

# APPENDIX H

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## ADDITIONAL TECHNICAL REPORTS



BELLEVUE GRAND  
CONNECTION: I-405  
CROSSING -  
DOWNTOWN TO  
EASTRAIL  
PRELIMINARY  
GEOTECHNICAL REPORT

CITY OF BELLEVUE

WSP PROJECT NO.: 31300216.000  
DATE: JULY 2024

WSP  
1001 FOURTH AVE  
SUITE 3100  
SEATTLE, WA 98154

TEL.: +1 (206) 382-5200  
WSP.COM



July 12, 2024

Jun Suk An  
City of Bellevue  
450 110th Ave NE  
Bellevue, WA 98004

Subject: Grand Connection – Preliminary Geotechnical Report

The WSP Geotechnical and Tunneling Group is pleased to submit this Preliminary Geotechnical Report presenting the results of our geotechnical interpretation, analyses, and design recommendations for the Bellevue Grand Connection project located in Bellevue, Washington.

WSP appreciates the opportunity to be of service and look forward to continuing to work with you in the future. Please let us know if you have any questions or concerns about this report or need additional services or information.

Sincerely,

John Schober, PE  
Lead Geotechnical Engineer

Elizabeth Lundquist, PE  
Assistant VP, Geotechnical Engineer

Moi Arzamendi, PE  
Director, Geotechnical Engineer  
Senior Technical Principal

---

# SIGNATURES

## PREPARED BY

---

John Schober, PE  
Lead Consultant  
Geotechnical Engineer

---

Elizabeth Lundquist, PE  
Assistant Vice President  
Geotechnical Engineer

## REVIEWED BY

---

Moi Arzamendi, PE  
Vice President, Geotechnical Engineer

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# PRODUCTION TEAM

## CLIENT

City of Bellevue

Jun Suk An

## WSP

Vice President, Geotechnical Engineer

Moi Arzamendi, PE

Assistant Vice President, Geotechnical Engineer

Elizabeth Lundquist, PE

Lead Consultant, Geotechnical Engineer

John Schober, PE



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### *APPENDICES*

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# 1 INTRODUCTION

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## 1.1 BACKGROUND

WSP USA (WSP) was retained by the City of Bellevue (City) to prepare a preliminary geotechnical report to support the Bellevue Grand Connection Project. The Grand Connection program is a series of projects and initiatives designed to improve pedestrian experience between Meydenbauer Bay Park through downtown Bellevue across Interstate 405 (I-405) to Eastrail.

The I-405 Non-Motorized Crossing project is the first phase of the Grand Connection Program and will establish a pedestrian and bicycle crossing over I-405, the first step in creating an iconic lid, including activated space over I-405, with the overall intent of directly connecting Downtown Bellevue to the Wilburton neighborhood and the Eastrail, an essential missing link.

A lid park over I-405 is a different phase of the Grand Connection, but the I-405 Non-Motorized Crossing project will need to be compatible and integrated with the lid in order to make pedestrian and bicycle connections to it in the future.

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## 1.2 PROJECT DATUM

All horizontal coordinates, unless otherwise noted, are provided in North American Datum (NAD83) South State Plane Coordinates System. Elevations, unless otherwise noted, are provided in North American Vertical Datum of 1988 (NAVD88).

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## 1.3 SITE LOCATION AND DESCRIPTION

The Bellevue Grand Connection site is located in Bellevue, Washington. The general site boundaries are between 110<sup>th</sup> Ave NE to the west, the former rail corridor to the east, NE 6<sup>th</sup> St to the north, and NE 4<sup>th</sup> St to the south. I-405 cuts through the project area between 112<sup>th</sup> Ave NE and 116<sup>th</sup> Ave NE. The total alignment length is approximately 2,500 feet. The topography of the site is gently sloping downhill from west to east. The surface elevation is about +160 feet at 110<sup>th</sup> Ave NE and about 110 feet east of 116<sup>th</sup> Ave NE. The former rail corridor at the eastern edge of the project limits is on an approximately 30-foot-tall embankment, with an elevation of about +140 feet. The ground surface within the project is mostly paved with some trees in landscaped areas.

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## 1.4 PURPOSE AND SCOPE OF WORK

The purpose of this geotechnical investigation program is to evaluate the soil and geologic conditions at the site and provide geotechnical recommendations for the 30% design of the project. In accordance with CIP # PW-R-216 Exhibit A, dated June 23, 2023, the following scope of work has been undertaken:

- Review of existing literature and available geotechnical reports.
- Provide seismic design parameters.
- Provide earthwork recommendations.
- Provide retaining wall recommendations.



- Provide bridge foundation recommendations.
- Recommendations for further studies.
- Preparation of this report.

The work performed is in general accordance with AASHTO and WSDOT standards where applicable.

## 2 EXISTING INFORMATION

Geotechnical reports for adjacent projects such as Sound Transit Eastlink and various development projects at adjacent parcels. The Sound Transit Eastlink reports were prepared by Golder Associates for HJH Final Design Partners. In general, these older reports were prepared for a similar structure type and within or very near the current study area and contain sufficient detail and content such that they are adequate for preliminary design of the project. Relevant geotechnical information from the reports is presented in Appendix A.

A geotechnical reference summary of these documents is provided below.

- H-J-H Final Design Partners (HJH), 2016, "East Link: South Bellevue to Overlake Transit Center: Package E335 Geotechnical Data Report", dated March 8, 2016.
- H-J-H Final Design Partners (HJH), 2014, "East Link: South Bellevue to Overlake Transit Center: Package E330 Geotechnical Data Report", dated September 5, 2015.
- GeoEngineers, 2004, "Geotechnical Engineering Services Bellevue City Hall Complex, Bellevue, Washington, dated February 6, 2004.
- CH2M Hill, 2011, Final Geotechnical Data and Considerations Report for Preliminary Engineering, dated July, 2011
- H-J-H Final Design Partners (HJH), 2016, "East Link: South Bellevue to Overlake Transit Center: Contract E335 Geotechnical Recommendations Report", dated March 8, 2016.
- H-J-H Final Design Partners (HJH), 2014, "East Link: South Bellevue to Overlake Transit Center: Contract E330 Geotechnical Recommendations Report", dated September 5, 2015.

# 3 SITE CONDITIONS

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## 3.1 REGIONAL GEOLOGY

The project is located in the central portion of the Puget Lowland, an elongated, north-south topographic depression situated between the Olympic Mountains on the west and the Cascade Range on the east. This lowland is characterized by low, rolling relief with some deeply cut ravines and broad valleys. In Repeated glacial advances into this region strongly influenced present-day topography geology, and groundwater conditions in the project area. In general, the ground surface elevation is within 500 feet of sea level.

The Puget Sound area underwent six or more major glaciations during the Pleistocene Epoch (2 million years ago to about 10,000 years ago), which filled the Puget Lowland to significant depths with a complex sequence of glacial and nonglacial (deposited during interglacial times) sediments. These glaciers originated in the coastal mountains of British Columbia. The maximum southward advance of the ice was about halfway between Olympia and Centralia (about 50 miles south of Seattle). During the most recent glaciation of the central Puget Lowland (Vashon Stade of Fraser Glaciation), the thickness of ice was about 3,000 feet in the project area, resulting in overconsolidation of the underlying soils. Since the last glaciation, complete or partial erosion of some deposits, as well as local deposition of alluvial deposits, further complicates the geology of the region.

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## 3.2 TECTONIC SETTING

The tectonics and seismicity of the region are the result of the relative movement and collision between the tectonic plates that underlie North America and the Pacific Ocean. These tectonic plates include the Juan de Fuca Plate and the North American Plate, and the intersection of these two plates is called the Cascadia Subduction Zone (CSZ). As these two plates collide, the Juan de Fuca Plate is being driven northeast (subducted), beneath the North American Plate.

Within the present understanding of the regional tectonic framework and historical seismicity, three broad earthquake source zones are identified. These include a shallow crustal source zone, a deep source zone within the portion of the Juan de Fuca Plate subducted beneath the North American Plate (deep subcrustal zone), and an interplate zone where the Juan de Fuca and North American Plates are in contact in the CSZ. The anticipated earthquakes related to these sources are summarized below:

- **Shallow Crustal Zone:** Geophysical lineaments in Western Washington are believed to be capable of producing earthquakes with magnitudes up to 7.5. The closest of these geophysical lineaments to the site is the Seattle Fault Zone. Geologic studies suggest that this is an active fault with an estimated magnitude 7.0 event occurring approximately 1,100 years ago. Historical shallow crustal seismicity has also been observed between a depth of 1 and 10 miles. Based on the U.S. Geological Survey (USGS) Interactive Fault Map (USGS, 2017), the Project alignment is located about 2 miles north of the nearest mapped fault splay of the Seattle Fault Zone.
- **Deep Subcrustal Zone:** The largest historical earthquakes (magnitudes up to 7.1) to affect the site were in the subducted Juan de Fuca Plate (deep subcrustal zone) at depths of 32 miles or greater. The depth of this zone is estimated at about 34 miles below the Project alignment.
- **Interplate Zone (CSZ):** The CSZ has produced, and remains capable of producing, strong earthquakes. Work to date suggests that earthquake magnitudes may range from 8.0 to 9.0 and may occur at time

intervals ranging from about 400 to 1,000 years. The Project alignment is located about 100 miles east of this zone. Based on work by Goldfinger and others (2012), the last earthquake produced by the CSZ was about 315 years ago.

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### 3.3 SUBSURFACE CONDITIONS

Existing areas of the project site are underlain by various man-placed and natural soils including undocumented artificial fill, topsoil, lacustrine, recessional outwash, and glacial till.

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#### 3.3.1 ARTIFICIAL FILL

Shallow undocumented artificial fill soils (af) are located throughout the project area. These materials consist of both fine and coarse grain soils. In general, soils may be poorly to well-compacted. In most areas, they may be deemed adequate for support of additional fill. However, they should not be considered competent to support settlement sensitive structures.

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#### 3.3.2 LACUSTRINE DEPOSITS

Holocene lacustrine deposits (HI) is typically soft to firm, light gray to light brown, low to high plasticity silt, low plasticity clayey silt interbedded with organic silt with some fine sand and little gravel, wood debris, local deposits of wood debris, stratified.

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#### 3.3.3 RECESSIONAL OUTWASH DEPOSITS

Quaternary recessional outwash (Qvro) is a glaciofluvial sediment deposited as glacial ice retreated. This unit is typically loose to very dense, brown, sand to silty sand, gravelly sand, sandy gravel, sandy silt, stratified. Qvro may contain cobbles and boulders locally and oftentimes acts as a perched aquifer when overlying lower permeability stratigraphic units such as lodgement till.

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#### 3.3.4 LODGEMENT TILL

Quaternary lodgement till (Qvt) is a Vashon unit laid down along the base of the glacial ice. This unit is generally very dense, moist, silty sand with trace to some gravel or sand with trace to some silt and gravel or silty sandy gravel. It is generally non-stratified with a diamict structure and may contain boulders locally and saturated lenses of sand.

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#### 3.3.5 ADVANCE OUTWASH

Quaternary advance outwash (Qva) is glaciofluvial sediment deposited as the glacial ice advanced through the Puget Lowland. This unit is typically dense to very dense, sand to silty sand with gravel. This unit is crudely stratified.

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#### 3.3.6 PRE-VASHON FLUVIAL DEPOSITS

Quaternary pre-Vashon fluvial deposits (Qpnf) is an alluvial deposit from rivers and creeks. This unit is typically very dense, gray to greenish gray, sand to silty sand, gravel to silty gravel, organic particles, volcanic particles and micaceous particles. Qpnf is also commonly stratified.

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### 3.3.7 PRE-VASHON LACUSTRINE DEPOSITS

Quaternary pre-Vashon Lacustrine deposits (Qpl) is fine-grained lake deposits in large or small depressions. This unit is typically dense to very dense or very stiff to hard, gray to greenish gray, low plasticity silt to sandy silt, low plasticity clay, high plasticity clay, and silty fine sand. Qpl is commonly stratified with local lenses of sand and organic deposits.

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### 3.3.8 PRE-VASHON GLACIOLACUSTRINE DEPOSITS

Quaternary pre-Vashon glaciolacustrine deposits (Qpgl) is a fine-grained glacial flour deposited in proglacial lakes in the Puget Lowland. This unit is typically very stiff to hard or very dense, dark gray, silty clay to clayey silt with thin beds of laminae of fine sand and silt. Disturbed Qpgl contains randomly oriented slickensides and polished shear surfaces and may have a block structure. Disturbed Qpgl is interpreted to have resulted from ice loading during the Vashon glacial advance.

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### 3.3.9 PRE-VASHON LODGEMENT TILL

Quaternary pre-Vashon lodgement till (Qpgt) is a unit laid down along the base of the glacial ice. This unit is typically dense to very dense, silty sand with trace to some gravel, sand with trace to some silt and gravel, silty sandy gravel, generally non-stratified with a diamict structure (hardpan). Oxidation is common and may contain boulders locally and saturated lenses of gravelly sand to sandy gravel.

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## 3.4 GROUNDWATER CONDITIONS

Groundwater water data is available from boring logs and records of monitoring wells installed for the Sound Transit project. Generally, there is perched water over the glacial till with a groundwater table between 30 to 70 feet below ground surface. Hydraulic conductivity values were available for select geologic units and locations.

# 4 DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

## 4.1 POTENTIAL GEOLOGIC HAZARDS

The project area was evaluated for susceptibility to geologic hazards associated with seismic activity in the Puget Sound including strong ground shaking, ground failure, liquefaction, landslides, subsidence, and settlement.

### 4.1.1 FAULTING AND SURFACE RUPTURE

Ground surface displacement, or rupture, caused by an earthquake is a major consideration in the design of construction across active faults. The nearest known potentially active fault to the site is the east-west trending Seattle Fault Zone, located about 2.5 miles from the project site.

### 4.1.2 SEISMIC DESIGN CONSIDERATIONS

The seismic design for the bridge will be performed according to AASHTO (2023), the WSDOT BDM, and the WSDOT GDM. Recommended horizontal response spectra and related information, developed as described below, are presented in Table 5.1.

#### SITE CLASSIFICATION

AASHTO LRFD Seismic Bridge Design (2023) guidelines require the use of a site classification for seismic design. The seismic site class is permitted to be determined utilizing the guidelines provided in Table 4.1. In addition, with some exceptions, Site Class F is required for sites vulnerable to potential failure or collapse under seismic loading (such as liquefiable soils, quick and highly sensitive clays, and collapsible weakly cemented soil), soils with thick peat/organic deposits, very high plasticity clays, or very thick, soft to firm clays.

Table 4.1 Seismic Site Classification

SITE CLASS	$\bar{V}_s$ (FEET/SEC)	$\bar{N}$ OR $\bar{N}_{ch}$ (BLOWS/FOOT)	$\bar{S}_u$ (PSF)
A. HARD ROCK	> 5,000	NA	NA
B. ROCK	3,000 to 5,000	NA	NA
C. VERY DENSE SOIL AND SOFT ROCK	1,200 to 2,500	> 50	> 2,000
D. STIFF SOIL	600 to 1,200	15 to 50	1,000 to 2,000
E. SOFT CLAY SOIL <sup>(1)</sup>	< 600	< 15	< 1,000

<sup>(1)</sup> Any profile with more than 10 feet of soil with Plasticity Index (PI) greater than 20, moisture content greater than 40 percent, and undrained shear strength less than 500 psf is classified as Site Class E.

## AASHTO/WSDOT SEISMIC DEMAND

The coordinates used to obtain the seismic design parameters at the project site are 47.615033°N, -122.189848°W, respectively. AASHTO LRFD Seismic Bridge Design (2023) guidelines use a risk-targeted design response spectra taken from the AASHTO-USGS Seismic Design Ground Motion Database. The ground motion database provides 5 percent damped design acceleration coefficients,  $S_a$ , at 22 different periods shown in Table 5.3. The design response spectrum can be constructed with these values. The recommended seismic Site Class and design parameters are summarized in Table 4.2.

**Table 4.2 Recommended Seismic Design Parameters**

DESIGN PARAMETER	SYMBOL	RECOMMENDED VALUE
Site Class	--	C
Peak Ground Acceleration	$A_S$	0.49 g
Design spectral response acceleration (5% damped) at short periods	$S_{DS}$	1.23 g
Design spectral response acceleration (5% damped) at 1-second period	$S_{D1}$	0.54 g

**Table 4.3 Design Response Spectrum**

PERIOD, T (SECOND)	SPECTRAL ACCELERATION, $S_a$ (g)
<b>0.00</b>	0.49
<b>0.01</b>	0.49
<b>0.02</b>	0.50
<b>0.03</b>	0.54
<b>0.05</b>	0.66
<b>0.08</b>	0.85
<b>0.10</b>	1.04
<b>0.15</b>	1.21
<b>0.20</b>	1.23
<b>0.25</b>	1.15
<b>0.30</b>	1.06
<b>0.40</b>	0.87
<b>0.50</b>	0.73
<b>0.75</b>	0.61
<b>1.00</b>	0.54
<b>1.50</b>	0.36
<b>2.00</b>	0.27

## LIQUEFACTION, SEISMIC SETTLEMENT AND LATERAL SPREADING

Soil liquefaction is a phenomenon in which saturated, cohesionless soils lose stiffness and strength due to the build-up of excess pore water pressure during cyclic loading, such as that induced by earthquakes. The primary factors affecting the liquefaction potential of a soil deposit are (1) intensity and duration of earthquake shaking; (2) soil origin, type, and relative density; (3) overburden pressures; and (4) depth to groundwater. Soils most susceptible to liquefaction are saturated, loose sands and low plasticity to non-plastic silts. The potential consequences of liquefaction to engineered structures include loss of bearing capacity, buoyancy forces, increased lateral earth pressures, post-liquefaction settlement, lateral spreading, and slope instability. The potential for liquefaction, seismic settlement, and lateral spreading is considered negligible within the project area.

## SEISMICALLY INDUCED LANDSLIDING

Since the site is relatively flat, the risk of seismically induced landslides is considered negligible.

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### 4.1.3 FLOODING

Seasonal heavy precipitation including rain and snow are anticipated in the project area. However, uncontrolled flooding and site inundation are not anticipated if the associated project areas are adequately planned following appropriate site grading and earthwork design practices.

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## 4.2 EARTHWORK AND GRADING

### 4.2.1 GENERAL

All earthwork design and grading excavation and fill/backfill operations should be performed in accordance with the most recent approved edition of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction (SSRBMC). Selected earthwork and grading specifications from these documents should be incorporated in the project specifications as deemed appropriate. The earthwork operations should be observed, and compaction testing performed by a certified testing laboratory and field technician/inspector as required.

All surficial vegetation and deleterious material should be stripped and completely removed from the proposed site areas that will be graded. The excavation of these soils should be possible using moderate to strong effort with conventional heavy-duty excavating equipment.

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### 4.2.2 ENGINEERED FILL

The majority of soils excavated from the site may be used as engineered fill, provided that they are free of oversized rock, organic materials, expansive clay, and deleterious debris. Oversize material in excess of 6 inches in diameter should not be used in structural fill and material larger than 3 inches should not be used within the upper 3 feet of subgrade. Although the optimum lift thickness for fill soils will be dependent on the type of compaction equipment utilized, fill should generally be placed in uniform lifts not to exceed approximately 8 to 12 inches in loose thickness.

General engineered fill should be moisture conditioned to between  $\pm 2$  percent of the optimum moisture content and compacted to a minimum of 90 percent relative compaction (RC) per the Modified Proctor



(ASTM D 1557) maximum dry density. A rock correction adjustment to the maximum dry density and optimum moisture content should be performed when there is more than 5 percent oversized particles (larger than  $\frac{3}{4}$  inch) in the fill material. The adjustment should follow ASTM D4718. Excavation of the onsite formational materials for reuse as compacted fill should comply with WSDOT common borrow specifications.

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### 4.2.3 TEMPORARY EXCAVATIONS

Conditions of temporary excavations should be further evaluated during construction. Temporary excavations with a maximum height of 10 feet should be laid back or shored in accordance with the U.S. Occupational Safety and Health Administration (OSHA), and any other applicable regulations. For planning purposes, all near surface soils can be considered OSHA Type C soil. The actual OSHA soil type should be determined by the contractor's responsible person in the field at the time of construction. Type C soils should have 1½H:1V temporary construction excavation slopes up to 20 feet high, however 20-foot-deep excavations are not anticipated for this project. If glacial till is present, slopes of 1H:1V is reasonable. If stability of an excavation becomes questionable during construction, the excavation should be evaluated promptly by the geotechnical engineer. If groundwater seepage is observed, slopes should be cut back to 2H:1V. The maximum vertical unbraced excavation should be 5 feet.

The soil classifications presented in this report may be used for the planning of temporary excavations in accordance with OSHA requirements. Construction personnel should be aware that soil conditions may change rapidly if soil moisture conditions change or if soils that have been disturbed by previous excavations are encountered. Measures should be taken to protect construction personnel from raveling of excavated slopes. Any temporary cut slopes should be protected from precipitation and drying out. Direct rainfall or surface water on the slope face can destabilize the face of the excavation. On the other hand, if the face becomes too dry, raveling will occur. All excavations should comply with current OSHA safety requirements.

