
					ML	Gray silt with wood fragments (stiff, wet)			
-10	40	18	11	9					

Water level symbol shown at approximately 12.5 feet depth.

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-37

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40											
								SP-SM	Gray fine to medium sand with silt (very loose, wet)			
			14	P	10					26		%F=9
-15	45											
								SP	Gray fine to medium sand (medium dense to dense, wet) (transitional deposits?)			
			16	22	11							
-20	50											
			12	38	12							
-25	55											
			12	27	13							
-30	60											
			12	40	14							
-35	65											
			15	34	15							
-40	70											
			16	24	16							
-45	75							ML	Brown silt (very stiff, wet)			
								SP	Gray fine to medium sand with occasional gravel (very dense, wet)			
			3	50/3"	17							
-50	80											
-55	85											
-60												

LOG OF BORING GEI-37 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	01/31/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	110	Surface Elevation (ft)	36.2	Groundwater Elevation (ft)	9.2
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307966.457 356236.3391

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
36.2	0				SOD	0 to 3 inches grass/sod mat			
					SM	Dark gray silty fine to medium sand with occasional plastic (loose, moist) (fill)			
		12	3	1					
		12	4	2					
		11	6	3					
	15				MSW	Refuse (plastic, paper, glass, rubber, and cloth intermixed with black silty fine to coarse sand)			
		4	9	4					
		18	26	5					
		8	3	6					
		8	4	7	PT	Brown peat with wood chips (soft, wet) (alluvial deposits)			
		24	P	8			60	59	
		16	6	9	ML	Gray silt with occasional wood fragments (medium stiff, wet)			

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-38

GeoEngineers

Project: Everett Riverfront Redevelopment Project

Project Location: Everett, Washington

Project Number: 6191-002-08

Figure A-39

Sheet 1 of 3

V6_GTBORING W:\EVERETT\PROJECTS\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

Depth feet	Elevation feet	Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	OTHER TESTS AND NOTES
40								
	-5							
		0	4	10			48	
45								
	-10							
		18	2	11				
50								
	-15							
					SM	Gray silty fine to medium sand (loose, wet)		
		16	3	12			14	%F=14
55								
	-20							
					SP	Gray fine to medium sand (dense, wet) (transitional deposits)		
		18	33	13				Drill mud added to hole
60								
	-25							
		16	40	14				
65								
	-30							
		12	38	15				
70								
	-35							
		12	31	16				
75								
	-40							
		11	12	17a 17b				
					ML	Dark brown silt with organic matter (stiff, wet)		
80								
					OL	Brown organic silt with 3 inches dark brown peat (stiff, wet)		
	-45							
		18	13	18				
85		0	P	19				
	-50							
					ML/SP	Gray silt interlayered with gray medium to coarse sand (very stiff, wet)		
		3	31	20				

LOG OF BORING GEI-38 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	90											
-55												
			8	9	21							
	95											
-60								SP	Gray fine to medium sand (dense to very dense, wet)			
			16	43	22							
	100											
-65												
			16	79/11"	23							
	105											
-70												
			16	39	24							
	110											
-75												
	115											
-80												
	120											
-85												
	125											
-90												
	130											
-95												
	135											
-100												

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-38 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Date(s) Drilled	01/22/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	14.0	Groundwater Elevation (ft)	-4
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1308085.195 356346.5904

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
14	0					SM	0 to 2 inches root mass			
							Brown silty fine to medium sand with occasional wood chips and gravel (very loose, moist) (fill)			
10	5	14	1	1				47		
						ML	Gray silt with organic matter, wood chips (soft, moist) (alluvial deposits)			
5	10	18	2	2				76		
0	15	6	4	3						
						SM	Dark gray silty fine sand (very loose to loose, wet)			
-5	20	16	5	4	▼					
-10	25	15	2	5						
						SP	Gray fine to medium sand (dense, wet) (transitional deposits)			
-15	30	18	40	6						
-20	35	16	33	7						
-25	40	16	48	8			Grades with occasional gravel			

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-39

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-40
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40									
-30	45	18	50/3"*	9						*3 feet heave Blow count may not be representative
-35	50	15	60*	10						*2 feet heave Blow count may not be representative
-40	55	15	42	11						8 inches heave
-45	60	12	25	12						
						PT	Brown peat (very stiff, wet)			
-50	65	18	23	13				256		
						ML	Gray silt with fine sand (very stiff, wet)			
-55	70	16	17	14						
						SP	Gray fine to medium sand with occasional gravel (very dense, wet)			
-60	75	16	55	15						
-65	80	18	48	16						
-70	85									
-75										

LOG OF BORING GEI-39 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-40
Sheet 2 of 2

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

DRAFT

Date(s) Drilled	12/05/07	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	90	Surface Elevation (ft)	32.5	Groundwater Elevation (ft)	14.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307965.759 356487.9814

Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
0					AC	4 inches asphalt concrete			
					SM	Dark gray silty fine to coarse sand with occasional gravel (medium dense, moist) (fill)			
~4	8	23	1				6		%F=17
~6.5					MSW	Refuse (plastic, glass fragments, cloth, and charcoal intermixed with black silty sand with occasional gravel)			
~9	7	23	2						
~14	8	12	3						
~18				▼					
~19	2	19	4						
~24	10	38	5						
~26.5					ML	Gray brown silt with occasional organic matter (soft, wet) (alluvial deposits)			
~29	13	3	6						
~34	16	8	7a						
~35			7b		SM	Gray silty fine sand (loose, wet)			
~37					ML	Gray silt with occasional organic matter (soft, wet)			
~39	16	3	8						
40									

Elevation feet scale: 30 (depth ~2.5), 25, 20, 15, 10, 5, 0, -5 (depth ~37.5)

Note: See Figure A-1 for explanation of symbols.

V6_GTBORING W:\EVERETT\PROJECTS\6\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-40

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-41
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
		18	P	9					
-10		18	4	10					
-15	45	18	4	11a, 11b	SM	Gray silty fine to medium sand (loose, wet)			
	50				SP-SM	Gray, black, and white fine to medium sand with silt (medium dense, wet) (transitional deposits)			
-20		10	24	12			15		SA, %F=10
-25	55				SP	Gray fine sand (medium dense, wet)			
		9	22	13					
-30	60	18	28	14					
-35	65				SM	Gray silty fine sand (medium dense to dense, wet)			
		14	40	15					1.5 feet heave
-40	70	18	24	16					
-45	75				SP	Gray, black, and white fine to medium sand (very dense, wet)			
		18	50/5"	17					
-50	80	18	59	18					
-55	85	16	74	19					
	90								

LOG OF BORING GEI-40 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	01/30/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	6-inch ID, 10-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	95	Surface Elevation (ft)	35.0	Groundwater Elevation (ft)	12
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307915.404 356363.1222

Elevation feet	Depth feet	SAMPLES: Interval	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
35	0							AC	4 inches asphalt concrete			
								SM	Grayish brown silty fine to coarse sand with occasional gravel (dense, moist) (fill)			
			15	31	1					45		
30	5											
								MSW	Refuse (plastic, glass fragments, metal, and wood chips intermixed with brown silty fine to medium sand with occasional gravel)			
			10	2	2							
25	10											
			5	2	3							
20	15											
			5	2	4							
15	20											
						▼						
			4	4	5							
10	25											
			10	3	6							
5	30											
			10	14	7							
0	35											
			15	32	8							
-5	40											

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-41

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

DRAFT

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
-5	40					ML	Gray silt (medium stiff, wet) (fill?)			
						WD	Red partially decayed wood chips (wet) (wood waste?)			
		4	13	9						
-10	45									
						ML	Gray silt with occasional wood chips (soft, wet) (fill?)			
		8	3	10				79		
-15	50									
		18	4	11		ML	Gray sandy silt (soft, wet) (alluvial deposits)			Vibrating wire piezomenter intalled at elevation -16.0 feet
		8	P	12						
-20	55									
						SP	Gray fine sand (very loose, wet)			
		16	P	13						Drill mud added to hole
-25	60									
		10	18	14						
-30	65									
		16	15	15a				40		
				15b		PT	Brown peat (stiff, wet)	120		
-35	70									
		18	15	16a						
				16b		SM	Dark gray silty fine to medium sand with organic silt (medium dense, wet)			
		3	13	17						
-40	75									
						SP	Gray fine to medium sand with trace silt (very dense, wet) (transitional deposits)			
		16	60	18						
-45	80									
		12	50/6"	19			Grades with occasional gravel			
-50	85									
		16	93	20						

V6_GTBORING W:\EVERETT\PROJECTS\6191002\08\FINAL\619100208.GPJ GEIV6_1.GDT 7/23/08

LOG OF BORING GEI-41 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
-55	90											
			16	88	21							
-60	95											
									Vibrating wire piezometer installed upon completion			
-65	100											
-70	105											
-75	110											
-80	115											
-85	120											
-90	125											
-95	130											
-100	135											

LOG OF BORING GEI-41 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-42
Sheet 3 of 3

Date(s) Drilled	01/28/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	6-inch ID, 10-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	80	Surface Elevation (ft)	34.5	Groundwater Elevation (ft)	6.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307784.727 356444.7623