No surcharge loads, such as the weight of heavy equipment, should be placed within 10 feet from the top of open excavations. Care should be taken during excavation to avoid removing support for any existing improvements, such as foundations, pavements, and buried utilities. The contractor is responsible for selecting, designing, and constructing temporary shoring systems (if needed) that adequately protect the existing structures, utilities, and other improvements.

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### 4.2.4 USE OF ON-SITE SOILS

In general, the excavated soils at the site are suitable for use as general structural fill provided they are placed near the optimum moisture content and any deleterious materials are screened from the fill prior to re-use. Deleterious materials would include any large chunks of wood, metal, concrete, plastic, or any other construction debris and garbage. Topsoil may be suitable for re-use in non-structural areas of the site.

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## 4.3 DESIGN RECOMMENDATIONS

The project is anticipated to utilize drilled shafts for the bridge structure support, MSE wall or soldier pile wall for approach embankments, and shallow foundations for vertical circulation towers.

### 4.3.1 DEEP FOUNDATION RECOMMENDATIONS

Based on discussions with the design team, WSP understands drilled shafts are being considered to support the bridge structure. The use of drilled shafts will mitigate lateral loading on the nearby sound Transit elevated guideway. Driven piles are not considered appropriate based on the existing site conditions.

#### AXIAL RESISTANCE

Axial resistance of deep foundations is developed through the combination of side friction along the length of the pile and the base resistance developed at the pile tip. Table 4.4 presents the recommended unit side and base resistances for the soil conditions encountered near the proposed bridge structure. Unless otherwise noted, the parameters provided in Table 4.4 are applicable to both static and seismic loading condition. To determine the axial resistance of a given drilled shaft, the provided unit side resistances should be multiplied by the perimeter of the pile, and the unit base resistance should be multiplied by the area of the concrete at the tip of the shaft.

Table 4.4 Generalized Soil Profile Depths and Properties for Axial Drilled Shaft Design

SUBSURFACE LAYER	DEPTH RANGE (FEET)	UNIT SIDE RESISTANCE (KSF)	UNIT BASE RESISTANCE (KSF)	GEOTECHNICAL PARAMETERS
Hf	0-10 (West of I-405) 0-5 (East of I-405)	0.15	--	$\gamma_t = 120$ pcf $c = 0$ psf $\phi = 32^\circ$
Qvro	5-15 (East of I-405)	0.4	--	$\gamma_t = 120$ pcf $c = 0$ psf $\phi = 36^\circ$
Glacial Soils	>10 (West of I-405) >15 (East of I-405)	6	100	$\gamma_t = 130$ pcf $S_u = 8,000$ psf

$\gamma_t$ : Total Unit Weight  
 $S_u$ : Undrained Shear Strength

$c$ : Drained Cohesion  
 $\phi$ : Drained Friction Angle

Due to the liquefaction potential of the fill, the axial resistance of the fill should be neglected in the seismic design load case. In addition, liquefaction-induced downdrag will impart a load on the pile. For the seismic analysis, WSP recommends applying a downdrag load in kips equal to  $2P$ , where  $P$  is the shaft perimeter.

The resistances provided Table 4.4 are nominal resistances and need to be multiplied by an appropriate resistance factor to determine the factored resistance. These axial resistance recommendations are for a single pile and do not consider group effects. If the piles are spaced at closer than three pile diameters, center-to-center, then the recommendations will need to be modified to consider axial pile group effects.

#### LATERAL RESISTANCE

WSP anticipates that the structural engineer will use the computer program LPILE to perform lateral analyses of the drilled shafts. Table 4.65 provides the recommended soil parameters for the lateral analyses. Unless otherwise noted, the parameters provided in Table 4.6 are applicable to both static and seismic loading conditions.

Table 4.5 Generalized Soil Profile Depths and Properties for Lateral Drilled Shaft Design

SUBSURFACE LAYER	DEPTH RANGE (FEET)	LPILE MODEL	UNIT WEIGHT (PCF)	FRICTION ANGLE (DEGREE)	INITIAL MODULUS OF SUBGRADE REACTION (PCI)	COHESION, C (PSF)	STRAIN FACTOR, $\epsilon_{50}$
Hf	0-10 (West of I-405) 0-5 (East of I-405)	Sand (Reese)	120	32	35	--	--
Qvro	5-15 (East of I-405)	Sand (Reese)	120	36	75	--	--
Glacial Soils	>10 (West of I-405) >15 (East of I-405)	Stiff Clay w/o Free Water	65	--	--	8000	0.004

The recommended lateral parameters provided in Table 4.65 assume a pile group with center-to-center spacing greater than five pile diameters. If closer spaced pile groups are used, group reduction factors should be applied as describe in AASHTO Table 10.7.2.4-1.

### 4.3.2 MSE WALL RECOMMENDATIONS

Retaining walls may be considered to retain approach embankments. The selection of an appropriate retaining wall system is dependent upon several factors, including tolerance to total and differential settlement, and construction considerations. Based on the explored subsurface conditions and the fill heights, WSP considers a Mechanically Stabilized Earth (MSE) wall for the approach embankments appropriate for the project.

#### MSE WALL DESIGN SOIL PARAMETERS

As recommended by AASHTO LRFD, MSE wall minimum soil reinforcement length should be 70 percent of the wall height (0.7H) as measured from the leveling pad, or 8 feet, whichever is greater. The MSE should be constructed in accordance with WSDOT SSRBMC Division 6-13 Structural Earth walls. MSE wall reinforced zone should meet the requirements provided in division 9-03.14(4) Gravel Borrow for Structural earth Wall. Embankment fill placed behind the reinforce zone should meet the specifications provided in WSDOT SSRBMC Division 2-03.3(14) – Rock Embankment. The estimated soil parameters are presented in Table 4.6.

Table 4.6 MSE Wall Geotechnical Design Parameters

MATERIAL TYPE	REINFORCED ZONE	RETAINED FILL	FOUNDATION ZONE
Unit Weight (pcf)	130	130	130
Friction Angle (degrees)	34	34	38
Cohesion (psf)	0	0	0

MSE wall lateral pressures should be calculated using soil parameters of retained fill provided in Table 4.6. The MSE walls should be embedded in accordance with Section 15-4.5 of the WSDOT GDM, with a minimum embedment of 2 feet at the face of the wall.

#### MSE WALL LATERAL RESISTANCE

Lateral resistance to lateral movement for an MSE wall consists of sliding friction and passive resistance. WSP recommends that passive earth pressure be neglected when calculating the lateral resistance because potential soil disturbance or loss in front of the wall, and future excavation in front of the wall. The nominal friction resistance from sliding can be expressed as the vertical load on the footing multiplied by a coefficient of 0.6 for SE-reinforced soil mass on an approved subgrade. A resistance factor of 1.0 should be used calculation of friction sliding resistance.

#### MSE WALL BEARING RESISTANCE

The bearing resistance analysis was performed in accordance with the WSDOT GDM and AASHTO LRFD. The factored bearing resistance analysis was based on the assumption that the MSE walls will be supported on Qvt. A factored bearing resistance of 5 ksf can be used assuming an embedment depth of 2 feet or more.

It is assumed that MSE walls will be constructed as part of new approach fills, and all approach fill settlements will be allowed to occur prior to installation of permanent MSE wall facing. Therefore, the service limit state bearing resistance was not estimated. The bearing resistance of the wall was evaluated as a rectangular foundation with a length to width (L/B) ratio of 10, where the width is the width of the reinforced backfill. A resistance factor of 0.65 should be used for the strength limit state, and a factor of 0.9 should be used for the extreme event limit state designs.

#### MSE WALL STATIC SETTLEMENT

It is assumed that permanent wall facing will not be installed until settlement is complete. According to WSDOT GDM, MSE walls constructed with flexible facing should tolerate up to six inches of settlement. MSE walls founded on glacial till are anticipated to undergo minimal settlement.

#### MSE WALL DRAINAGE

Suitable drainage for walls can be provided by granular backfill material and a wall base subdrain system consisting of a 6-inch-diameter perforated or slotted drainpipe wrapped in an envelope of filter material at least 12 inches thick and confined by a separation geotextile. The filter material should meet the requirements for Gravel Backfill for Drains specified in Division 9-03.12(4) of the WSDOT SSRBMC.

The separation geotextile fabric should meet the requirements for Geotextile for Underground Drainage Filtration Property specified in Table 2 in the Division 9-3.2(1) of the WSDOT SSRBMC. The subdrain should be above the typical groundwater level, convey any collected seepage to the end of the wall, and daylight at low spots below the wall elevation. In addition, the subdrain should daylight to the face of the wall or tie-in to a drainage system every 300 feet.

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### 4.3.3 VERTICAL CIRCULATION TOWERS

#### SHALLOW FOUNDATIONS

The bearing resistance analysis was performed in accordance with the WSDOT GDM and AASHTO LRFD. The factored bearing resistance analysis assumed that the vertical circulation towers, elevator shafts, and staircases will be supported on Qvt with a minimum embedment depth of 2 feet and minimum width of 2 feet. A factored bearing resistance of 5 ksf can be used.

#### SLAB-ON-GRADE FLOORS

WSP recommends that the upper 3 feet of soils below ground level floor slabs consist of properly compacted select fill soil. These soils should be compacted to a relative compaction of at least 90 percent per ASTM D1557. Subgrade soil supporting floor slabs should be prepared in accordance with the earthwork recommendations of this report.

The slab reinforcement should be placed near the center of the concrete slab. A welded wire fabric (WWF) may be used in lieu of conventional reinforcement bars. As a minimum, the slab-on-grade floor should be underlain by at least 4 inches of clean, coarse sand or fine gravel subbase to provide a capillary moisture break and uniform support to the slab. In order to minimize the likelihood of membrane punctures, the subgrade must be compacted smooth and flat before installation to further eliminate the possibility of protrusion points.

Subsurface moisture and vapor naturally migrate upward through the soil. Where the soil is covered by a building or pavement, this subsurface moisture will collect and transmit through the concrete slab-on-grade. Traditional Visqueen® vapor barriers may be considered marginally effective and degrade with time. To reduce the impact of this subsurface moisture and the potential impact of future introduced moisture, WSP recommends a polyolefin vapor barrier membrane be utilized between the prepared subgrade and the bottom of the slab-on-grade floor. The structural engineer/architect should determine the most suitable moisture barrier to be utilized based on the information provided in this report.

---

## 4.4 INFILTRATION

Infiltration testing has not yet been performed at the site. When infiltration test results are available, the feasibility of infiltration can be evaluated. Infiltration may be possible in areas with underlying fill and recessional outwash deposits, whereas glacial till and glacially consolidated deposits generally act as an impermeable layer making for a poor infiltration basin.

There is anticipated to be up to 10 feet or more fill and recessional outwash deposits between the median of I-405 and B-011. Areas west of 112<sup>th</sup> Ave NE may also have up to 10 feet or more of fill material at the surface. These areas should be further investigated for infiltration feasibility. Other areas are expected to have less than 5 feet of fill or glacial till at the ground surface.

# 5 CONSTRUCTION CONSIDERATIONS

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## 5.1 DRILLED SHAFTS

Drilled shaft installation procedures should follow the WSDOT SSRBMC, Division 6-19 Shafts, with appropriate project-specific provisions. The selection of equipment and procedures for constructing drilled shafts should consider shaft diameter and length and subsurface conditions. The design and performance of drilled shafts can be significantly influenced by the equipment and construction procedures used to install the shafts.

Generally, drilled shafts are constructed by excavating a cylindrical bore to the prescribed embedment with a large-diameter auger or other drilling tool. Temporary or permanent casing is often used, depending on site conditions. Upon completion of drilling and inspection of the shaft, a steel rebar cage is placed, and concrete is pumped into the hole to complete the drilled shaft.

Due to the possibility of instability while drilling in loose sand below the groundwater table, WSP recommends that the drilled shafts be constructed using fully-cased excavations using a non-vibratory and non-driving method. The drilled shafts should be constructed in the wet if groundwater is encountered during drilling. The temporary casing should be advanced ahead of the auger. Further, due to concerns over the potential impact of construction vibration on the adjacent structure, WSP recommends that the temporary casing be installed using a non-vibratory method. Due to the potential hydrostatic imbalances, drilling slurry may be required to avoid soil loss around the casing. Drilled shaft contractors who participate in on this project should be required to demonstrate that they have suitable equipment for this project and adequate experience in the construction of shafts with similar subsurface conditions.

Based on review of available geotechnical data and interpretation of the local geology, cobbles and boulders should be expected during excavation at the site. The boulder may be greater than 24 inches in diameter. The contractor should be prepared to advance the excavation past these obstructions with suitable means, method, and equipment.

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## 5.2 MSE WALL CONSTRUCTION

A leveling pad is an unreinforced concrete pad generally used to begin the facing construction. If concrete fascia panels are used, this allows a uniform, level starting point to place the fascia panels on which to build upward. The surface of the leveling pad should be smooth and horizontal, both side-side-and front-to-back, to ensure the fascia panel courses are level.

## 6 RECOMMENDATIONS FOR FURTHER STUDIES

Further studies in the form of additional geotechnical borings and laboratory testing are recommended for the bridge alignment east of 116th Ave NE. If the bridge alignment is placed greater than 100 feet from the existing Sound Transit elevated guideway, a boring should be drilled at each proposed bent support. Furthermore, borings should extend a minimum of 20 feet deeper than proposed foundation depths.

## 7 LIMITATIONS

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This preliminary geotechnical report has been prepared for the exclusive use of City of Bellevue and their consultants for specific application to the subject project with the purpose of providing geotechnical design recommendations. The findings, conclusions and recommendations presented in this report were prepared to support the preliminary design of the project and were prepared in accordance with generally accepted geotechnical engineering practice. No warranty, express or implied, is made.

The scope of services was limited to those described herein. It should be recognized that definition and evaluation of subsurface conditions are difficult. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies.

WSP offers various levels of investigative and engineering services to suit the varying needs of different clients. Although risk can never be eliminated, more detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service, which provide information for their purposes at acceptable levels of risk. The client and key members of the design team should discuss the issues addressed in this report with WSP, so that the issues are understood and applied in a manner consistent with the owner's budget, tolerance of risk and expectations for future performance and maintenance.

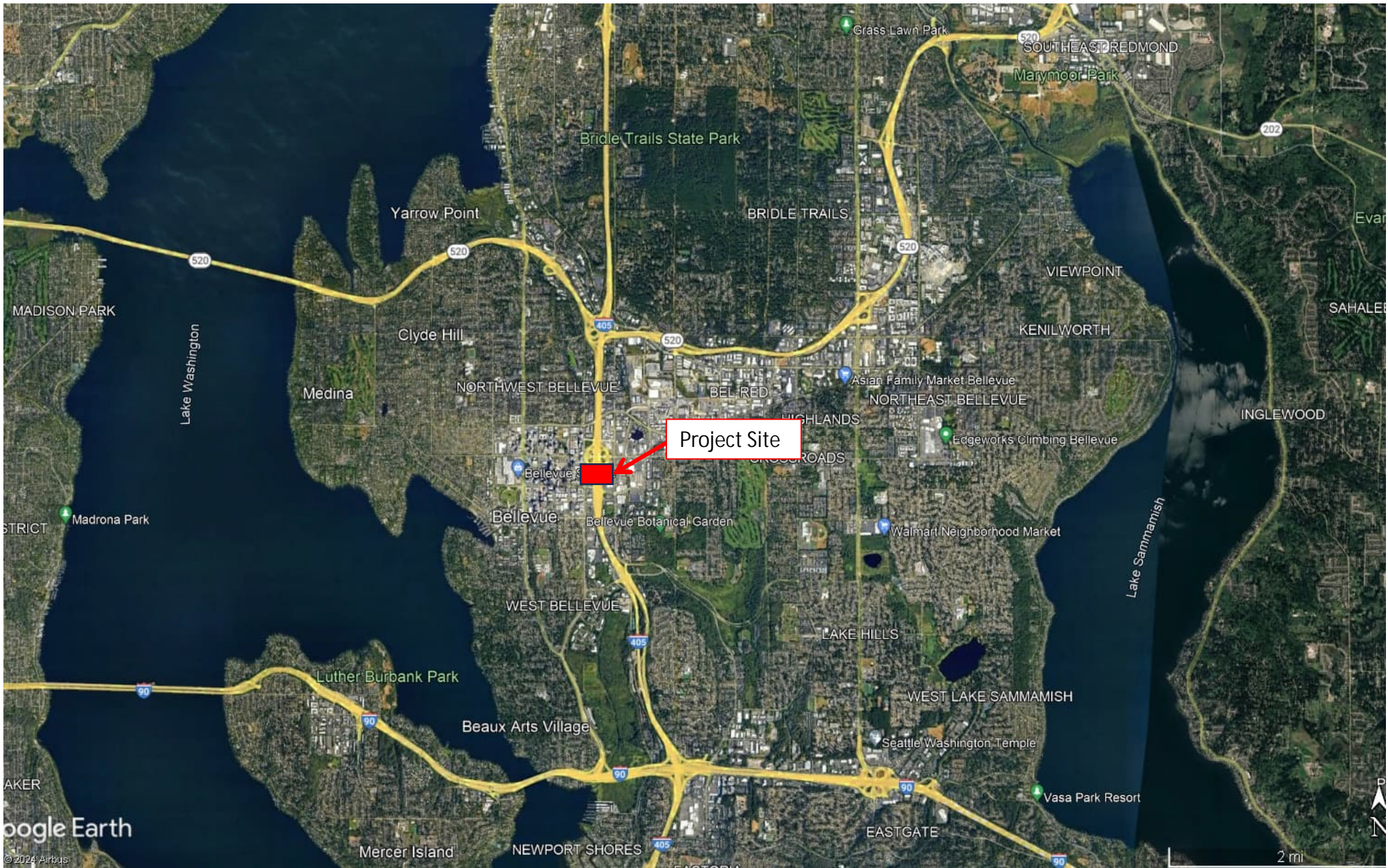
Recommendations contained in this report are based on subsurface explorations and laboratory tests performed by others and our present knowledge of the proposed construction. It is possible that soil or groundwater conditions could vary between or beyond the points explored. Our geotechnical scope of services did not include environmental assessments or evaluations regarding the presence or absence of hazardous substances in the soil, surface water, or groundwater at this site.



## 8 REFERENCES

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- AASHTO, 2017, AASHTO LRFD Bridge Design Specifications, 8<sup>th</sup> edition.
- AASHTO, 2023, AASTHO LRFD Seismic Bridge Design, 3<sup>rd</sup> edition.
- H-J-H Final Design Partners (HJH), 2016, “East Link: South Bellevue to Overlake Transit Center: Package E335 Geotechnical Data Report”, dated March 8, 2016.
- H-J-H Final Design Partners (HJH), 2014, “East Link: South Bellevue to Overlake Transit Center: Package E330 Geotechnical Data Report”, dated September 5, 2015.
- GeoEngineers, 2004, “Geotechnical Engineering Services Bellevue City Hall Complex, Bellevue, Washington, dated February 6, 2004.
- Goldfinger, C., Nelson, C.H., et al, 2012, Turbidite Event History: Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone, USGS Professional Paper 1661-F, U.S. Geological Survey, p. 184 p, 64 Figures. [http://pubs.usgs.gov/pp/pp1661f/ Appendices](http://pubs.usgs.gov/pp/pp1661f/Appendices)
- CH2M Hill, 2011, Final Geotechnical Data and Considerations Report for Preliminary Engineering, dated July, 2011
- H-J-H Final Design Partners (HJH), 2016, “East Link: South Bellevue to Overlake Transit Center: Contract E335 Geotechnical Recommendations Report”, dated March 8, 2016.
- H-J-H Final Design Partners (HJH), 2014, “East Link: South Bellevue to Overlake Transit Center: Contract E330 Geotechnical Recommendations Report”, dated September 5, 2015.
- WSDOT, 2024, Standard Specifications for Road, Bridge, and Municipal Construction, M 41-10.



WSP  
 1001 Fourth Ave  
 Suite 3100  
 Seattle, WA 98154

PROJECT NO.: 30903010  
 DRAWN BY: J. Schober  
 CHECKED BY: E. Lundquist  
 DATE: 5/13/2024

Bellevue Grand Connection  
 Bellevue, Washington

Vicinity Map

FIGURE  
 1

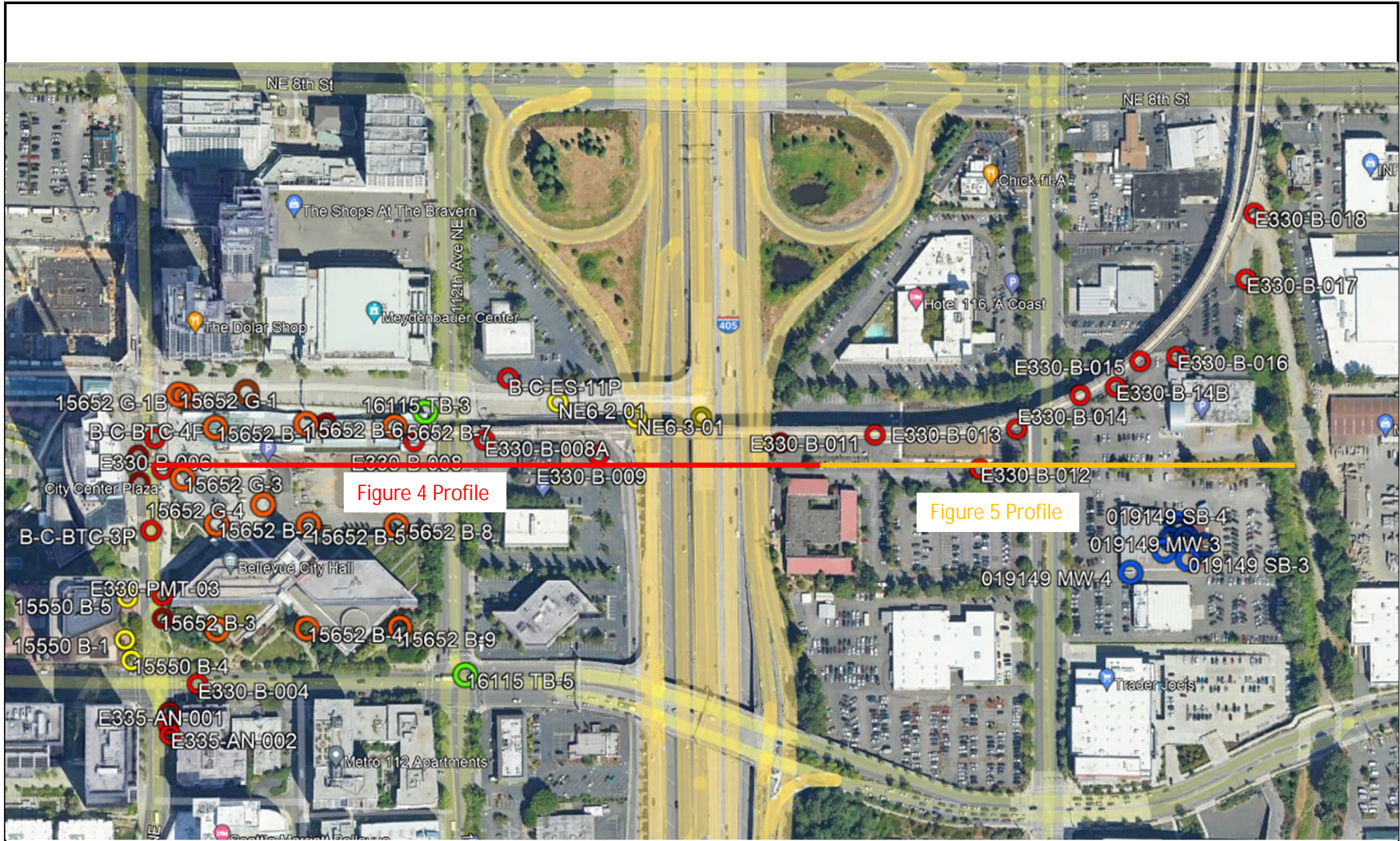

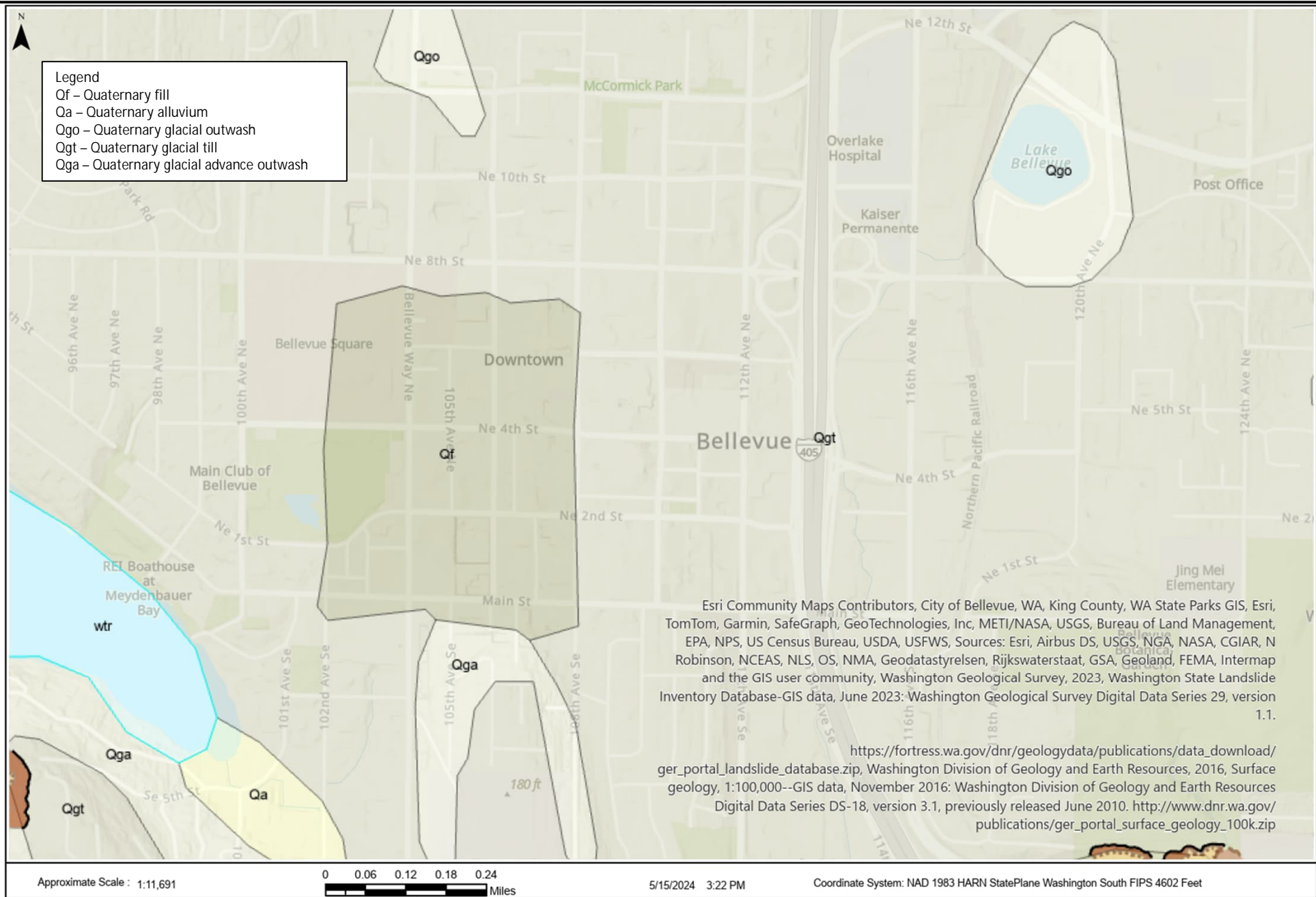


Figure 4 Profile

Figure 5 Profile

	WSP 1001 Fourth Ave Suite 3100 Seattle, WA 98154	PROJECT NO.: 30903010	Bellevue Grand Connection Bellevue, Washington	FIGURE  2
		DRAWN BY: J. Schober		
		CHECKED BY: E. Lundquist	Boring Location Map	
		DATE: 2/13/2024		



Esri Community Maps Contributors, City of Bellevue, WA, King County, WA State Parks GIS, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA, USFWS, Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community, Washington Geological Survey, 2023, Washington State Landslide Inventory Database-GIS data, June 2023; Washington Geological Survey Digital Data Series 29, version 1.1.

[https://fortress.wa.gov/dnr/geologydata/publications/data\\_download/ger\\_portal\\_landslide\\_database.zip](https://fortress.wa.gov/dnr/geologydata/publications/data_download/ger_portal_landslide_database.zip), Washington Division of Geology and Earth Resources, 2016, Surface geology, 1:100,000--GIS data, November 2016; Washington Division of Geology and Earth Resources Digital Data Series DS-18, version 3.1, previously released June 2010. [http://www.dnr.wa.gov/publications/ger\\_portal\\_surface\\_geology\\_100k.zip](http://www.dnr.wa.gov/publications/ger_portal_surface_geology_100k.zip)

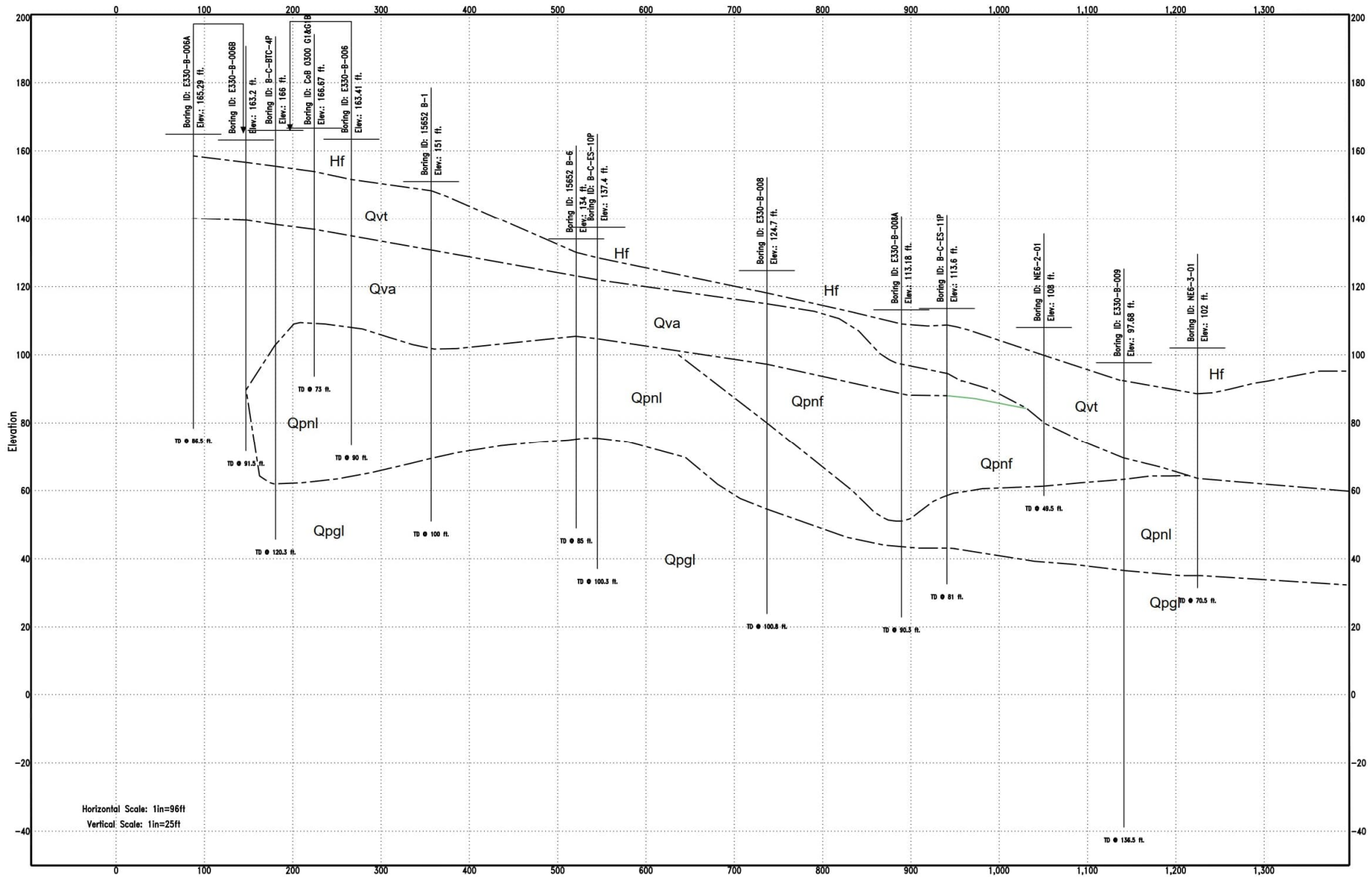


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Bellevue Grand Connection  
 Bellevue, Washington  
 Regional Geologic Map

FIGURE  
 2



WSP  
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PROJECT NO.: 30903010

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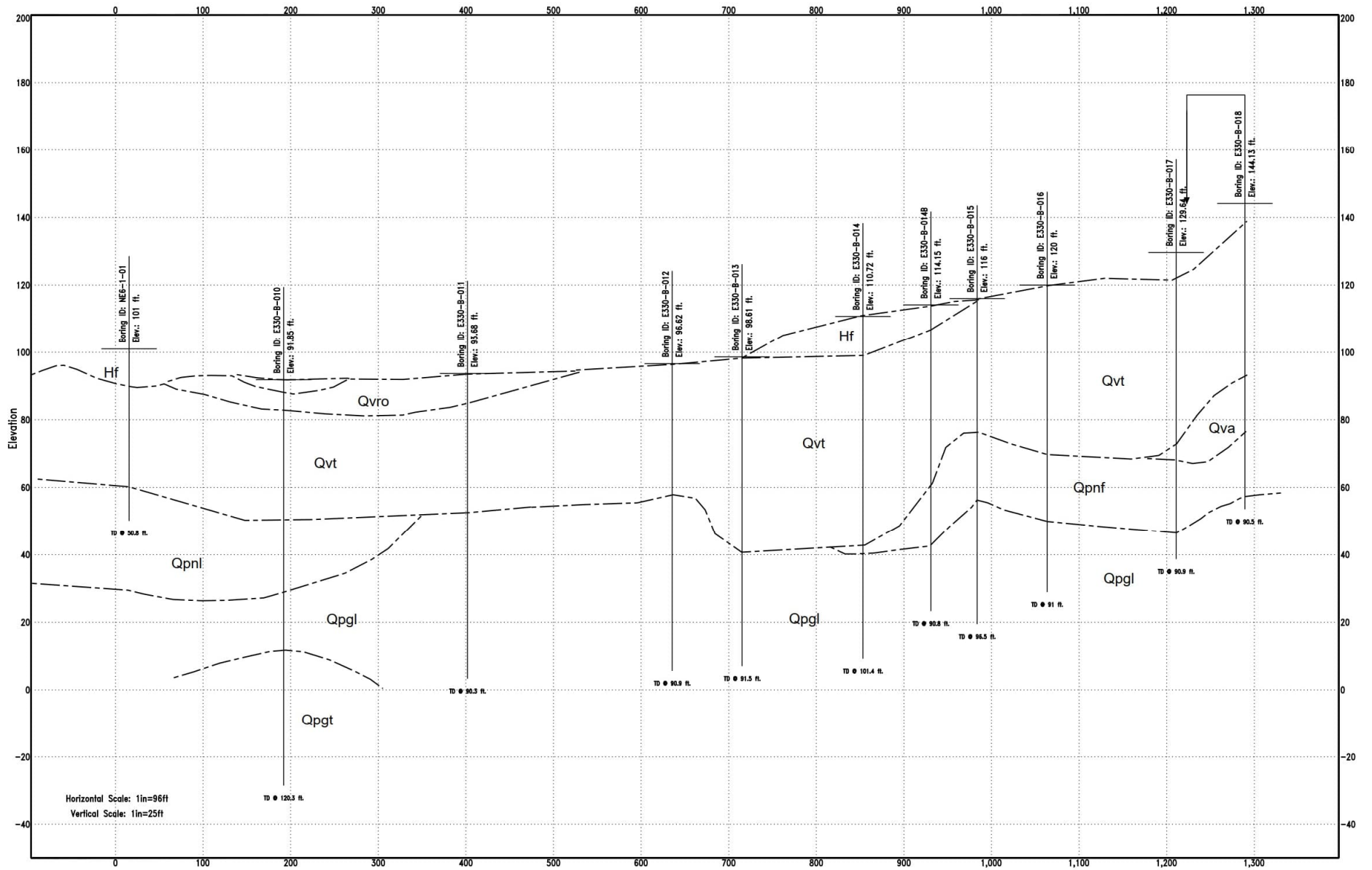
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DATE: 5/13/2024

Bellevue Grand Connection  
Bellevue, Washington

Geologic Profile West of I-405

FIGURE  
3



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DATE: 5/13/2024

Bellevue Grand Connection  
Bellevue, Washington

Geologic Profile East of I-405

FIGURE

4

# APPENDIX

# A GEOTECHNICAL DATA SUMMARY



## MEMO

TO: City of Bellevue, Transportation Department  
450 110<sup>th</sup> Avenue NE  
Bellevue, WA 98004  
Attention: Jun Suk An, PE

FROM: Elizabeth Lundquist, PE (WSP); John Schober, PE (WSP)  
1001 4<sup>th</sup> Avenue, Suite 3100  
Seattle, WA 98154

SUBJECT: Geotechnical Data Summary for Bellevue Grand Connection: I-405 Crossing – Downtown to Eastrail

DATE: July 12, 2024

---

## INTRODUCTION

The Bellevue Grand Connection Project: I-405 Crossing – Downtown to Eastrail includes a pedestrian and bicycle bridge crossing over I-405. WSP collected available geotechnical data in the project area summarized in this memo. The project study area is shown in Figure 1 and is between 110<sup>th</sup> Ave NE to the west, the former rail corridor to the east, NE 6<sup>th</sup> St to the north, and NE 4<sup>th</sup> St to the south. The data presented in this memo will be used to support the alternatives analysis and 30% design of Grand Connection Crossing project.

## REVIEW OF EXISTING INFORMATION

A total of 83 explorations in the project study area between NE 4<sup>th</sup> and NE 6<sup>th</sup> streets were collected. Geotechnical data was collected from Sound Transit and the Washington Department of Natural Resources (WA DNR) geologic portal. A summary of the boring locations and data available at each location is available in Table 1. Where possible, the primary investigation reports are referenced.

## EXISTING GEOTECHNICAL DATA

Existing geotechnical borings are available from HJH Final Design Partners “Geotechnical Data Report: E335 South Bellevue to Overlake Transit Center” and “Geotechnical Data Report: E330 South Bellevue to Overlake Transit Center” from September 2014. Relevant boring logs are presented in Appendix A.1. The borings collected were drilled primarily on 110<sup>th</sup> Ave NE and NE 6<sup>th</sup> St for the elevated guideway as part of the Eastlink project. The borings were drilled with sonic, mud rotary and hollow stem auger drilling methods and ranged in depth from 55 to 136.5 feet below ground surface. Additional historic borings were found in the WA DNR portal. These borings come from development projects of the parcels between NE 6<sup>th</sup> St and NE 4<sup>th</sup> St.





## EXISTING IN-SITU AND LABORATORY TESTING DATA

Laboratory testing data is available for select borings as indicated in Table 1 and presented in Appendix A.2. Laboratory tests include moisture content, grain size analysis, and Atterberg limit tests.

Pressuremeter test results are also available for boring E33-PMT-003. A vertical seismic profile is available for Boring E-330-005. These test results and profiles are presented in Appendix A.4

## GEOLOGIC UNIT DESCRIPTIONS

Because most of the data is from the HJH reports, a similar unit description will be implemented in this data summary. The following geologic units were identified in the project study area:

Fill (Hf): Loose to dense material disturbed by human processes.

Lacustrine Deposits (Hl): Soft to firm, light gray to light brown, low to high plasticity silt, low plasticity clayey silt interbedded with organic silt with some fine sand and little gravel, wood debris, local deposits of wood debris, stratified.

Recessional Outwash deposits (Qvro): Compact to very dense, brown, sand to silty sand, gravelly sand, sandy gravel, sandy silt, stratified. May contain cobbles and boulders locally. Oftentimes acts as a perched aquifer when overlying lower permeability stratigraphic units such as lodgement till.

Lodgement Till (Qvt): Dense to Very Dense, moist, silty sand with trace to some gravel or sand with trace to some silt and gravel or silty sandy gravel. It is generally non-stratified with a diamict structure and may contain boulders locally and saturated lenses of sand.

Advance Outwash (Qva): Compact to very dense sand to silty sand with gravel. This unit is crudely stratified.

Pre-Vashon Fluvial Deposits (Qpnf): Dense to very dense, gray to greenish gray, sand to silty sand, gravel to silty gravel, organic particles, volcanic particles and micaceous particles. Commonly stratified.

Pre-Vashon Lacustrine Deposits (Qpnl): Very Dense to hard gray to greenish gray, low plasticity silt to sandy silt, low plasticity clay, high plasticity clay, and silty fine sand. Commonly stratified with local lenses of sand and organic deposits.

Pre-Vashon Glaciolacustrine Deposits (Qpgl): hard to very dense, dark gray, silty clay to clayey silt with thin beds of laminae of fine sand and silt. Disturbed Qpgl contains randomly oriented slickensided and polished shear surfaces and may have a block structure. Disturbed Qpgl interpreted to have resulted from Ice loading during the Vashon glacial advance.

Pre-Vashon Lodgement Till (Qpgt): Dense to very dense silty sand with trace to some gravel, sand with trace to some silt and gravel, silty sandy gravel, generally non-stratified with a diamict structure. Oxidation is common and may contain boulders locally and saturated lenses of gravelly sand to sandy gravel.