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0				AC	4 inches asphalt concrete			
					SM	Gray silty fine to medium sand with occasional gravel (medium dense, moist) (fill)			
					MSW	Refuse (gray, black, and brown silty fine to medium sand with occasional gravel intermixed with glass fragments, paper, plastic, cloth, and partially decayed wood chips)			
		16	13	1					
-30	5								
		13	10	2					
-25	10								
		13	13	3					
-20	15								
		3	37	4					
-15	20								
		12	15	5					
-10	25								
		12	2	6					
-5	30								
		13	11	7					
0	35								
		8	50/3"	8	WD	Partially decayed wood (log) (wet)			Drill mud added to hole
-5	40								

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-42

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40–41.5								
	41.5				ML	Gray sandy silt with fine sand and occasional wood fragments (soft to medium stiff, wet) (alluvial deposits)			
-10	45	15	6	9			33		
-15	50	18	5	10					
		13	P	11					
-20	55	18	3	12			70		Vibrating wire piezomenter installed at Elevation -19.5 feet
-25	60	2	45*	13					*Wood/log? Blow count may not be representative
					SP	Gray fine to medium sand (dense, wet) (transitional deposits)			
-30	65	18	32	14			23		%F=3
-35	70	16	56	15a, 15b	ML	Gray silt (hard, wet)			
					SP	Gray fine to medium sand with trace silt (very dense, wet)			
-40	75	15	62	16					
-45	80	14	55	17					

Sondex settlement system and vibrating wire piezometer installed upon completion

LOG OF BORING GEI-42 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-43
Sheet 2 of 2

Date(s) Drilled	12/06/07	Logged By	CMK	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT, Shelby
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	90	Surface Elevation (ft)	29.5	Groundwater Elevation (ft)	2.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307970.374 356631.3424

SAMPLES

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0				AC	3 inches asphalt concrete			
					SM	Gray silty fine to coarse sand with occasional gravel (medium dense, moist) (fill)			
-25	5	18	16	1					
					MSW	Refuse (glass, paper, cloth, metal, wood fragments, brick, and plastic intermixed with gray silty fine to coarse sand)			
-20	10	0	3	2					
		4	6	3					
-15	15	5	19	4					
-10	20	4	11	5					
-5	25	2	7	6					
					WD	Wood waste (fill)			Driller notes standing water in hole at 27 feet. Logs and drilling through wood from 27 to 30 feet logs
0	30	11	8	7					
					ML/OL	Gray clayey silt with organic matter (soft, wet) (alluvial deposits?)			
		18	2	8			46		
-5	35	25	P	9					
		18	10	10		Becomes medium stiff to stiff			
-10	40	18	7	11					

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-43

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-44

DRAFT

Elevation feet	Depth feet	Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
						ML	Gray silt with fine sand and trace organic matter (very soft, wet)			
-15	45	6	1	12				32		Water added to hole
						SM	Gray silty fine sand with organic matter (medium dense, wet)			
-20	50	16	11	13						
-25	55	12	20	14						
-30	60	11	29	15						
						CH	Gray clay with occasional brown organic matter (very stiff, moist to wet)			
-35	65	17	17	16				30		AL
						SM	Gray silty fine sand (medium dense, wet) (transitional deposits?)			
-40	70	18	27	17a 17b				19		%F=36
						SP-SM	Gray, white, and black fine to medium sand with silt (dense to very dense, wet)			
-45	75	16	69	18				15		%F=11
-50	80	18	74	19						
-55	85	17	41	20						
-60	90	16	48	21						

LOG OF BORING GEI-43 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-44
Sheet 2 of 2

Date(s) Drilled	01/21/08	Logged By	SH	Checked By	DCO
Drilling Contractor	Boart Longyear/Holt Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 8-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	70	Surface Elevation (ft)	13.2	Groundwater Elevation (ft)	-9.8
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307999.954 355596.1036

Elevation feet	Depth feet	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SOD	0 to 3 inches sod/root mass			
						SM	Gray silty sand with occasional gravel (loose, moist) (fill)			
10						SM	Gray silty fine to medium sand with occasional gravel, wood chips, grass roots, and plastics (loose, moist) (fill)			
	5	8	3	1						
						ML	Gray silt with occasional sand (soft, moist) (alluvial deposits)			
5		16	2	2				24		%F=98
	10									
0		15	2	3			Grades to silt with sand	37		AL
	15									
-5		18	2	4						
	20									
						SM	Gray silty fine sand with occasional wood chips (very loose, wet)			
-10		16	1	5	▼					
	25									
						SP	Gray fine to coarse sand (medium dense, wet)			
-15		12	50/6"*	6						*3.5 feet heave Blow count may not be representative Drill mud added to hole
	30									
-20		14	20	7		SM	Grades to sand with silt	27		%F=43 3 feet heave
	35									
-25		14	22	8						
	40									