## GROUNDWATER

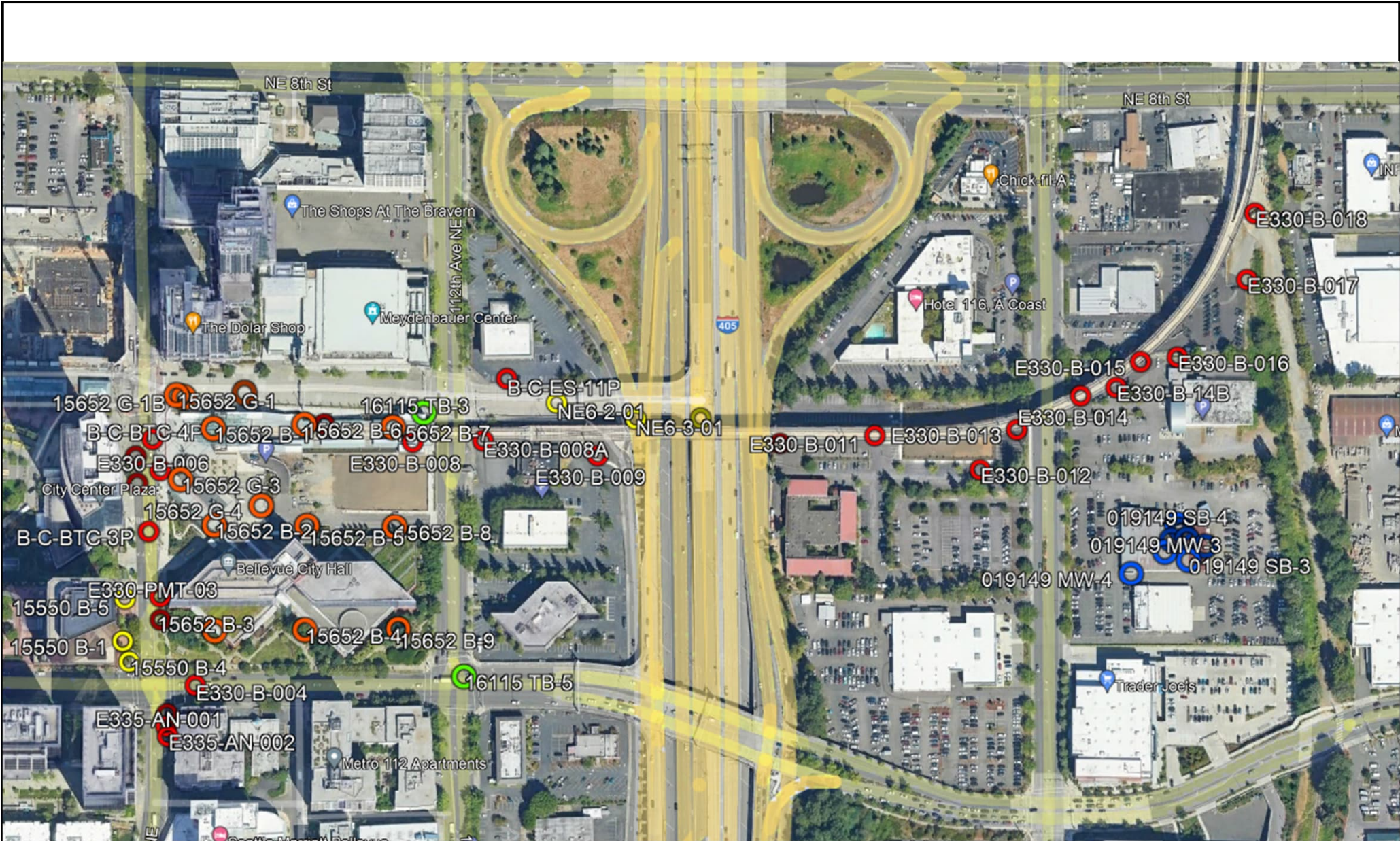


Groundwater water data is available from boring logs and records of monitoring wells installed for the Sound Transit project. Generally there is perched water over the glacial till with a groundwater table between 30 to 70 feet below ground surface. Hydraulic conductivity values were available for select geologic units and locations. Available groundwater data is compiled in Appendix A.3.

Attachments:

- Figure 1: Boring Location Map
- Table 1: Existing Boring Summary
- Appendix A.1 Boring Logs
- Appendix A.2 Laboratory Test Results
- Appendix A.3 Groundwater Measurements
- Appendix A.4 In-Situ Testing
- Appendix A.5 Photographs

# FIGURES



PROJECT NO.: 30903010

DRAWN BY: E. Lundquist

CHECKED BY: J. Schober

DATE: 2/13/2024

Boring Location Map

Geotechnical Data Summary

FIGURE

1

# TABLES

Exploration ID	Type	Termination Depth	Depth to Till	Completion Date	Elevation	Northing	Easting	GW Depth (FT)	GW Measure Date	Lab Data
E330-PMT-03		71.5			158	227030.31	1304953.89	N/A	--	N
B-C-BTC-3P	HSA/Mud	55	NE	6/20/2010	161.4	227173.20	1304932.10	N/A	--	Y
B-C-BTC-4P	HSA/Mud	120.3	1	6/23/2010	166	227372.30	1304945.89	N/A	--	Y
E330-B-003	Sonic	90	10	1/2/2013	143.84	226056.31	1304908.97	N/A	--	Y
E330-B-004	Sonic	85	6	4/8/2013	145.07	226835.32	1305021.89	28.9	2/11/2014	Y
E330-B-005	Sonic	78	6	2/15/2013	157.76	226980.34	1304953.45	N/A	--	Y
E330-B-006	Sonic	90	12.5	2/14/2013	163.41	227305.15	1304960.60	67.5	2/11/2014	Y
E330-B-006A	Mud Rotary	86.5	6	3/19/2013	165.29	227336.06	1304908.52	66.7	2/11/2014	Y
E330-B-006B	Mud Rotary	91.5	8	3/29/2013	163.2	227278.06	1304909.98	59.2	2/11/2014	Y
E330-B-008	Mud Rotary	100.8	9.5	5/22/2013	124.7	227357.33	1305502.07	N/A	--	Y
E330-B-008A	Mud Rotary	90.3	7	7/3/2013	113.18	227357.89	1305654.42	N/A	--	Y
E330-B-009	Mud Rotary	136.5	7	3/20/2013	97.68	227320.61	1305905.59	N/A	--	Y
E330-B-010	Mud Rotary	120.3	9.5	2/15/2013	91.85	227340.59	1306309.88	N/A	--	Y
E330-B-011	Mud Rotary	90.3	8	2/11/2013	93.68	227354.27	1306520.15	N/A	--	Y
E330-B-012	Mud Rotary	90.9	1	2/10/2013	96.62	227274.86	1306751.91	N/A	--	Y
E330-B-013	Mud Rotary	91.5	1	2/6/2013	98.61	227361.75	1306833.91	N/A	--	Y
E330-B-014	Mud Rotary	101.4	12.0	3/28/2013	110.72	227433.20	1306973.61	N/A	--	Y
E330-B-014B	Mud Rotary	90.8	6	3/29/2013	114.15	227449.89	1307051.57	N/A	--	Y
E330-B-015	Mud Rotary	96.5	1	9/12/2013	116	227505.30	1307105.84	N/A	--	Y
E330-B-016	Mud Rotary	91	1	9/13/2013	120	227513.30	1307185.84	N/A	--	Y
E330-B-017	Mud Rotary	90.9	9.0	5/9/2013	129.64	227680.51	1307337.23	N/A	--	Y
E330-B-018	Mud Rotary	90.5	7.0	2/27/2013	144.13	227822.94	1307352.92	N/A	--	Y
B-C-ES-10P	HSA/Mud	100.3	10	8/16/2010	137.4	227399.50	1305311.10	34.4	--	Y
B-C-ES-11P	HSA/Mud	81	15	6/24/2010	113.6	227492.80	1305709.30	8.7	--	Y
E335-AN-001	Sonic	133	3.0	10/2/2013	150	226748.32	1304958.89	46.4	2/11/2014	N
E335-AN-002	Sonic	110	12.0	10/7/2013	149	226726.32	1304961.89	36.7	2/11/2014	N
E335-AN-003	Sonic	60	6.0	10/9/2013	150	226775.32	1304960.89	39.6	2/11/2014	N
15652 B-1	NR	100	5	11/12/1979	151	227362.30	1305121.88	48	--	N
15652 B-2	NR	95	8	11/26/1979	145	N/A	N/A	N/A	--	N
15652 B-3	NR	92	6	11/19/1979	N/A	N/A	N/A	N/A	--	N
15652 B-4	NR	75	5	11/23/1979	123	226916.32	1305284.88	N/A	--	N
15652 B-5	NR	79	8	11/24/1979	127	227119.31	1305293.88	N/A	--	N
15652 B-6	NR	85	10	11/24/1979	134	227347.30	1305285.88	N/A	--	N
15652 B-7	NR	25	10	11/22/1979	121	N/A	N/A	N/A	--	N
15652 B-8	NR	25	12	11/23/1979	113	N/A	N/A	N/A	--	N
15652 B-9	NR	35	8	11/23/1979	104	N/A	N/A	N/A	--	N
15652 SB-1	HSA	45.1	25	12/3/2002	Unknown	N/A	N/A	N/A	--	N
15652 SB-2	HSA	40.5	30	12/3/2002	Unknown	N/A	N/A	N/A	--	N
CoB 0300 G1&G1B	HSA	73	1	9/11/2003	166.67	227351.17	1304989.25	47.9	1/23/2004	Y
CoB 0300 G-2	HSA	47.5	8.5	9/8/2003	151.4	N/A	N/A	34.8	1/30/2004	Y
CoB 0300 G-3	HSA	58	5.5	9/12/2003	161.4	N/A	N/A	45	--	Y
CoB 0300 G-4	HSA	40	6	12/12/2003	N/A	N/A	N/A	19.5	1/30/2004	Y



Exploration ID	Type	Termination Depth	Depth to Till	Completion Date	Elevation	Northing	Easting	GW Depth (FT)	GW Measure Date	Lab Data
15550 B-1	NR	57.9	NE	NE	157	226935.31	1304869.89	N/A	--	N
15550 B-4	NR	93.5	NE	NE	157	226890.32	1304882.89	N/A	--	N
15550 B-5	NR	73.8	NE	NE	159	227027.31	1304876.89	N/A	--	N
NE6-1-01	NR	50.8	NE	NE	101	227399.30	1306134.86	N/A	--	N
NE6-3-01	NR	70.5	NE	NE	102	227400.30	1305990.86	N/A	--	N
NE6-2-01	NR	49.5	NE	NE	108	227438.30	1305817.87	N/A	--	N
16115 TB-3	HSA	16	8	1/8/1991	NR	NR	NR	N/A	--	N
16115 TB-5	HSA	15	12	1/14/1991	NR	NR	NR	N/A	--	N
09149 SB-1	HSA	15.5	4	12/9/1994	NR	NR	NR	N/A	--	N
09149 SB-2	HSA	13	4	12/10/1994	NR	NR	NR	N/A	--	N
09149 SB-3	HSA	15.5	4	12/10/1994	NR	NR	NR	N/A	--	N
09149 SB-4	HSA	13	5	12/10/1994	NR	NR	NR	N/A	--	N
09149 MW-1	HSA	20	12	12/10/1994	NR	NR	NR	N/A	--	N
09149 MW-2	HSA	23	3	12/10/1994	NR	NR	NR	N/A	--	N
09149 MW-3	HSA	23	4	12/10/1994	NR	NR	NR	N/A	--	N
09149 MW-4	HSA	22.5	8	12/9/1994	NR	NR	NR	N/A	--	N



# APPENDIX A.1

## BORING LOGS



## UNIFIED SOIL CLASSIFICATION (ASTM D 2487-00)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES AND GROUP SYMBOLS USING LABORATORY TESTS	GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	GW WELL-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	GP POORLY GRADED GRAVEL
			GM SILTY GRAVEL
		GC CLAYEY GRAVEL	
	SANDS ≥50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	SW WELL-GRADED SAND
		SANDS AND FINES >12% FINES	SP POORLY GRADED SAND
			SM SILTY SAND
			SC CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	<p style="font-size: small;">ORGANIC CLAY OR SILT (OH, OL) if: LL (oven dried) &lt; 0.75 LL (not dried) &lt; 0.75</p> <p style="font-size: x-small;">(PI &gt; 7) CL-ML (PI &lt; 4)</p> <p style="font-size: x-small;">(PI or above "A" line) (below "A" line)</p> <p style="font-size: x-small;">"A" LINE</p>	CL LEAN CLAY
			ML SILT
			OL ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT ≥ 50		CH FAT CLAY
			MH ELASTIC SILT
	OH ORGANIC CLAY OR SILT		
	HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR
OTHER SOIL UNITS	FILL: PLACED BY HUMANS, ENGINEERED AND NONENGINEERED.	(Hf)	
	TILL: LODGMET TILL LAID DOWN ALONG THE BASE OF THE GLACIAL ICE AND HETEROGENEOUS SOILS DEPOSITED DURING THE WASTING OF GLACIAL ICE.	(Qvt)/(Qvat) /(Qpgt)	

Gravels or sands with 5% to 12% fines require dual symbols (GW-GM, GW-GC, GP-GM, GP-GC, SW-SM, SW-SC, SP-SM, SP-SC).

### COMPONENT DEFINITIONS BY GRADATION

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 IN.
COBBLES	3 IN. TO 12 IN.
GRAVEL	3 IN. TO NO. 4 (4.76 mm)
COARSE GRAVEL	3 IN. TO 3/4 IN.
FINE GRAVEL	3/4 IN. TO NO. 4 (4.76 mm)
SAND	NO. 4 (4.76 mm) TO NO. 200 (0.074 mm)
COARSE SAND	NO. 4 (4.76 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 (0.074 mm)
SILT	0.074 mm TO 0.005 mm
CLAY	LESS THAN 0.005 mm

### RELATIVE DENSITY / CONSISTENCY ESTIMATE USING STANDARD PENETRATION TEST (SPT) VALUES

COHESIONLESS SOILS <sup>(a)</sup>		COHESIVE SOILS <sup>(b)</sup>		UNCONFINED COMPRESSIVE STRENGTH
RELATIVE DENSITY	N <sub>60</sub> (BLOWS/ FOOT) <sup>(c)</sup>	CONSISTENCY	N <sub>60</sub> (BLOWS/ FOOT) <sup>(c)</sup>	
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
COMPACT	10 - 30	FIRM	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

- (a) Soils consisting of gravel, sand, and silt, either separately or in combination possessing no characteristics of plasticity, and exhibiting drained behavior.
- (b) Soils possessing the characteristics of plasticity, and exhibiting undrained behavior.
- (c) Refer to ASTM D 1586-99 for a definition of N. N values may be affected by a number of factors including material size, depth, drilling method, and borehole disturbance. N values are only an approximate guide for frozen soil or cohesive soil.

### DESCRIPTIVE TERMINOLOGY FOR PERCENTAGES

DESCRIPTIVE TERMS	RANGE OF PROPORTION
TRACE	0 - 5%
LITTLE	5 - 12%
SOME OR ADJECTIVE AND	12 - 30%
AND	>30%

### CRITERIA FOR DESCRIBING MOISTURE CONDITION

DRY	NO VISIBLE MOISTURE
DAMP	ENOUGH MOISTURE TO DARKEN SOIL
MOIST	MOISTENS HAND
WET	VISIBLE WATER PRESENT

### SAMPLER AND OTHER ABBREVIATIONS

<b>SS</b>	SPT Sampler (2 in. OD, 140 lb hammer)
<b>HD</b>	Heavy Duty Split Spoon (3 in. OD, 140 lb hammer)
<b>SH</b>	Thin Walled (Shelby) Tube
<b>GS</b>	Grab Sample from Surface / Testpit / Sonic Core
<b>ATD</b>	At Time of Drilling
<b>BGS</b>	Below Ground Surface

# RECORD OF BOREHOLE E330-B-003

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave. N of Main St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 1/2/13  
 DRILL RIG: Track Mounted Geoprobe 8140LS Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,144.97 E: 1,633,023.08

ELEVATION: 143.84  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
					DEPTH (Ft)					PL MC LL 20 40 60 80				
0	Sonic-4-inch Diameter Core/6-inch Diameter Casing	0.0 - 0.5 Asphalt Pavement.		XXXXXX	143.3								7 inch diameter asphalt core. Air knife excavation from 0.5 to 5 ft bgs.	
		0.5 - 5.0 Dense, brown, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, trace cobbles, [WEATHERED TILL, Qvt].	SM	(Soil Profile Diagram)	0.5	1	4.5 4.5	S-1	GB					
5		5.0 - 10.0 Dense, brown, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, [WEATHERED TILL, Qvt]	SM	(Soil Profile Diagram)	5.0	2	0.5 0.5	S-2	GB					
		10.0 - 14.0 Dense, brown, (SM), moist, silty, fine to medium SAND, little to some fine to coarse gravel, [TILL, Qvt].	SM	(Soil Profile Diagram)	10.0	3	0.5 0.5	S-4	GB					
		14.0 - 14.5 Dense, brown, (SP-SM), moist, fine to medium SAND, little silt, [TILL, Qvt].	SP-SM	(Soil Profile Diagram)	14.0		0.5 0.5	S-5	GB					
		14.5 - 15.0 Dense, brown, (SM), moist, silty, fine to medium SAND, trace fine gravel, [TILL, Qvt].	SM	(Soil Profile Diagram)	14.5		0.5 0.5	S-6	GB					
		15.0 - 17.5 Very dense, brown, (SM), moist, silty, fine to medium SAND, little fine to coarse gravel, some small pockets of brown, moist, fine to medium SAND, little silt, [TILL, Qvt].	SM	(Soil Profile Diagram)	15.0		0.5 0.5	S-7	GB					
		17.5 - 20.0 Very dense, gray, (SM), moist, fine SAND an SILT, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM	(Soil Profile Diagram)	17.5	4	0.5 0.5	S-8	GB					
20		Boulder encountered from 19 to 20 ft bgs.			(Soil Profile Diagram)	123.8								
		Log continued on next page												

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Steve Zimmerman

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-003

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave. N of Main St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 1/2/13  
 DRILL RIG: Track Mounted Geoprobe 8140LS Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,144.97 E: 1,633,023.08

ELEVATION: 143.84  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS					
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80							
					DEPTH (Ft)					PL	MC		LL				
20	Sonic-4-inch Diameter Core/6-inch Diameter Casing	20.0 - 25.0 Very dense, brown to gray, (SM), moist, fine to medium SAND and SILT, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		20.0	5											
		Grades to grayish brown at 22 ft bgs.													0.5 0.5	S-9	GB
		Small pocket of (SP-SM), moist, fine to medium SAND, little silt from 23 to 25 ft bgs.															
25		25.0 - 30.0 Dense to very dense, grayish brown, (SM), moist to wet, silty, fine SAND, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		118.8	6											
															0.5 0.5	S-11	GB
		Some sub-horizontal laminations observed from 29.5 to 30 ft bgs.															
30		30.0 - 35.0 Very dense, gray, (SM), moist, fine SAND and SILT, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		113.8	7											
															0.5 0.5	S-13	GB
35		35.0 - 37.0 Very dense, gray to dark gray, (GM), moist, silty, fine to coarse GRAVEL, some fine sand, [TILL, Qvt].	GM		108.8	8											
															0.5 0.5	S-14	GB
		37.0 - 40.0 Very dense, gray to dark gray, (SM), moist, fine SAND and SILT, some fine to coarse gravel, trace dark brown organic debris at 39.5 ft bgs, [TILL, Qvt].	SM		106.8												
															1.0 1.0	S-15	GB
40					103.8												
			Log continued on next page														

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Steve Zimmerman

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



S-10@24.5ft  
 %G-5.3  
 %S-49.8  
 %F-44.9

Driller's Note: Easier drilling, top portion of RUN 6 wet (slough).

End drilling at 35 ft bgs, 1410 on 1/2/13.  
 Begin drilling at 35 ft bgs, 0905 on 1/3/13.

Driller's Note: Easier drilling from 35 to 38 ft bgs.

S-16@39ft  
 %G-16.0  
 %S-40.4  
 %F-43.6

# RECORD OF BOREHOLE E330-B-003

PROJECT: Sound Transit East Link/WA     DRILLING METHOD: Sonic     DATUM: Sound Transit East Coordinate System     ELEVATION: 143.84  
 PROJECT NUMBER: 113-93533.0320     DRILLING DATE: 1/2/13     COORDINATES: N: 554,144.97 E: 1,633,023.08     INCLINATION: -90  
 LOCATION: 110th Ave. N of Main St.     DRILL RIG: Track Mounted Geoprobe 8140LS Sonic

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						PENETRATION RESISTANCE BLOWS / ft ♦	NOTES WATER LEVELS			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT			NUMBER	TYPE	
					DEPTH (Ft)							
40	Sonic-4-inch Diameter Core/6-inch Diameter Casing	40.0 - 50.0 Very dense, gray, (SM), moist, silty, fine SAND, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		40.0							Harder drilling 40 to 45 ft bgs.  Slightly easier drilling conditions from 45-50 ft bgs.  RUN 11 grades sandier with depth.  S-21@52ft %G-18.3 %S-41.6 %F-40.1
					9	0.5 / 0.5	S-17	GB				
					10	1.0 / 1.0	S-18	GB				
45		Wood fragment at 47.5 ft bgs.										
					10	0.5 / 0.5	S-19	GB				
50		Cobble encountered at 50 ft bgs.										
					93.8	0.5 / 0.5	S-20	GB				
					50.0							
					11	0.5 / 0.5	S-21	GB	●			
					12	0.5 / 0.5	S-22	GB				
55												
60		59.5 - 60.0 Very dense, gray, (SM), moist, silty, fine SAND, little silt at 52.5 to 55 ft bgs.	SM									
		Log continued on next page										
					84.3							
					59.5							
					83.8							

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Steve Zimmerman

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-003

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave. N of Main St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 1/2/13  
 DRILL RIG: Track Mounted Geoprobe 8140LS Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,144.97 E: 1,633,023.08

ELEVATION: 143.84  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS					
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80							
					DEPTH (Ft)					PL MC LL 20 40 60 80							
60	Sonic-4-inch Diameter Core/6-inch Diameter Casing	SAND, trace fine gravel, some light gray sand partings, [TILL, Qvt]. 60.0 - 65.0 Very dense, gray, (SM), moist, fine to medium SAND and SILT, some fine to coarse gravel, trace cobbles, heterogeneous, [TILL, Qvt].	SM		60.0	13											
		78.8			0.5 0.5										S-25	GB	●
		2-inch thick layer of fine to medium SAND, little silt at 65.5 ft bgs.			0.5 0.5										S-26	GB	
65		65.0 - 70.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		65.0	14											
		73.8			0.5 0.5										S-27	GB	
		70.0			0.5 0.5										S-28	GB	
70		70.0 - 76.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		70.0	15											
		67.8			1.0 1.0										S-29	GB	
		76.0			1.0 1.0										S-30	GB	
75		76.0 - 77.0 Very dense, gray, (SM), moist to wet, silty, fine to medium SAND, some fine to coarse gravel, some small lenses/pockets of fine to medium SAND, [TILL, Qvt].	SM		66.8	16											
	77.0	0.5 0.5	S-31	GB													
	77.5	0.5 0.5	S-32	GB													
	77.0 - 77.5 Very dense, gray, (GP), wet, fine to coarse GRAVEL, some fine to coarse sand, trace silt, [TILL, Qvt].	GP		77.0	16												
	66.3	0.5 0.5	S-31	GB													
	77.5	0.5 0.5	S-32	GB													
	77.5 - 79.0 Very dense, gray, (SM), moist to wet, silty, fine to medium SAND, some fine to coarse gravel, some small lenses/pockets of fine to medium SAND, [TILL, Qvt].	SM		64.8	16												
	79.0	0.5 0.5	S-32	GB													
	64.3	0.5 0.5	S-32	GB													
80	79.0 - 79.5 Very dense, gray, (SP), wet, fine to medium SAND, trace silt, [TILL, Qvt].	SM		79.5													

S-25@62ft  
 %G-19.3  
 %S-40.0  
 %F-40.7

Driller's Note: Few inches of water at bottom of hole (RUN 14).

Large cobble or boulder encountered at 77.5 to 78.0 ft bgs, (dry rock flour and broken rock fragments).

ST SONIC 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Steve Zimmerman

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-003

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave. N of Main St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 1/2/13  
 DRILL RIG: Track Mounted Geoprobe 8140LS Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,144.97 E: 1,633,023.08

ELEVATION: 143.84  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS					
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80								
					DEPTH (Ft)					PL	MC	LL						
80	Sonic-4-inch Diameter Core/6-inch Diameter Casing	79.5 - 83.5 Very dense, gray, (SM), moist, fine SAND and SILT, little fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		60.3 83.5	17								Groundwater observed at 74.0 ft bgs at the end of RUN 16. Very hard drilling RUNS 17 through 19.				
															1.0 1.0	S-33	GB	
85		83.5 - 90.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		53.8 90.0	18												
																1.0 1.0	S-34	GB
																	19	
90		Boring completed at 90.0 ft.												Groundwater measured at 78.2 ft bgs, hole open to 90 ft bgs (end of borehole).				
95																		
100																		

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Steve Zimmerman

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

# RECORD OF BOREHOLE E330-B-004

SHEET 1 of 3

PROJECT: Sound Transit East Link/WA      DRILLING METHOD: Sonic      DATUM: Sound Transit East Coordinate System      ELEVATION: 145.01  
 PROJECT NUMBER: 113-93533.0320      DRILLING DATE: 4/8/2013      COORDINATES: N: 554,924.27 E: 1,633,136.57      INCLINATION: -90  
 LOCATION: NE 4th St. and 110th Ave NE      DRILL RIG: Tsi 150cc Compact Crawler      WELL TAG # BHU584

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft $\blacklozenge$	NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	RUN	REC ATT	NUMBER		
0	Sonic-4-inch Diameter Core/6-inch Diameter Casing	0.0 - 0.7 Asphalt Pavement, [Fill, Hf].	GP-GM		144.3	1			●	8-inch diameter flush mount steel monument, cemented to 1 ft bgs.  2-inch diameter PVC riser from 0.3 to 28 ft bgs.  Backfilled with 3/8 inch bentonite chips from 1 to 24.8 ft bgs. S-2@4ft %G-15.4 %S-45.2 %F-39.4
0.7 - 0.9 Crushed Rock, [FILL, Hf].				0.9	1.0 1.0		S-1	GB		
0.9 - 6.0 Dense, grayish brown, (SM), moist, fine to medium SAND and SILT, some fine to coarse gravel, scattered cobbles, [FILL, Hf].		SM			1.0 1.0		S-2	GB		
6.0 - 22.5 Dense, grayish brown, (SM), moist, fine to medium SAND and SILT, some fine to coarse gravel, scattered cobbles, [TILL, Qvt].		SM		139.0 6.0	1.0 1.0		S-3	GB		
					1.0 1.0		S-4	GB		
					1.0 1.0		S-5	GB		
					1.0 1.0		S-6	GB		
					1.0 1.0		S-7	GB		
					1.0 1.0		S-8	GB		
22.5 - 27.0 Very dense, grayish brown, (SM), moist, gravelly, silty, fine to coarse SAND, [TILL, Qvt].		SM		122.5 22.5	1.0 1.0		S-9	GB		
			1.0 1.0	S-8	GB					
27.0 - 30.0 Very dense, gray, (GP-GM), moist to wet, fine to coarse GRAVEL, some sand, little silt [ADVANCE OUTWASH, Qva].	GP-GM		118.0 27.0	1.0 1.0	S-9	GB	Driller's Note: More gravel encountered midway RUN 4.  Backfilled with Colorado silica 10 x 20 sand filter from 24.8 to 39 ft bgs. S-9@26ft %G-27.6 %S-49.1 %F-23.3			
			1.0 1.0	S-10	GB					
30		Log continued on next page		115.0					2-inch diameter slotted PVC size 0.010 inch from 28 to 38 ft bgs	

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Brian Owens

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-004

SHEET 2 of 3

PROJECT: Sound Transit East Link/WA      DRILLING METHOD: Sonic      DATUM: Sound Transit East Coordinate System      ELEVATION: 145.01  
 PROJECT NUMBER: 113-93533.0320      DRILLING DATE: 4/8/2013      COORDINATES: N: 554,924.27 E: 1,633,136.57      INCLINATION: -90  
 LOCATION: NE 4th St. and 110th Ave NE      DRILL RIG: Tsi 150cc Compact Crawler      WELL TAG # BHU584

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20    40    60    80				
					DEPTH (Ft)					PL                      MC                      LL 20                      40                      60                      80				
30	Sonic-4-inch Diameter Core/6-inch Diameter Casing	30.0 - 33.0 Very dense, gray, (GM), moist to wet, silty GRAVEL, some sand, [ADVANCE OUTWASH, Qva].	GM	o	30.0	6	1.0 1.0	S-11	GB	●	Vibration test conducted at 30 feet by ATS Consulting.  S-12@33ft %G-23.4 %S-67.6 %F-9.0 Saturated soil encountered at 34 ft bgs.  Backfilled with 3/8 inch bentonite chips from 39 to 85 ft bgs.  S-16@42ft %G- %S- %F-98.4  Vibration test conducted at 50 feet by ATS Consulting.			
				112.0	33.0		1.0 1.0	S-12	GB	●				
		33.0 - 34.5 Very dense, gray, (SW-SM), wet, fine to coarse SAND, some fine gravel, little silt, [ADVANCE OUTWASH, Qva].	SW-SM	o	110.5									
35		34.5 - 37.0 Very dense, gray, (GM), wet, silty, fine to coarse GRAVEL, little sand, [ADVANCE OUTWASH, Qva].	GM	o	34.5									
		37.0 - 37.5 Hard, greenish gray, (ML), moist, low plasticity SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML	o	108.0			1.0 1.0	S-13	GB				
		37.5 - 43.0 Hard, mottled dark gray and white, (CL), moist, low plasticity, silty CLAY, some slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL	hatched	107.5			0.5 0.5	S-14	GB				
40					37.5			1.0 1.0	S-15	GB				
					102.0			1.0 1.0	S-16	GB		●		
45			43.0 - 59.0 Hard, gray, (ML), moist, low plasticity, clayey SILT, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML	o	43.0	7	1.0 1.0	S-17	GB				
50						8	1.0 1.0	S-18	GB					
55														
60		Log continued on next page	CL	hatched	86.0 59.0		1.0 1.0	S-19	GB					

ST SONIC 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT.GDT 8/18/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Brian Owens

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014





# RECORD OF BOREHOLE E330-B-004

SHEET 3 of 3

PROJECT: Sound Transit East Link/WA      DRILLING METHOD: Sonic      DATUM: Sound Transit East Coordinate System      ELEVATION: 145.01  
 PROJECT NUMBER: 113-93533.0320      DRILLING DATE: 4/8/2013      COORDINATES: N: 554,924.27 E: 1,633,136.57      INCLINATION: -90  
 LOCATION: NE 4th St. and 110th Ave NE      DRILL RIG: Tsi 150cc Compact Crawler      WELL TAG # BHU584

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80						
					DEPTH (Ft)											
60	Sonic-4-inch Diameter Core/6-inch Diameter Casing	59.0 - 72.0 Hard, dark gray, (CL), moist, silty CLAY, some light gray mottling, slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].  White clasts observed from 61 to 62 ft bgs.  Grades to mottled gray and light gray at 64 ft bgs.	CL			9			1.0	S-20	GB					
65									1.0						S-21	GB
70									1.0							
75		72.0 - 76.0 Hard, gray, (ML), moist, low plasticity, clayey SILT, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML			10			1.0	S-22	GB					
80									1.0						S-23	GB
85		76.0 - 80.0 Hard, mottled gray and light gray, (ML), moist, low plasticity, clayey SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML			11			1.0	S-24	GB					
90									1.0							
95		80.0 - 82.0 Hard, gray, (ML), moist, low plasticity, clayey SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML			11			1.0	S-25	GB					
100									1.0							
105		82.0 - 85.0 Hard, mottled gray and light gray, (ML), moist, low plasticity, clayey SILT, few slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML			11			1.0	S-25	GB					
110	1.0															
115	Boring completed at 85.0 ft.															

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Brian Owens

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-005

SHEET 1 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave, N of NE 4th St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: Truck Mounted R131 Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,069.03 E: 1,633,067.56

ELEVATION: 157.76  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80			
					DEPTH (Ft)					PL	MC		LL
0		0.0 - 0.8 Asphalt Pavement.			157.0								Air knife excavation to 6.5 ft bgs.
		0.8 - 2.0 Concrete Pavement.			0.8								
	Air Knife Excavation	2.0 - 6.0 From observation during air knife excavation: Compact, grayish brown, (SM), moist, SAND and SILT, some fine to coarse gravel, heterogeneous, [WEATHERED TILL, Qvt].	SM		155.8 2.0								4-inch PVC casing installed to 76 feet for shear wave test. Grouted in place.
5		6.0 - 22.5 Dense, grayish brown, (SM), moist, silty, fine to coarse SAND, some fine to coarse gravel, [TILL, Qvt].  Some yellowish red oxidation observed from 6 to 15 ft bgs.			151.8 6.0	1	1.0 1.0	S-1	GB	●			
													Pressuremeter Test at 8.5 ft bgs.
10	Sonic-4-inch Diameter Core/6-inch Diameter Casing												Pressuremeter Test at 10 ft bgs.
		Large cobble encountered at 12 ft bgs.	SM			2	1.0 1.0	S-3	GB				Large cobble encountered at 12 ft bgs during casing advance.
15													
20													
		Log continued on next page											

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-005

SHEET 2 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave, N of NE 4th St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: Truck Mounted R131 Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,069.03 E: 1,633,067.56

ELEVATION: 157.76  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS				
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80								
					DEPTH (Ft)					PL	MC	LL						
20	Sonic-4-inch Diameter Core/6-inch Diameter Casing	6.0 - 22.5 Dense, grayish brown, (SM), moist, silty, fine to coarse SAND, some fine to coarse gravel, [TILL, Qvt].  Becomes slightly sandier from 20.5 to 22.5 ft bgs.	SM		135.3	3												
															1.0 1.0	S-7	GB	
25		22.5 - 27.5 Very dense, grayish brown, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		22.5	3												
																1.0 1.0	S-8	GB
																1.0 1.0	S-9	GB
30		27.5 - 32.5 Very dense, grayish brown, (GM), moist, silty, fine to coarse GRAVEL and SAND, little cobbles, [TILL, Qvt].	GM		130.3	4												
					27.5											1.0 1.0	S-10	GB
35		32.5 - 35.0 Dense to very dense, brown to grayish brown, (GP-GM), moist to wet, fine to coarse GRAVEL and SAND, little silt, [ADVANCE OUTWASH, Qva].	GP-GM		125.3	4												
					32.5											1.0 0.5	S-11	GB
		35.0 - 37.0 Dense to very dense, brown, (GP), moist to wet, fine to coarse GRAVEL and SAND, trace silt, [ADVANCE OUTWASH, Qva].	GP		122.8	5												
					35.0											1.0 1.0	S-13	GB
		37.0 - 38.5 Dense to very dense, grayish brown, (GM), wet, silty, fine to coarse GRAVEL, some sand, [ADVANCE OUTWASH, Qva].	GM		120.8	5												
					37.0											1.0 1.0	S-14	GB
		38.5 - 39.0 Dense to very dense, brown, (GP), moist to wet, fine to coarse GRAVEL and SAND, trace silt, [ADVANCE OUTWASH, Qva].	GP		119.3	5												
			GM		38.5 118.8 39.0											0.5 0.5	S-15	GB
40	Log continued on next page																	

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-005

SHEET 3 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave, N of NE 4th St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: Truck Mounted R131 Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,069.03 E: 1,633,067.56

ELEVATION: 157.76  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80					
					DEPTH (Ft)										
40	Sonic-4-inch Diameter Core/6-inch Diameter Casing	39.0 - 41.0 Dense, brown, (GM), moist, silty, fine to coarse GRAVEL, some sand, [ADVANCE OUTWASH, Qva].	GM		116.8	5	1.0 1.0	S-16	GB					Casing wet at 40 ft bgs, observed while pulling casing for Shear Wave install on 2/19/2013.  A few inches of groundwater at bottom of hole at the end of RUN 5 at 42.6 ft bgs, slow seepage of groundwater into hole, likely from 35 feet and below.  Ground water measured at 46 ft bgs at 1215 on 2/15/2013 (bottom of hole at 47 ft bgs, no casing). S-19@48ft %G-0.0 %S-4.8 %F-95.2	
		41.0 - 42.6 Dense, brown, (GP-GM), moist to wet, fine to coarse GRAVEL and SAND, little silt, little cobbles, [ADVANCE OUTWASH, Qva].	GP-GM		41.0		1.0 1.0	S-17	GB						
		42.6 - 47.5 Dense, brown, (GM/GP-GM), wet to moist, silty, fine to coarse GRAVEL, some sand, little cobbles and fine to coarse GRAVEL and SAND, little silt and cobbles, [ADVANCE OUTWASH, Qva].	GM/GP-GM		115.2	6	1.0 1.0	S-18	GB						
		42.6 - 47.5 Dense, brown, (GM/GP-GM), wet to moist, silty, fine to coarse GRAVEL, some sand, little cobbles and fine to coarse GRAVEL and SAND, little silt and cobbles, [ADVANCE OUTWASH, Qva].			42.6										
45			Yellowish red oxidation observed in (GM) soils from 46 to 46.5 below ground surface.												
			47.5 - 51.5 Hard, mottled gray and light gray, (CL), damp to moist, CLAY, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		110.3	7	1.0 1.0	S-19	GB					
			47.5 - 51.5 Hard, mottled gray and light gray, (CL), damp to moist, CLAY, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		47.5		1.0 1.0	S-19	GB					
50			51.5 - 52.0 Dense, brown, (GM), moist, silty, fine to coarse GRAVEL, some fine to coarse sand.	GM		106.3	8	0.5 0.5	S-20	GB					
			52.0 - 52.5 Hard, mottled gray and light gray, (ML), moist, low plasticity SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		51.5 105.8									
			52.5 - 60.0 Hard, gray, (ML), moist, low plasticity SILT, trace fine to coarse gravel, non-stratified, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		52.0	9	1.0 1.0	S-21	GB					
		52.0 - 52.5 Hard, mottled gray and light gray, (ML), moist, low plasticity SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	52.5												
		52.5 - 60.0 Hard, gray, (ML), moist, low plasticity SILT, trace fine to coarse gravel, non-stratified, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	52.5												
55		No gravel at 55 ft bgs.													
60		Log continued on next page			97.8										

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-005

SHEET 4 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th Ave, N of NE 4th St.

DRILLING METHOD: Sonic  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: Truck Mounted R131 Sonic

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,069.03 E: 1,633,067.56

ELEVATION: 157.76  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						SAMPLES		PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20 40 60 80			
					DEPTH (Ft)					PL	MC	LL	
60	Sonic-4-inch Diameter Core/6-inch Diameter Casing	60.0 - 62.5 Hard, gray, (CH), moist, high plasticity CLAY, slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH	[Hatched Pattern]	60.0	9		S-23	GB				S-23@61ft %G-0.0 %S-2.5 %F-97.5  Pressuremeter Test at 64.3 ft bgs.  Casing advanced to 67 ft bgs prior to RUN 11 on 2/18/2013.  Pressuremeter Test at 71 ft bgs.  Pressuremeter Test at 73 ft bgs. Ground water measured at 69.1 ft bgs at 0915 on 2/19/2013 (bottom of hole at 73.3 ft bgs, cased to 75 feet).  Cascade over-drilled borehole from 76 to 78 ft bgs for shear wave installation on 2/19/2013.
										1.0 1.0			
65		62.5 - 67.5 Hard, gray, (ML), moist, low plasticity, clayey SILT, non-stratified, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML	[Vertical Lines]	95.3 62.5	10		S-24	GB				
										1.0 1.0			
70		67.5 - 73.0 Dense to very dense, gray, (ML), moist to wet, non-plastic SILT, trace fine sand, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML	[Vertical Lines]	90.3 67.5	11		S-25	GB				
					1.0 1.0								
75	73.0 - 78.0 Hard, gray, (ML), moist, low plasticity clayey SILT, slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML	[Vertical Lines]	84.8 73.0	12		S-26	GB					
									1.0 1.0				
78.0	Boring completed at 78.0 ft.			79.8 78.0									

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014

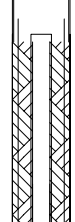
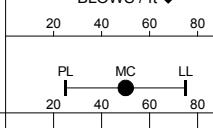


# RECORD OF BOREHOLE E330-B-006

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Sonic    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.41  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 2/8/2013-2/14/2013    COORDINATES: N: 555,393.84    E: 1,633,074.71    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: Truck Mounted R131 Sonic    WELL TAG # BHS738

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft ♦	NOTES WATER LEVELS  WELL INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	RUN	REC ATT	NUMBER		
0	Air Knife Excavation	0.0 - 0.8 Asphalt Pavement.		X	162.7					Air knife excavation to 10 ft bgs completed on 2/7/2013. Begin drilling at 1145 on 2/8/2013, advance casing to 10 ft bgs. cleanout to 10 feet.  12-inch diameter flush mount steel monument, cemented to 3.0 ft bgs.  4-inch diameter PVC riser from 0.3 to 53 ft bgs.  Backfilled with medium bentonite chips from 3 to 50 ft bgs.
		0.8 - 10.0 Controlled Density Fill.		X	0.8					
10	Sonic 4-inch Diameter Core/6-inch Diameter Casing	10.0 - 12.5 Compact, grayish brown, (SM/SP-SM), moist, silty, fine to medium SAND, little fine gravel and fine to medium SAND, little silt and fine gravel in pockets/lenses, [WEATHERED TILL, Qvt].	SM/SP-SM	O	153.4 10.0					Hydraulic leak observed in sonic drill head.   Shut down at 1244 2/8/2013, 16 ft of 8-inch diameter casing removed from bore hole. Resume drilling at 0915 2/12/2013. RUN-2@15.5ft %G-14.8 %S-47.0 %F-38.2
15		12.5 - 27.5 Very dense, grayish brown, (SM), moist fine to medium SAND and SILT, little fine to coarse gravel, heterogeneous, [TILL, Qvt].		O	150.9 12.5	1				
		Minor yellowish-red oxidation observed from about 15 to 18 ft bgs.	SM	O			1.0 1.0	RUN-2	GB	
20				O		2				