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-44

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-45
Sheet 1 of 2

DRAFT

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40											
-30			12	29	9			SP-SM	Grades to sand with silt	20		%F=8
	45											
-35			15	32	10							
	50											
-40			15	35	11							
	55											
-45			15	37	12							
	60											
								SP	Gray medium to coarse sand with trace silt (very dense, wet) (transitional deposits)			
-50			17	51	13							
	65											
-55			16	66	14							
	70											
-60												
	75											
-65												
	80											
-70												
	85											
-75												

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LOG OF BORING GEI-44 (continued)

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Date(s) Drilled	01/24/08	Logged By	AJ2	Checked By	DCO
Drilling Contractor	Holocene Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 11-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	31.5	Surface Elevation (ft)	42.5	Groundwater Elevation (ft)	27.5
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307058.397 356376.4522

Elevation feet	Depth feet	SAMPLES: Recovered (in)	Blows/foot	Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					SM	0 to 5 inches root mass			
							Brown and gray silty fine to medium sand with gravel and wood fragments (very loose, moist) (fill)			
40		12	2	1				18		
	5	12	15	2			Becomes loose to medium dense			
35		12	7	3						
	10	12	6	4						
30						MSW	Refuse (paper, plastic, glass, and weeds intermixed with gray silty fine to medium sand)			
	15	8	9	5	▼					
25						SM	Gray silty fine to medium sand (loose, wet) (fill?)			
	20	12	7	6						
20						SP	Brownish gray fine to coarse sand with gravel (very dense, moist) (transitional deposits)			
	25	0	52	7						
15										
	30	12	69/11"	8				11		SA, %F=3
10										
	35									
5										
	40									

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING GEI-45

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-46
Sheet 1 of 1

DRAFT

Date(s) Drilled	01/23/08	Logged By	AJ2	Checked By	DCO
Drilling Contractor	Holocene Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 11-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	41.5	Surface Elevation (ft)	42.1	Groundwater Elevation (ft)	26.1
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307043.167 356621.3971

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0						SM	0 to 3 inches root mass			
								Brown silty fine to medium sand (loose, moist) (fill)			
40							MSW	Refuse (burned wood fragments, ceramics, glass pieces, and concrete debris intermixed with brownish gray silty sand)			
		▮	12	8	1						
	5	▮	2	5	2						
35							SP-SM	Brown fine to medium sand with silt (very loose to loose, moist) (alluvial deposits)			
		▮	12	2	3						
	10	▮	8	5	4				29		%F=60
30							SM	Brown silty fine to medium sand (medium dense, wet)			
	15	▮	12	14	5	▼					
25											
	20	▮	12	17	6				4		%F=36
20							SP	Brown fine to medium sand with gravel (very dense, wet) (transitional deposits)			
	25	▮	0	50/6"	7						
15											
	30	▮	12	68	8						3 feet heave Water added to hole
10							SM	Brown silty fine to medium sand (very dense, wet)			
	35	▮	12	64	9						
5											
	40										

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-46

GEOENGINEERS

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-47
Sheet 1 of 2

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	40		12	79	10							

Elevation scale: 0, -5, -10, -15, -20, -25, -30, -35, -40, -45

Depth scale: 40, 45, 50, 55, 60, 65, 70, 75, 80, 85

LOG OF BORING GEI-46 (continued)

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-47
Sheet 2 of 2

DRAFT

Date(s) Drilled	01/23/08	Logged By	AJ2	Checked By	DCO
Drilling Contractor	Holocene Drilling	Drilling Method	Hollow-stem Auger	Sampling Methods	SPT
Auger Data	4-inch ID, 11-inch OD	Hammer Data	140 lb hammer/30 in drop automatic	Drilling Equipment	Mobile B-59 Truck Rig
Total Depth (ft)	31.5	Surface Elevation (ft)	41.7	Groundwater Elevation (ft)	25.7
Vertical Datum	NAVD 88	Datum/ System	NAD 83	Easting(x): Northing(y):	1307080.031 356763.7075

Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
0				SM	0 to 3 inches root mass Brownish gray silty fine to medium sand with gravel (medium dense, moist) (fill)			
	12	12	1			11		
5	12	8	2	MSW	Refuse (glass and wood fragments intermixed with brown/gray/black silty sand with gravel)			
	3	11	3					
10	12	10	4					
				CL	Light brown clay (medium stiff, moist) (alluvial deposits)			
15	12	7	5			39		AL
20	12	8	6					
				SM	Light brown silty fine to medium sand (medium dense, moist)			
25	12	22	7					
				SW	Brown fine to coarse sand with trace silt (medium dense, wet)			
30	12	29	8			41		%F=80

Elevation feet: 40, 35, 30, 25, 20, 15, 10, 5. Water level symbol at approximately 16 feet depth.

Note: See Figure A-1 for explanation of symbols.

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LOG OF BORING GEI-47

GeoEngineers

Project: Everett Riverfront Redevelopment Project
Project Location: Everett, Washington
Project Number: 6191-002-08

Figure A-48
Sheet 1 of 1