Log continued on next page

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Sonic    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.41  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 2/8/2013-2/14/2013    COORDINATES: N: 555,393.84    E: 1,633,074.71    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: Truck Mounted R131 Sonic    WELL TAG # BHS738

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft ♦	NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER		
					DEPTH (Ft)					
20	Sonic-4-inch Diameter Core/6-inch Diameter Casing	12.5 - 27.5 Very dense, grayish brown, (SM), moist fine to medium SAND and SILT, little fine to coarse gravel, heterogeneous, [TILL, Qvt].	SM		135.9	2			20    40    60    80 PL    MC    LL 20    40    60    80	Driller's Note: Tight formation, very hard drilling.  Easier drilling.          No groundwater observed at end of RUN 4, 35 ft bgs.
25		27.5 - 32.5 Dense to very dense, gray to grayish brown, (GM/GP-GM), moist, silty, fine to coarse GRAVEL, some fine to coarse sand and fine to coarse GRAVEL and SAND, little silt, [TILL, Qvt].			GM/GP-GM	27.5	3			
30		Becomes grayish brown at about 30 ft bgs.  Brown fabric-like organic fragments at about 32.5 ft bgs.		130.9	4					
35		32.5 - 40.0 Dense to very dense, grayish brown, (GP-GM), moist, fine to coarse GRAVEL and SAND, little silt, [ADVANCE OUTWASH, Qva].	GP-GM	32.5	5					
40		Log continued on next page		123.4						

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Sonic    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.41  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 2/8/2013-2/14/2013    COORDINATES: N: 555,393.84    E: 1,633,074.71    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: Truck Mounted R131 Sonic    WELL TAG # BHS738

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20    40    60    80				
					DEPTH (Ft)									
40	Sonic-4-inch Diameter Core/6-inch Diameter Casing	40.0 - 45.0 Dense to very dense, grayish brown, (GP), moist, fine to coarse GRAVEL and SAND, trace silt, [ADVANCE OUTWASH, Qva].	GP		40.0	5								
45		45.0 - 47.5 Dense to very dense, grayish brown, (GP-GM), moist, fine to coarse GRAVEL, some fine to coarse sand, little silt, [ADVANCE OUTWASH, Qva].			118.4				6					
		Grades siltier at 47 ft bgs.	115.9	7										
		47.5 - 48.0 Dense to very dense, grayish brown, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel.	SM				47.5	0.5 0.5	RUN-7	GB	●			
		48.0 - 56.5 Dense to very dense, grayish brown, (GP-GM), moist, fine to coarse GRAVEL, some fine to coarse sand, little silt, cobbles, [ADVANCE OUTWASH, Qva].  Cobbles/boulders encountered at 48 to 48.5 ft bgs.  Becomes moist to wet at 50 ft bgs.  Becomes gray at 52.5 ft bgs.	GP-GM	115.4										
50				48.0										
55			56.5 - 57.5 Very dense, gray, (GM), moist, silty, fine to coarse GRAVEL, some sand, [ADVANCE OUTWASH, Qva].	GM		106.9	8							
		57.5 - 60.0 Hard, dark gray, (ML), moist, low plasticity, clayey SILT, trace fine organic fragments, rhythmic gray clayey SILT layers to 1/2 inch thick, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].  Becomes fine SAND at 60 ft bgs.	ML		56.5									
60				105.9										
				57.5										
				103.4										
		Log continued on next page												

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014





# RECORD OF BOREHOLE E330-B-006

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA      DRILLING METHOD: Sonic      DATUM: Sound Transit East Coordinate System      ELEVATION: 163.41  
 PROJECT NUMBER: 113-93533.0320      DRILLING DATE: 2/8/2013-2/14/2013      COORDINATES: N: 555,393.84 E: 1,633,074.71      INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St. DRILL RIG: Truck Mounted R131 Sonic      WELL TAG # BHS738

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20    40    60    80				
					DEPTH (Ft)					<div style="display: flex; justify-content: space-between; width: 100%;"> <span>PL</span> <span>MC</span> <span>LL</span> </div> <div style="display: flex; justify-content: space-between; width: 100%; margin-top: 5px;"> <span>20</span> <span>40</span> <span>60</span> <span>80</span> </div>				
60	Sonic-4-inch Diameter Core/6-inch Diameter Casing	60.0 - 65.0 Dense to very dense, gray, (GP-GM), wet, fine to coarse GRAVEL, some sand, little silt, cobbles, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	GP-GM		60.0	9							RUN 9 appears to be mixed and disturbed.	
65		65.0 - 66.0 Hard/dense to very dense, dark gray, (ML/SP), moist, low plasticity SILT and fine SAND, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML/SP		98.4 65.0								2/12/2013 end drilling at 65 ft bgs at 1430. Stop drilling 1430 2/12/2013 at 65 feet 2/13/13 Hole caved, three cleanout runs because of caving. RUN 10 Soil may be disturbed and physically mixed due to casing advancement prior to run. Groundwater measured in extraction well at about 66.5, 1330 2/13/2013.	
70		66.0 - 73.0 Dense to very dense, dark gray, (SP-SM), moist, fine SAND, little silt, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	SP-SM		97.4 66.0	10							Trace coarse SAND at 72 ft bgs.	
75		73.0 - 84.0 Hard, greenish gray, (CL), moist, silty CLAY, trace sand and gravel, few slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		90.4 73.0						●		RUN-10@72ft %G-0.1 %S-94.5 %F-5.4  2/14/2013 Groundwater measured at 66.5 ft bgs after well installation.  Backfilled with medium bentonite chips from 73.5 ft to bottom of hole.	
80		Log continued on next page									●		RUN-11@76.7ft %G-0.5 %S-1.8 %F-97.7	

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Sonic    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.41  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 2/8/2013-2/14/2013    COORDINATES: N: 555,393.84    E: 1,633,074.71    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: Truck Mounted R131 Sonic    WELL TAG # BHS738

DEPTH (Ft)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft ♦				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	20    40    60    80				
					DEPTH (Ft)					PL                      MC                      LL 20                      40                      60                      80				
80	Sonic-4-inch Diameter Core/6-inch Diameter Casing	73.0 - 84.0 Hard, greenish gray, (CL), moist, silty CLAY, trace sand and gravel, few slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL	[Hatched Pattern]	79.4	12							2/13/2013 Groundwater measured at 67.5 ft bgs at end of RUN 11 (80 ft bgs).	
85		84.0 - 87.5 Hard, gray, (ML), moist, clayey SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML	[Vertical Lines]	84.0									
90		87.5 - 90.0 Hard, mottled gray and light gray, (ML), moist, clayey SILT, few slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML	[Vertical Lines]	75.9 87.5	13								
90		Boring completed at 90.0 ft.			73.4 90.0									
95														
100														

ST SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Cascade Drilling, LP  
 DRILLER: Kevin Rogers

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006A

SHEET 1 of 3

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 165.29  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 3/19/2013    COORDINATES: N: 555,424.75    E: 1,633,022.63    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: B-59 Mobile Drill Truck    WELL TAG#: BHU524

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
0	Air Knife Excavation	0.0 - 1.0 Concrete Pavement.			164.3									Air knife excavation to 7 ft bgs. Begin drilling at 1248 on 3/19/2013  8-inch diameter flush mount steel monument, concrete to 1.5 ft bgs.  2-inch diameter PVC riser from 0.3 to 52 ft bgs.  3/8-inch HolePlug Bentonite Chips from 1.5 to 49 ft bgs.	
		1.0 - 1.5 Crushed Rock.	GP-GM		163.8										
		1.5 - 6.0 Compact to dense, brown, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, cobbles, [FILL, Hf].  Trace fine roots to 4 ft bgs.	SM		159.3										
	4.9-inch Diameter Bit, Mud Rotary	6.0 - 15.0 Very dense, mottled brown and grayish brown, (SM), moist, fine to medium SAND and SILT, some fine to coarse gravel, [TILL, Qvt].	SM		6.0	S-1	SS	26-40-42	>50	1.2 1.5				>> S-2@10ft %G-13.7 %S-40.5 %F-45.8 Intermittent drill chatter from 10 to 15 ft bgs.	
		15.0 - 16.0 Very dense, grayish brown, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel and cobbles, some reddish yellow mottling/oxidation, [TILL, Qvt].	SM		150.3									>>	
		16.0 - 25.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, scattered cobbles, [TILL, Qvt].	SM		149.3									>>	
		25.0 - 33.0 Very dense, gray, (GP-GM), moist, fine to coarse GRAVEL and fine to medium SAND, little silt, scattered cobbles, [ADVANCE OUTWASH, Qva].	GP-GM		140.3	S-4	SS	28-50/4"	>50	0.5 0.8				>> S-4@20ft %G-18.6 %S-49.8 %F-31.6 Increasing drill chatter from 20 to 25 ft bgs. Slight loss of drilling mud, possible water bearing zone at 21 ft bgs.	
					140.3	S-5	SS	50/5"	>50	0.4 0.4				>> Significant drill chatter from 25 to 30 ft bgs.	

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT.GDT 8/18/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006A

SHEET 2 of 3

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 165.29  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 3/19/2013    COORDINATES: N: 555,424.75    E: 1,633,022.63    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: B-59 Mobile Drill Truck    WELL TAG#: BHU524

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10 20 30 40				
											PL	MC	LL		
30	4.9-inch Diameter Bit, Mud Rotary	25.0 - 33.0 Very dense, gray, (GP-GM), moist, fine to coarse GRAVEL and fine to medium SAND, little silt, scattered cobbles, [ADVANCE OUTWASH, Qva].  Some fine to coarse SAND.	GP-GM		132.3	S-6	SS	50/3"	>50	0.0 0.3					S-6@30ft %G-56.6 %S-35.9 %F-7.5  End drilling at 0250 on 3/19/2013, Resume drilling at 1110 on 3/20/2013.
33.0 - 38.0 Very dense, brown to grayish brown, (GP-GM), moist, fine to coarse GRAVEL, and fine to medium SAND, little silt, [ADVANCE OUTWASH, Qva].		33.0			S-7	SS	35-50/3"	>50	0.6 0.8					Drill chatter observed at 35 ft bgs.	
38.0 - 45.0 Very dense, grayish brown, (GP-GM), moist to wet, fine to coarse GRAVEL, some fine to medium sand, little silt, [ADVANCE OUTWASH, Qva].		GP-GM		127.3	S-8	SS	32-50/2"	>50	0.7 0.7					S-8@40ft %G-62.6 %S-31.4 %F-6.0  Drill chatter observed at 43 ft bgs.	
45.0 - 53.0 Very dense, brown, (GP-GM), moist, fine to coarse GRAVEL and fine to medium SAND, little to trace silt, [ADVANCE OUTWASH, Qva].				120.3	S-9	SS	50/6"	>50	0.3 0.5						
53.0 - 60.0 Very dense, brown, (GP), moist, fine to coarse GRAVEL and fine to medium SAND, cobbles, [ADVANCE OUTWASH, Qva].		GP		112.3	S-10	SS	50/3"	>50	0.3 0.3					10x20 silica sand from 49 to 86.5 ft bgs. Drill chatter observed at 50 ft bgs.	
60.0				S-11	SS	50/3"	>50	0.2 0.3						2-inch diameter, 0.010 inch machine slotted PVC installed between 82 and 52 ft bgs. Driller Note: increased, coarser gravel at approximately 55 ft bgs.  Drill chatter observed at 58 ft bgs.	
105.3															

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

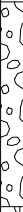





LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006A

SHEET 3 of 3

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 165.29  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 3/19/2013    COORDINATES: N: 555,424.75 E: 1,633,022.63    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St. DRILL RIG: B-59 Mobile Drill Truck    WELL TAG#: BHU524

DEPTH (Ft)	BORING METHOD	SOIL PROFILE			SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
60	4.9-inch Diameter Bit, Mud Rotary	60.0 - 64.0 Very dense, gray, (GP), moist to wet, coarse GRAVEL and SAND, trace silt, [ADVANCE OUTWASH, Qva].	GP		60.0	S-12	SS	50/3"	>50	0.2 0.3					WELL INSTALLATION  >> Significant drill chatter to 69.5 ft bgs.  Smooth drilling from 69.5 to 71 ft bgs.  Drill chatter encountered from 71 to 73 ft bgs.  Smooth drilling from 73 to 86.5 ft bgs.  >>  >>  >>  S-17@85ft %G-9.9 %S-53.4 %F-36.7	
65		64.0 - 65.2 Very dense, gray and greenish gray, (GM), moist, silty, fine to coarse GRAVEL, some fine to medium sand, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	GM		101.3 64.0	S-13	SS	50/6"	>50	0.4 0.5						
		65.2 - 70.5 Hard, gray (CL), moist, low plasticity CLAY, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		100.1 65.2											
70		70.5 - 73.0 Very dense, greenish gray, (GC), moist, clayey, fine to coarse GRAVEL, some sand, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	GC		94.8 70.5	S-14	SS	12-50/3"	>50	0.8 0.8						
		73.0 - 83.0 Very dense, gray, (SP), wet, medium to fine SAND, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	SP		92.3 73.0											
75						S-15	SS	50/5.5"	>50	0.5 0.5						
80			Trace fine gravel.			S-16	SS	50/6"	>50	0.4 0.5						
			83.0 - 86.5 Dense, greenish-gray, (SM), moist, silty SAND, little fine gravel, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	SM		82.3 83.0	S-17	SS	22-37-43	>50	1.5 1.5					
			Borehole completed at 86.5 ft.			78.8 86.5										

ST LOG 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT.GDT 8/18/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet


LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006B

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.20  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 3/29/2013    COORDINATES: N: 555,366.75 E: 1,633,024.09    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: B-60 Mobile Drill Truck    WELL TAG#: BHU570

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
0	Air Knife Excavation	0.0 - 1.0 Asphalt Pavement.			162.2										
		1.0 - 1.5 Crushed Rock.	GP-GM		1.0 161.7										
		1.5 - 8.0 Compact to dense, brown, (SM), silty, fine to medium SAND, some fine to coarse gravel, few cobbles, [FILL, Hf].			1.5										
5		Roots to 4 ft bgs.	SM												
		Gravel and cobbles at 7 to 7.5 ft bgs.													
		No sampling from 8 to 60 ft bgs, lithology inferred from drill action.			155.2										
10	4.9-inch Diameter Bit, Mud Rotary	8.0 - 31.0 Dense to very dense, (SM), silty SAND, little to some gravel, [TILL, Qvt].			8.0									<p style="text-align: center;">Very slow groundwater seepage at 7.5 ft during air knife excavation.</p>	
		No sampling from 8 to 60 ft bgs, lithology inferred from drill action.	SM												
15															
20															

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006B

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.20  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 3/29/2013    COORDINATES: N: 555,366.75    E: 1,633,024.09    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: B-60 Mobile Drill Truck    WELL TAG#: BHU570

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
20	4.9-inch Diameter Bit, Mud Rotary	8.0 - 31.0 Dense to very dense, (SM), silty SAND, little to some gravel, [TILL, Qvt].  No sampling from 8 to 60 ft bgs, lithology inferred from drill action.	SM											Changing drilling conditions, marked increase in drill rig chatter at 31 ft bgs.	
25		31.0 - 57.0 Very dense, (GP/GP-GM/GM), GRAVEL, variable amounts of silt, sand and cobbles, [ADVANCE OUTWASH, Qva].  No sampling from 8 to 60 ft bgs, lithology inferred from drill action.			GP /GP-GM /GM	132.2 31.0									
30															
35															
40															

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey


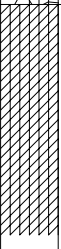
LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006B

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.20  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 3/29/2013    COORDINATES: N: 555,366.75    E: 1,633,024.09    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: B-60 Mobile Drill Truck    WELL TAG#: BHU570

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
40	4.9-inch Diameter Bit, Mud Rotary	31.0 - 57.0 Very dense, (GP/GP-GM/GM), GRAVEL, variable amounts of silt, sand and cobbles. [ADVANCE OUTWASH, Qva].  No sampling from 8 to 60 ft bgs, lithology inferred from drill action.	GP /GP-GM /GM											Backfilled with 10x20 silica sand from 42 to 76 ft bgs. Slightly easier drilling from 42 to 45 ft bgs.  2-inch diameter, 0.010 inch machine slotted PVC installed between 45 and 75 ft bgs.  Drill chatter.  Sudden change in drill action at 57 ft bgs, becomes smooth.	
57.0 - 60.8		Hard, dark greenish gray, (ML/CL), moist, clayey SILT and silty CLAY. [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].			ML /CL		106.2 57.0								

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014





# RECORD OF BOREHOLE E330-B-006B

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA DRILLING METHOD: Mud Rotary DATUM: Sound Transit East Coordinate System ELEVATION: 163.20  
 PROJECT NUMBER: 113-93533.0320 DRILLING DATE: 3/29/2013 COORDINATES: N: 555,366.75 E: 1,633,024.09 INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St. DRILL RIG: B-60 Mobile Drill Truck WELL TAG#: BHU570

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						PL	MC	LL			
60	4.9-inch Diameter Bit, Mud Rotary		ML / CL		102.4	S-1	SS	17-50/5.5"	>50	1.0 1.0					>>	
		60.8 - 62.5 Very dense, gray, (SM), moist, silty, fine SAND, some micaceous grains, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	SM		60.8											
		62.5 - 68.0 Hard, mottled greenish gray and gray, (ML), moist, clayey SILT and SAND, abundant wood fragments, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		100.7 62.5	S-2	SS	18-50/5"	>50	0.9 0.9						S-2@65ft %G-0.5 %S-38.8 %F-60.7
65																
		68.0 - 78.0 Hard, gray, (CH), moist, high plasticity CLAY, trace coarse gravel, slickensides, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnl].	CH		95.2 68.0	S-3	SS	26-30-33	>50	1.5 1.5						>>
70																
	Some internal deformation observed - offsets, slickensides.					S-4	SS	12-19-25	44	1.5 1.5						Cap at bottom of screen.
75															Backfilled with 3/8-inch HolePlug Bentonite Chips from 75 ft bgs to bottom of hole.	
	78.0 - 83.0 Hard, gray, (ML), moist, low plasticity, clayey SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		85.2 78.0											Easier drilling at 78 ft bgs, transition out of clayey silt.	
80															Log continued on next page	

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-006B

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 163.20  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 3/29/2013    COORDINATES: N: 555,366.75    E: 1,633,024.09    INCLINATION: -90  
 LOCATION: NE 110th Ave. S of NE 6th St.    DRILL RIG: B-60 Mobile Drill Truck    WELL TAG#: BHU570

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10 20 30 40					
					DEPTH (Ft)						PL	MC	LL			
80	4.9-inch Diameter Bit, Mud Rotary	78.0 - 83.0 Hard, gray, (ML), moist, low plasticity, clayey SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		80.2	S-5	SS	50/6"	>50	0.5 0.5					>>	
85		83.0 - 91.5 Hard, gray, (CH), moist, high plasticity CLAY, few slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CH		83.0	S-6	SS	14-18-25	43	1.5 1.5						
90							S-7	SS	14-16-21	37	1.5 1.5					
		Borehole completed at 91.5 ft.			71.7 91.5											

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E330-B-008

SHEET 1 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 11101 NE 6th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/22/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.03 E: 1,633,616.19

ELEVATION: 124.70  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						PL	MC	LL			
0	4.9-inch bit, Mud Rotary	0.0 - 4.5 Loose, dark brown, (SM), moist, silty, fine SAND, [FILL, Hf].	SM	[Cross-hatched pattern]	120.2	S-1	SS	3-4-3	7	0.7 1.5	◆					
5		4.5 - 7.0 Dense, light brown, (SM), moist, silty, fine SAND, some gravel, [FILL, Hf].			SM	[Cross-hatched pattern]	117.7	S-2	SS	14-17-13	30	0.3 1.5		◆		
		7.0 - 9.5 Compact, brownish gray, (SM), moist, fine to medium SAND and SILT, some gravel, ribbons of brown-orange, silty, fine to coarse sand, [FILL, Hf].	SM	[Cross-hatched pattern]	115.2	S-3	SS	10-13-14	27	1.0 1.5	●	◆			S-3@7.5ft %G-5.9 %S-57.5 %F-36.6	
10		9.5 - 12.0 Very dense, brownish gray, (SM), moist, silty, fine to coarse SAND, some gravel, [TILL, Qvt].	SM	[Stippled pattern]	112.7	S-4	SS	36-40-50/4"	>50	0.9 1.3				>>		
		12.0 - 27.0 Very dense, gray, (GP-GM/GM), moist to wet, fine to coarse GRAVEL and SAND, little silt, to silty, fine to coarse GRAVEL, some sand, [ADVANCE OUTWASH, Qva].	GM	[Circular pattern]		S-5	SS	20-50/3"	>50	0.3 0.8				>>	Moderate drilling chatter.	
15						S-6	SS	21-50/3"	>50	0.3 0.8				>>		
20						S-7	SS	24-50/2"	>50	0.5 0.7	●				>>	S-7@20ft %G-58.3 %S-30.9 %F-10.8
25						S-8	SS	17-50/3"	>50	0.7 0.8					>>	
30			27.0 - 43.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SM	[Stippled pattern]	97.7 27.0									Smooth drilling at 27.5 ft bgs.	

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT.GDT 6/23/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsy

LOGGED: Chris Smith  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-008

SHEET 2 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 11101 NE 6th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/22/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.03 E: 1,633,616.19

ELEVATION: 124.70  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS					
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40				
					DEPTH (Ft)						PL	MC	LL						
30	4.9-inch bit, Mud Rotary	27.0 - 43.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SM		81.7	S-9	SS	25-38-41	>50	1.5 1.5					S-9@30ft %G-0.0 %S-68.0 %F-32.0				
35										S-10	SS	37-38-50/6"	>50	1.3 1.5					>>
40										S-11	SS	25-50/5"	>50	0.9 0.9					S-11@40ft %G-0.0 %S-62.4 %F-37.6
45		43.0 - 67.0 Very dense, greenish gray, (ML), moist, SILT and SAND, ribbons of gray-purple, silty, fine sand, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnf].	ML		43.0	S-12	SS	31-38-49	>50	1.3 1.5					>>				
50		Trace organic fragments at 50 ft bgs.						S-13	SS	13-23-42	>50	1.0 1.5					>>		
55						S-14	SS	31-50/6"	>50	1.0 1.0					>>				
60		Log continued on next page																	

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsy

LOGGED: Chris Smith  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-008

SHEET 3 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 11101 NE 6th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/22/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.03 E: 1,633,616.19

ELEVATION: 124.70  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40				
					DEPTH (Ft)						PL	MC	LL					
60	4.9-inch bit, Mud Rotary	43.0 - 67.0 Very dense, greenish gray, (ML), moist, SILT and SAND, ribbons of gray-purple, silty, fine sand, [PRE-VASHON LACUSTRINE DEPOSITS, Qpn].	ML		57.7	S-15	SS	30-50/3"	>50	0.8 0.8					S-15@60ft %G-2.9 %S-32.3 %F-64.8 Slight drilling chatter at 61 ft bgs.  Smooth drilling from 63 ft bgs to bottom of hole.			
65							S-16	SS	14-23-29	>50	1.3 1.5							
			67.0 - 73.0 Dense, gray, (CH), moist, high plasticity CLAY, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CH		67.0												
70									S-17	SS	17-22-25	47	1.2 1.5					S-17@70ft %G- %S- %F-98.3
			73.0 - 87.0 Very dense, gray, (ML), moist, sandy SILT, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		51.7 73.0												
75								S-18	SS	50/6"	>50	0.5 0.5						
80								S-19	SS	50/5"	>50	0.4 0.4						
85						S-20	SS	30-31-50/6"	>50	1.2 1.5								
90		87.0 - 93.0 Very dense, gray, (CL), moist, low plasticity CLAY and SAND, trace gravel, increased sand with depth, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		37.7 87.0													

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT.GDT 6/23/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsy

LOGGED: Chris Smith  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-008

SHEET 4 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 11101 NE 6th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/22/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.03 E: 1,633,616.19  
 ELEVATION: 124.70  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
90	4.9-inch bit, Mud Rotary	87.0 - 93.0 Very dense, gray, (CL), moist, low plasticity CLAY and SAND, trace gravel, increased sand with depth, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		31.7 93.0	S-21	SS	26-50/5"	>50	0.8 0.9	●		>>●	S-21@90ft %G- %S- %F-62.7	
95		93.0 - 97.0 Very dense, gray, (CL), moist, low plasticity CLAY, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		27.7 97.0	S-22	SS	26-42-50/6"	>50	1.1 1.5	>>●				
100		97.0 - 100.8 Very dense, gray, (ML), moist, SILT, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		23.9 100.8	S-23	SS	38-50/4"	>50	0.8 0.8	>>●				
		Borehole completed at 100.8 ft. Backfilled with 3/8-inch bentonite chips.													
105															
110															
115															
120															

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsy

LOGGED: Chris Smith  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-008A

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 530 112th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 7/3/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.59 E: 1,633,768.55

ELEVATION: 113.18  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
0	5-inch Diameter Bit, Mud Rotary	0.0 - 4.5 Dense, mottled gray-brown, (SM), moist, gravelly, silty SAND, [FILL, Hf].	SM		108.7	S-1	SS	17-17-13	30	0.8 1.5	●	◆			Gravel at surface.  S-1@2.5ft %G-26.2 %S-53.0 %F-20.8	
5		4.5 - 7.0 Compact, gray-brown, (SM), moist, silty, fine to coarse SAND, little gravel, iron oxide staining, [FILL, Hf].	SM		106.2	S-2	SS	9-14-12	26	1.0 1.5		◆				
		7.0 - 9.5 Very dense, gray-brown, (SM), moist, silty, fine to coarse SAND, some gravel, friable, [TILL, Qvt].	SM		103.7	S-3	SS	17-25-30	>50	1.2 1.5	●					S-3@7.5ft %G-13.7 %S-64.2 %F-22.1
10		9.5 - 12.0 Very dense, gray, (SM/ML), moist, fine to coarse SAND and fine-sandy SILT, some gravel, [TILL, Qvt].	SM /ML		101.2	S-4	SS	36-50/6"	>50	0.6 1.0						>>
		12.0 - 17.0 Very dense, gray, (SM), moist, fine to coarse SAND, some silt, little gravel, diamict structure, [TILL, Qvt].	SM		96.2	S-5	SS	9-37-50/4"	>50	1.0 1.3						>>
15		17.0 - 22.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, some gravel, diamict structure, friable, micaceous particles, [ADVANCE OUTWASH, Qva].  Cobbles encountered at 18 ft bgs.	SM		96.2	S-6	SS	50/5"	>50	0.4 0.4						>>
20		Log continued on next page														

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

ATD-07/02/2013

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsey

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-008A

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 530 112th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 7/3/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.59 E: 1,633,768.55

ELEVATION: 113.18  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
20	5-inch Diameter Bit, Mud Rotary	17.0 - 22.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, some gravel, diamict structure, friable, micaceous particles, [ADVANCE OUTWASH, Qva].	SM		91.2 22.0	S-7	SS	37-50/6"	>50	0.7 1.0					S-7@20ft %G-18.8 %S-53.8 %F-27.4	
		22.0 - 30.7 Dense, gray, (SP-SM), wet, fine to coarse SAND, little silt, fine organics, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].  Piece of rock in sampler.													Easy drilling at 22 ft bgs.	
25				SP-SM		S-8	SS	50/6"	>50	0.1 0.5					Very poor recovery Sample S-8 at 25 ft bgs, rock lodged in tip of sampler.	
30			30.7 - 33.0 Compact, gray-green, (ML), moist, fine sandy SILT, with little shell fragments and brown organic silt, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnf].	ML		82.5 30.7	S-9	SS	25-23-23	46	1.5 1.5					
35			33.0 - 38.0 Compact, gray-green, (CL-ML), moist, low plasticity, silty CLAY and SAND, fine organics, fine micaceous particles, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnf].			80.2 33.0										
				CL-ML		S-10	SS	17-25-26	>50	1.5 1.5					S-10@35ft %G- %S- %F-61.9	
40		38.0 - 41.0 Compact, gray-green, (ML), moist, SILT, some clay, little sand, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnf].	ML		75.2 38.0											
		Log continued on next page														

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsey

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14



# RECORD OF BOREHOLE E330-B-008A

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 530 112th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 7/3/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.59 E: 1,633,768.55  
 ELEVATION: 113.18  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
40	5-inch Diameter Bit, Mud Rotary	38.0 - 41.0 Compact, gray-green, (ML), moist, SILT, some clay, little sand, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnl].	ML		72.2 41.0	S-11	SS	13-27-35	>50	1.5 1.5					>> ◆	
		41.0 - 43.0 Compact, gray, (SP), wet, fine to coarse SAND, trace silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP		70.2 43.0											
		43.0 - 45.3 Very dense, gray, (SM), wet, silty, fine to coarse SAND and GRAVEL, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SM		67.9 45.3	S-12	SS	27-50/3"	>50	0.8 0.8						>> ◆ S-12@45ft %G-32.1 %S-48.8 %F-19.1
		45.3 - 48.0 Very dense, gray, (SW), wet, fine to coarse SAND and fine GRAVEL, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SW		65.2 48.0											
		48.0 - 63.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, micaceous particles, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SM			S-13	SS	28-37-43	>50	1.5 1.5						>> ◆
55						S-14	SS	39-50/6"	>50	0.9 1.0					>> ◆	
60		Log continued on next page														

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsey

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-008A

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 530 112th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 7/3/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.59 E: 1,633,768.55

ELEVATION: 113.18  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
60	5-inch Diameter Bit, Mud Rotary	48.0 - 63.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, micaceous particles, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SM	[Dotted Pattern]	50.2	S-15	SS	43-50/4"	>50	0.8 0.8	●				S-15@60ft %G-0.2 %S-80.1 %F-19.7
		63.0													
65		63.0 - 68.0 Very dense, gray, (ML), moist, clayey SILT, some fine to coarse SAND, trace gravel, diamict structure, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnf]	ML	[Vertical Lines]	45.2	S-16	SS	41-50/2"	>50	0.7 0.7					>> ●
		68.0													
70			68.0 - 73.0 Hard, gray, (CH), moist, CLAY, trace fine to coarse sand and gravel, distorted bedding, heavily slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CH	[Diagonal Hatching]	40.2	S-17	SS	20-50/6"	>50	1.0 1.0				>> ●
	73.0														
75		73.0 - 78.0 Hard, gray, (ML), moist, SILT, little sand, slickensided, fractures ranging from horizontal to vertical, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML	[Vertical Lines]	35.2	S-18	SS	38-50/6"	>50	1.0 1.0	●			S-18@75ft %G- %S- %F-90.6 Difficulty extracting drill bit at 75 ft bgs.	
	78.0														
80		78.0 - 83.0 Hard, gray, (CL/ML), moist, SILT to CLAY, numerous clayey slickensided fractures, ranging from 10° to 70° from horizontal, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL /ML	[Vertical Lines]	35.2										
	83.0														

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsey

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-008A

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 530 112th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 7/3/2013  
 DRILL RIG: Landa L-10-T Track

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,446.59 E: 1,633,768.55  
 ELEVATION: 113.18  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
80	5-inch Diameter Bit, Mud Rotary	78.0 - 83.0 Hard, gray, (CL/ML), moist, SILT to CLAY, numerous clayey slickensided fractures, ranging from 10° to 70° from horizontal, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL /ML		30.2 83.0	S-19	SS	33-50/6"	>50	1.0 1.0					>>	
85		83.0 - 88.0 Hard, gray, (CL), moist, CLAY, some fine to coarse sand, trace gravel, small shell fragments, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL		25.2 88.0	S-20	SS	50/6"	>50	0.5 0.5	●					S-20@85ft %G- %S- %F-85.7
90		88.0 - 90.3 Hard, gray, (SC), moist, clayey, silty, fine to coarse sand, trace fine gravel, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	SC		22.9 90.3	S-21	SS	50/3"	>50	0.3 0.3						>>
		Borehole completed at 90.3 ft.  Backfilled with 3/8-inch bentonite chips, surfaced with cold patch asphalt.														

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derick Patsey

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-009

SHEET 1 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 114th Ave NE - Dead End

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/20/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,409.3 E: 1,634,019.72

ELEVATION: 97.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS					
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40						
					DEPTH (Ft)						PL	MC	LL							
0	4.9-inch bit, Mud Rotary	0.0 - 0.5 Asphalt Pavement.	SM	[Cross-hatched pattern]	97.2															
		0.5 - 7.0 Compact, gray, (SM), damp, silty, fine to coarse SAND and fine to coarse GRAVEL, non-stratified, [FILL, Hf].																		
								S-1	SS	7-11-14	25	1.2 1.5								
5								S-2	SS	11-13-18	31	0.9 1.5								
		7.0 - 9.0 Very dense, gray, (SM), damp, silty, fine to coarse SAND, little fine to coarse gravel, non-stratified, slight socketing, [TILL, Qvt].	SM	[Soil profile symbols]	90.7 7.0															
							S-3	SS	32-50/4"	>50	0.5 0.8									
		9.0 - 14.0 Very dense, gray, (SM), damp, silty, fine to coarse SAND, little gravel, to fine to coarse SAND, little silt, trace gravel, non-stratified, sandy interbed in [TILL, Qvt].	SM	[Soil profile symbols]	88.7 9.0															
10							S-4	SS	26-45-50/3"	>50	0.9 1.3									
							S-5	SS	50/6"	>50	0.4 0.5									
		14.0 - 23.0 Very dense, gray, (SM), damp, silty, fine to coarse SAND, trace gravel, non-stratified, slight socketing, [TILL, Qvt].	SM	[Soil profile symbols]	83.7 14.0															
15							S-6	SS	50/5"	>50	0.4 0.4									
20																				

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: A. Dennison  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-009

SHEET 2 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 114th Ave NE - Dead End

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/20/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,409.3 E: 1,634,019.72

ELEVATION: 97.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
20	4.9-inch bit, Mud Rotary	14.0 - 23.0 Very dense, gray, (SM), damp, silty, fine to coarse SAND, trace gravel, non-stratified, slight socketing, [TILL, Qvt].	SM	[Graphic Log]	74.7	S-7	SS	50/3"	>50	0.3 0.3					>>	
		23.0 - 27.0 Very dense, gray, (SM), damp, silty, fine to coarse SAND, trace gravel, non-stratified, [TILL, Qvt].			23.0											
25				SM			S-8	SS	50/3"	>50	0.3 0.3					>>
			27.0 - 33.0 Very dense, gray, (SM), damp, fine to coarse SAND, some silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SM	[Graphic Log]	70.7										
						27.0										
30							S-9	SS	21-50/5.5"	>50	0.9 0.9	●				>>
															S-9@30ft %G-0.0 %S-85.5 %F-14.5	
35		33.0 - 35.7 Stiff to very stiff, gray, (CL-CH), damp to moist, low to high plasticity CLAY, trace decayed organics, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnf].	CL-CH	[Graphic Log]	64.7											
		Brown organic layer from 35.5 to 35.7 ft bgs.			33.0											
40		35.7 - 40.0 Very dense, gray, (SM), moist, silty, fine SAND, subtle layering, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnf].	SM	[Graphic Log]	62.0	S-10	SS	15-40-50/5"	>50	1.4 1.4					>>	
					35.7											Drill chatter from 37 to 40 ft bgs.
40		Log continued on next page			57.7											

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: A. Dennison  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-009

SHEET 3 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 114th Ave NE - Dead End

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/20/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,409.3 E: 1,634,019.72

ELEVATION: 97.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
40	4.9-inch bit, Mud Rotary	40.0 - 43.0 Hard, gray, (ML), damp to moist, SILT, trace sand, non-stratified, lenses of sand, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnl].	ML		40.0	S-11	SS	12-20-35	>50	1.5 1.5	>> ◆				
43.0 - 48.0 Hard, gray, (CH), moist, high plasticity CLAY, trace sand, homogeneous, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnl].		54.7 43.0			S-12						SS	6-16-16	32	1.5 1.5	● — ◆
48.0 - 53.0 Very dense, (ML/SM), damp to moist, fine sandy SILT to silty, fine SAND, trace gravel, fine sand partings in silt, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnl].		49.7 48.0	S-13	SS		11-22-34	>50	1.5 1.5	>> ◆						
53.0 - 58.0 Hard, gray, (CH), damp to moist, high plasticity CLAY, some fine sand, non-stratified, [PRE-VASHON LACUSTRINE DEPOSITS, Qpnl].		44.7 53.0			S-14				SS	21-50/6"	>50	1.0 1.0	>> ◆		
58.0 - 73.0 Hard, gray, (CH), moist, high plasticity CLAY, trace sand and gravel, fine sand partings, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].		39.7 58.0													
60		Log continued on next page													

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: A. Dennison  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-009

SHEET 4 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 114th Ave NE - Dead End

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/20/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,409.3 E: 1,634,019.72

ELEVATION: 97.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft		NOTES WATER LEVELS							
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20		30	40					
					DEPTH (Ft)						PL	MC		LL						
60	4.9-inch bit, Mud Rotary	58.0 - 73.0 Hard, gray, (CH), moist, high plasticity CLAY, trace sand and gravel, fine sand partings, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CH		24.7	S-15	SS	22-42-50/4"	>50	1.3 1.3	20	40	60	80	>>					
65					73.0						S-16	SS	8-15-17	32	1.5 1.5	20	40	60	80	>>
70					73.0						S-17	SS	8-17-22	39	1.5 1.5	20	40	60	80	>>
75					73.0						S-18	SS	16-50/6"	>50	1.0 1.0	20	40	60	80	>>
80		77.0 - 83.0 Hard, gray, (CH), moist, high plasticity CLAY, laminated, zones of slickensided fractures at 20° to 45° from horizontal. [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		20.7 77.0															

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: A. Dennison  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-009

SHEET 5 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 114th Ave NE - Dead End

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/20/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,409.3 E: 1,634,019.72

ELEVATION: 97.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						20	40	60		80	
80	4.9-inch bit, Mud Rotary	77.0 - 83.0 Hard, gray, (CH), moist, high plasticity CLAY, laminated, zones of slickensided fractures at 20° to 45° from horizontal. [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL		14.7 83.0	S-19	SS	20-50/5.5"	>50	0.9 0.9					>>	
85		83.0 - 88.0 Very dense, gray, (ML), SILT, moist, non-plastic, massive. [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML			S-20	SS	43-50/3"	>50	0.8 0.8						>>
90		88.0 - 100.0 Hard, gray, (CH), moist, high plasticity CLAY, moderately fissured, blocky texture, zones of slickensided fractures at 40° to 90° from horizontal. [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		9.7 88.0	S-21	SS	10-20-27	47	1.5 1.5						
95						S-22	SS	13-18-22	40	1.5 1.5						
100					-2.3											

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: A. Dennison  
 CHECKED: David P. Findley  
 DATE: 5/22/2014





# RECORD OF BOREHOLE E330-B-009

SHEET 6 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 114th Ave NE - Dead End

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/20/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,409.3 E: 1,634,019.72

ELEVATION: 97.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
100	4.9-inch bit, Mud Rotary	100.0 - 107.0 Hard, gray, (CL), moist, low plasticity CLAY, irregular layers of brown sandy silt at 80° from horizontal, slightly fissured and slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL		100.0	S-23	SS	16-39-36	>50	1.5 1.5					>>
					S-24	SS	26-50/5"	>50	0.9 0.9					>>	
105															
			107.0 - 110.0 Hard, gray, (CL), moist, low plasticity CLAY, scattered slickensided fractures at 10° from horizontal, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL		-9.3 107.0									
110			110.0 - 136.5 Hard, gray, (CH), moist, high plasticity CLAY, laminated, slightly fissured, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		-12.3 110.0	S-25	SS	14-17-19	36	1.5 1.5				◆
115							S-26	SS	11-13-17	30	1.5 1.5				◆
120		Log continued on next page													

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: A. Dennison  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-009

SHEET 7 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 114th Ave NE - Dead End

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/20/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,409.3 E: 1,634,019.72

ELEVATION: 97.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft		NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10 20 30 40 20 40 60 80		PL MC LL
120	4.9-inch bit, Mud Rotary	110.0 - 136.5 Hard, gray, (CH), moist, high plasticity CLAY, laminated, slightly fissured, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH			S-27	SS	16-18-20	38	1.5 1.5	◆		
125						Scattered slickensided fractures at 10° to 60° from horizontal.	S-28	SS	11-13-20	33	1.5 1.5	◆	
130							S-29	SS	9-15-15	30	1.5 1.5	◆	
135							S-30	SS	11-13-10	23	1.5 1.5	◆	-----
140							Borehole completed at 136.5 ft. Backfilled with 3/8-inch bentonite chips, surfaced with cold patch asphalt.		-38.8 136.5				

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Derek Patsey

LOGGED: A. Dennison  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-010

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,429.28 E: 1,634,424.02

ELEVATION: 91.85  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS				
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40			
0	4.9-inch bit, Mud Rotary	0.0 - 0.3 Asphalt Pavement.	CH	XXXX	91.6													
0.3 - 3.5					0.3	S-1	SS	22-10-10	20	0.8 1.5								
3.5 - 9.5			Dense, gray-brown, (GW-GM), wet, sandy GRAVEL, little silt, [RECESSIONAL OUTWASH, Qvro].	GW-GM	●●●	88.4												
					3.5	S-2	SS	4-38-32	>50	0.8 1.5								>> Gravelly drilling from 3.5 to 20 ft bgs.
					82.4	S-3	SS	10-21-18	39	0.2 1.5								
					9.5	S-4	SS	27-50/4"	>50	0.3 0.8								>>
9.5 - 19.0			Very dense, gray-green, (SM), wet, silty, fine to coarse SAND, trace to little gravel, [TILL, Qvt].	SM	○●○	82.4												
					9.5	S-5	SS	33-50/2"	>50	0.5 0.7								>> S-5@10ft %G-7.0 %S-65.9 %F-27.1
					72.9	S-6	SS	50/6"	>50	0.4 0.5								>>
					19.0	S-7	SS	50/5"	>50	0.3 0.4								>> S-7@15ft %G-2.5 %S-70.7 %F-26.8
19.0 - 22.0		Very dense, greenish gray, (SP), wet, fine to coarse SAND, trace silt, sandy interbed in [TILL, Qvt].	SP	○●○	72.9													
				19.0	S-8	SS	50/6"	>50	0.3 0.5								>>	
22.0 - 43.0		Very dense, greenish gray, (SM), wet, silty, fine to coarse SAND, little fine gravel, diamict structure, friable, [TILL, Qvt].	SM	○●○	69.9													
				22.0														
25		Log continued on next page																

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-010

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,429.28 E: 1,634,424.02

ELEVATION: 91.85  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	PENETRATION RESISTANCE BLOWS / ft				
											10	20	30	40	
25	4.9-inch bit, Mud Rotary	22.0 - 43.0 Very dense, greenish gray, (SM), wet, silty, fine to coarse SAND, little fine gravel, diamict structure, friable, [TILL, Qvt].	SM		48.9 43.0	S-9	SS	50/3"	>50	0.2 0.3					Gravelly drilling at 27 ft bgs.  S-10@30ft %G-12.2 %S-61.4 %F-26.4  Gravelly drilling at 33 ft bgs.  Gravelly drilling from 37 to 39 ft bgs.  Contact with clay at 43 ft bgs, inferred from drill action.
						S-10	SS	8-50/5"	>50	0.3 0.9					
						S-11	SS	50/3"	>50	0.1 0.3					
						S-12	SS	50/2"	>50	0.2 0.2					
						S-13	SS	8-17-19	36	1.5 1.5					
45		43.0 - 48.0 Hard, gray, (CH), moist, high plasticity CLAY, distorted bedding, joint at 45°, with parting of fine sand and 1/8 inch layer of fractured clay, joint at 75° with parting of fine sand, [PRE-VASHON LACUSTRINE DEPOSITS, Qpn].	CH		48.9 43.0										
50		48.0 - 63.0 Hard, gray, (CL), moist, low plasticity CLAY, scattered fine organics, pockets of fractured, slickensided clay, [PRE-VASHON LACUSTRINE DEPOSITS, Qpn].	CL		43.9 48.0										

ST LOG 11393533 ST PROJECT.GPJ 113.935333SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-010

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,429.28 E: 1,634,424.02  
 ELEVATION: 91.85  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40			
					DEPTH (Ft)						PL	MC	LL				
50	4.9-inch bit, Mud Rotary	48.0 - 63.0 Hard, gray, (CL), moist, low plasticity CLAY, scattered fine organics, pockets of fractured, slickensided clay. [PRE-VASHON LACUSTRINE DEPOSITS, Qpnl].	CL		28.9	S-14	SS	27-44-50/6"	>50	1.5 1.5					>>		
		Little fine sand.				S-15	SS	21-50/6"	>50	1.0 1.0	●					>>	
55							S-16	SS	50/2"	>50	0.1 0.2						>>
60																	>>
65		63.0 - 68.0 Hard, gray, (ML/MH), moist, low to high plasticity SILT, little clay, trace fine sand, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML /MH		23.9	S-17	SS	25-50/6"	>50	0.7 1.0					>>		
																>>	
70		68.0 - 73.0 Hard, gray, (CL), moist, low plasticity CLAY, trace fine sand, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL		18.9	S-18	SS	32-50/5"	>50	0.9 0.9	●				>>		
																>>	
75		73.0 - 78.0 Hard, gray, (CH), moist, silty CLAY, distorted bedding, joint at 70°, highly fractured and blocky, partings and 1-inch seam of silt, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		73.0										>>		
		Log continued on next page														>>	

ST LOG 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-010

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,429.28 E: 1,634,424.02  
 ELEVATION: 91.85  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
75	4.9-inch bit, Mud Rotary	73.0 - 78.0 Hard, gray, (CH), moist, silty CLAY, distorted bedding, joint at 70°, highly fractured and blocky, partings and 1-inch seam of silt, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		13.9 78.0	S-19	SS	12-33-50/6"	>50	1.5 1.5					>>	
		78.0 - 87.0 Hard, gray (CL), moist, CLAY, trace fine sand, [PRE-VASHON TILL, Qpgt].  Sandy, trace gravel, diamict structure, some fractured zones.	CL			S-20	SS	18-50/5"	>50	0.9 0.9						>>
80							S-21	SS	33-50/4"	>50	0.6 0.8					>>
85			87.0 - 93.0 Very dense, gray, (ML), moist, sandy SILT, trace fine gravel, diamict structure, some micaceous particles, [PRE-VASHON TILL, Qpgt].	ML		4.8 87.0										
							S-22	SS	50/4"	>50	0.3 0.3					>>
90		93.0 - 98.0 Very dense, gray, (SM), moist, silty, fine to coarse SAND, trace fine gravel, diamict structure, [PRE-VASHON TILL, Qpgt].	SM		-1.2 93.0											
						S-23	SS	50/4"	>50	0.3 0.3					>>	
95		98.0 - 120.3 Very dense, gray, (ML), moist, sandy SILT, trace fine gravel, [PRE-VASHON TILL, Qpgt].	ML		-6.2 98.0											

Log continued on next page

Driller's Note: Sand interbeds encountered from 87 to 90 ft bgs.

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-010

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/15/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,429.28 E: 1,634,424.02  
 ELEVATION: 91.85  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
100	4.9-inch bit, Mud Rotary	98.0 - 120.3 Very dense, gray, (ML), moist, sandy SILT, trace fine gravel, [PRE-VASHON TILL, Qpgt].	ML		-28.5	S-24	SS	50/3"	>50	0.3 0.3	●	●	●	●	>>
105		S-25			SS	50/3"	>50	0.1 0.3	>>	No recovery Sample S-25 at 105 ft bgs.					
110		Wet, trace fine to coarse sand.			S-26	SS	50/2"	>50	0.1 0.2	>>					
115		S-27			SS	50/2"	>50	0.0 0.2	>>	No recovery Sample S-27 at 115 ft bgs.					
120		Borehole completed at 120.3 ft. Backfilled with 3/8-inch bentonite chips, surfaced with cold patch asphalt.			-28.5 120.3	S-28	SS	100/4"	>50	0.2 0.3	>>				

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-011

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/11/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,442.97 E: 1,634,634.3

ELEVATION: 93.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
0	4.9-inch bit, Mud Rotary	0.0 - 0.1 Asphalt Pavement.	SP	[Graphic Log: Dotted pattern]	0.1	S-1	SS	15-28-50/4"	>50	0.8 1.4	[Penetration Resistance Scale: 20-80]	[Scale Markers: PL, MC, LL]	[Scale Values: 10, 20, 30, 40]	>>	
0.1 - 2.0 Very dense, brown and reddish brown, (SP), moist, gravelly, fine to coarse SAND, trace silt, [RECESSIONAL OUTWASH, Qvrv].		91.7			S-2										SS
2.0 - 8.0 Very dense, brown, (GP-GM), wet, fine to coarse GRAVEL and fine to coarse SAND, little to some silt, iron oxide staining, [RECESSIONAL OUTWASH, Qvrv].		2.0	S-3	SS		21-33-44	>50	0.7 1.5	>>						
8.0 - 14.0 Very dense, gray, (ML), wet, non-plastic SILT, some fine sand, slow dilatancy, [TILL, Qvt].		85.7			S-4					SS					21-50/6"
Slight greenish tint, fine sandy SILT, partings of fine to coarse sand.		8.0	S-5	SS		17-32-50/5"	>50	1.0 1.4	●						
14.0 - 17.5 Very dense, gray with faint greenish tint, (GM), wet, silty, sandy GRAVEL, [TILL, Qvt].		79.7			S-6					SS					19-50/4"
17.5 - 22.5 Very dense, greenish gray, (SM), wet, silty, gravelly SAND, diamict structure, [TILL, Qvt].	76.2	14.0	17.5												
Log continued on next page															

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014





# RECORD OF BOREHOLE E330-B-011

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/11/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,442.97 E: 1,634,634.3

ELEVATION: 93.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
20	4.9-inch bit, Mud Rotary	17.5 - 22.5 Very dense, greenish gray, (SM), wet, silty, gravelly SAND, diamict structure, [TILL, Qvt].	SM		71.2	S-7	SS	33-50/2"	>50	0.1 0.7					>>	
		22.5 - 40.0 Very dense, gray, (SM), moist, silty, gravelly fine to coarse SAND, diamict structure, friable, [TILL, Qvt].			22.5											
25				SM		S-8	SS	45-50/2"	>50	0.3 0.7	●					>>
30			SM		S-9	SS	50/4"	>50	0.2 0.3						>>	
35					S-10	SS	50/3"	>50	0.2 0.3						>>	
40		Log continued on next page			53.7											

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-011

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/11/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,442.97 E: 1,634,634.3

ELEVATION: 93.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
40	4.9-inch bit, Mud Rotary	40.0 - 42.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, fine organics, small pockets/partings of light gray clay or ash, [TILL, Qvt].	SM		40.0	S-11	SS	50/3"	>50	0.3 0.3					Smooth drilling at 42 ft bgs.     S-13@50ft %G- %S- %F-89.3
42.0 - 55.9 Hard, gray, (CH), moist, high plasticity CLAY, little sand, disturbed bedding, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].		51.7 42.0													
45			CH			S-12	SS	13-25-35	>50	1.5 1.5					
50		Disturbed bedding, fractures and slickensided joint at 40°				S-13	SS	13-24-33	>50	1.5 1.5					
55						S-14	SS	13-28-50/5"	>50	1.4 1.4					
60		55.9 - 83.0 Hard, gray, (ML), moist, non-plastic SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		37.8 55.9										

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-011

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/11/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,442.97 E: 1,634,634.3

ELEVATION: 93.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS					
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40				
					DEPTH (Ft)						PL	MC	LL						
60	4.9-inch bit, Mud Rotary	55.9 - 83.0 Hard, gray, (ML), moist, non-plastic SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML																
					S-15	SS	18-50/6"	>50	0.0 1.0										
65					S-16	SS	50/5"	>50	0.0 0.4									>>	No recovery Sample S-16 at 85 ft bgs.
70					S-17	SS	50/5"	>50	0.4 0.4									>>	S-17@70ft %G-0.0 %S-0.0 %F-100.0
75		S-18	SS	50/5"	>50	0.4 0.4									>>				
80		Log continued on next page																	

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-011

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 515 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/11/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,442.97 E: 1,634,634.3

ELEVATION: 93.68  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
80	4.9-inch bit, Mud Rotary	55.9 - 83.0 Hard, gray, (ML), moist, non-plastic SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		10.7 83.0	S-19	SS	50/5"	>50	0.4 0.4					>>	
		83.0 - 86.0 Hard, gray, (CH), moist, high plasticity CLAY, distorted bedding, blocky 45° joint with slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		7.7 86.0	S-20	SS	11-28-50/4"	>50	1.3 1.3						S-20@85ft %G- %S- %F-94.2
		86.0 - 90.3 Hard, gray, (ML), moist, SILT, trace clay, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		3.4 90.3	S-21	SS	50/4"	>50	0.3 0.3						>>
90		Borehole completed at 90.3 ft.  Backfilled with 3/8-inch bentonite chips, surfaced with cold patch asphalt.														

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-012

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 550 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/10/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,363.55 E: 1,634,866.06

ELEVATION: 96.62  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS				
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	PENETRATION RESISTANCE BLOWS / ft							
											PL	MC	LL					
0	4.9-inch bit, Mud Rotary	0.0 - 0.4 Asphalt Pavement.		XXXXXX	96.2													
0.4 - 0.9		1-inch fine gravel road bedding, Very dense, mottled gray and dark brown, (SM), moist, silty, fine to coarse SAND, [FILL, Hf].		XXXXXX	95.7													
0.9 - 11.5		Very dense, gray-brown, (SM), moist to wet, silty, gravelly, fine to coarse SAND, [TILL, Qvt].  Diamict structure, friable, piece of gravel embedded in tip of sample S-2 at 2.5 ft bgs.		XXXXXX	0.9	S-1	SS	18-41-36	>50	0.8 1.5						>>		
				XXXXXX		S-2	SS	21-50/4"	>50	0.6 0.8							S-2@2.5ft %G-20.8 %S-60.1 %F-19.1	
5				XXXXXX		S-3	SS	50/5"	>50	0.4 0.4							>>	
				XXXXXX		S-4	SS	50/4"	>50	0.3 0.3							>>	
10			Diamict Structure, half of sample S-5 at 10 ft bgs is friable.		XXXXXX		S-5	SS	50/4"	>50	0.3 0.3							S-5@10ft %G-16.2 %S-61.2 %F-22.6
				XXXXXX	85.1													
			11.5 - 17.5 Very dense, gray-brown, (SP-SM), wet, fine to coarse SAND, little silt, trace fine gravel, sandy interbed in [TILL, Qvt].		XXXXXX	11.5	S-6	SS	34-50/6"	>50	0.8 1.0						>>	
15				XXXXXX		S-7	SS	33-45-50/5"	>50	1.3 1.4								S-7@15ft %G-2.3 %S-88.2 %F-9.5
			XXXXXX	79.1														
		17.5 - 22.5 Very dense, gray with faint greenish tint, (SP-SM), wet, fine to coarse SAND, little silt, little fine gravel, diamict structure, friable, [TILL, Qvt].		XXXXXX	17.5												Gravelly drilling below 18 ft bgs.	
20		Log continued on next page		XXXXXX														

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-012

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 550 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/10/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,363.55 E: 1,634,866.06  
 ELEVATION: 96.62  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
20	4.9-inch bit, Mud Rotary	17.5 - 22.5 Very dense, gray with faint greenish tint, (SP-SM), wet, fine to coarse SAND, little silt, little fine gravel, diamict structure, friable, [TILL, Qvt].	SP-SM		74.1	S-8	SS	50/4"	>50	0.3 0.3					>>	
		22.5 - 32.5 Very dense, gray, (SM), wet, silty, fine to coarse SAND, little silt, little fine gravel, diamict structure, friable, [TILL, Qvt].			22.5											
25						S-9	SS	50/5"	>50	0.2 0.4					>>	
				SM												
30			Becomes gravelly by 30 ft bgs.				S-10	SS	50/4"	>50	0.2 0.3					>>
35		32.5 - 39.0 Very dense, gray, (SP-SM), wet, gravelly, fine to coarse SAND, little silt, diamict structure, friable, [TILL, Qvt].  Cobble encountered at 34 ft bgs.			64.1											
					32.5	S-11	SS	50/5"	>50	0.2 0.4					>>	
			SP-SM													
40		Log continued on next page	CH		57.6 39.0										Smoother drilling at 39 ft bgs.	

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-012

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 550 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/10/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,363.55 E: 1,634,866.06

ELEVATION: 96.62  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS				
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40					
					DEPTH (Ft)						PL	MC	LL						
40	4.9-inch bit, Mud Rotary	39.0 - 73.0 Hard, gray, (CH), moist, high plasticity CLAY, little to some sand, trace fine gravel, distorted bedding, slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH			S-12	SS	42-50/5"	>50	0.0 0.9					>>	No recovery. Sampler filled with slough.			
45					S-13	SS	22-25-38	>50	1.5 1.5									S-13@45ft %G- %S- %F-91.7	
50		Interbedded with lower plasticity SILT (ML), thin joints with diced fractures.				S-14	SS	22-50/6"	>50	1.0 1.0									>>
55		Highly fractured, slickensided, joints at 30° to 45°.				S-15	SS	19-50/6"	>50	0.9 1.0									>>
60		Log continued on next page																	

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-012

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 550 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/10/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,363.55 E: 1,634,866.06  
 ELEVATION: 96.62  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
60	4.9-inch bit, Mud Rotary	39.0 - 73.0 Hard, gray, (CH), moist, high plasticity CLAY, little to some sand, trace fine gravel, distorted bedding, slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].  3-inch silt seam in sample S-16 at 60 ft bgs.	CH		23.6	S-16	SS	30-47-38	>50	1.5 1.5					>>	
65		Slickensided, joint at 60°, silt parting at 75°.			S-17	SS	38-42-50/5"	>50	1.4 1.4	●	—	—			S-17@65ft %G- %S- %F-85.9	
70		Interbedded with lower plasticity SILT (ML), fine sand partings and micaceous particles.			S-18	SS	26-46-48	>50	1.5 1.5							>>
73.0		73.0 - 83.0 Hard, gray, (ML), moist, sandy SILT to SILT and SAND, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].														
75						S-19	SS	50/6"	>50	0.5 0.5					>>	
80																

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014





# RECORD OF BOREHOLE E330-B-012

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 550 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/10/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,363.55 E: 1,634,866.06  
 ELEVATION: 96.62  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						PL	MC	LL			
80	4.9-inch bit, Mud Rotary	73.0 - 83.0 Hard, gray, (ML), moist, sandy SILT to SILT and SAND, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		13.6	S-20	SS	44-50/4"	>50	0.8 0.8					>>	
85		83.0 - 90.9 Hard gray, (CH), moist, high plasticity CLAY, distorted bedding, fractured and slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		83.0	S-21	SS	25-50/6"	>50	1.0 1.0		●				S-21@85ft %G- %S- %F-94.1
90						5.7	S-22	SS	22-50/5"	>50	0.9 0.9					
		Borehole completed at 90.9 ft. Backfilled with 3/8-inch bentonite chips, surfaced with cold patch asphalt.			90.9											

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-013

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 555 116th AVE NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/6/2013  
 DRILL RIG: Diedrich D-120 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,450.45 E: 1,634,948.07

ELEVATION: 98.61  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	PENETRATION RESISTANCE BLOWS / ft						
											10	20	30		40		
0		0.0 - 0.7 Asphalt Pavement.		XXXXXX	97.9												
0.7 - 21.0	4.9-inch bit, Mud Rotary	Very dense, gray-brown, (SM), moist, silty, fine to coarse SAND, little to some gravel, diamict structure, friable, [TILL, Qvt].  Little gravel, 1-inch seam of fine SAND, little silt, in sample S-3 at 5 ft bgs.  Becomes gravelly.  Becomes wet, trace coarse sand.	SM		97.9												
					S-1	SS	26-50/6"	>50	0.8 / 1.0								
					S-2	SS	27-50/4"	>50	0.8 / 0.8								S-2@2.5ft %G-9.6 %S-64.4 %F-26.0
					S-3	SS	24-50/5"	>50	0.6 / 0.9								Gravelly drilling at 5 ft bgs.
					S-4	SS	6-50/3"	>50	0.1 / 0.8								Drill fluid circulation lost, drill fluid seen entering adjacent catch basin though highly permeable soil unit from 7 to 11 ft bgs.
					S-5	SS	10-50/6"	>50	0.8 / 1.0								S-5@10ft %G-19.2 %S-65.5 %F-15.3
					S-6	SS	50/5"	>50	0.1 / 0.4								
	S-7	SS	50/3"	>50	0.2 / 0.3												
20	4.25-inch inner diameter Hollow Stem Auger	Log continued on next page															

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Roddy Gilseth

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-013

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 555 116th AVE NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/6/2013  
 DRILL RIG: Diedrich D-120 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,450.45 E: 1,634,948.07  
 ELEVATION: 98.61  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10 20 30 40				
					DEPTH (Ft)										
20	4.25-inch inner diameter Hollow Stem Auger	0.7 - 21.0 Very dense, gray-brown, (SM), moist, silty, fine to coarse SAND, little to some gravel, diamict structure, friable, [TILL, Qvt].	SM		77.6 21.0	S-8	SS	50/6"	>50	0.3 0.5					>>  Easier drilling at 21 ft bgs.
		21.0 - 25.2 Very dense, gray, (SP), wet, fine to medium SAND, trace silt, sandy interbed in [TILL, Qvt].	SP		73.4 25.2	S-9	SS	19-50/5"	>50	0.3 1.0	●				>> S-9@25ft %G-27.9 %S-51.9 %F-20.2
25		25.2 - 32.5 Very dense, gray, (SM), moist to wet, silty, gravelly, fine to coarse SAND, diamict structure, friable, [TILL, Qvt].  1-inch seam of silty, fine to coarse sand.	SM		66.1 32.5	S-10	SS	50/4"	>50	0.3 0.3					>>
		32.5 - 35.2 Very dense, gray, (SP), wet, fine to coarse SAND, trace silt, sandy interbed in [TILL, Qvt].	SP		63.4 35.2	S-11	SS	29-50/4"	>50	0.6 0.8					>> Hole collapsing during re-drill from 35 to 45 ft bgs.
35			35.2 - 40.2 Hard, gray, (CL), moist, low plasticity CLAY, trace sand, trace fine gravel, highly disturbed, (observed bottom of sample S-11 at 35 ft and top of sample S-12 at 40 ft), [TILL (Disturbed), Qvt].	CL											
40		Log continued on next page													

ATD-02/06/2013

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Roddy Gilseth

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-013

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 555 116th AVE NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/6/2013  
 DRILL RIG: Diedrich D-120 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,450.45 E: 1,634,948.07

ELEVATION: 98.61  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						PL	MC	LL			
40	4.25-inch inner diameter Hollow Stem Auger	40.2 - 45.8 Very dense, gray, (SM), moist to wet, silty, gravelly, fine to coarse SAND, diamict structure, friable, [TILL, Qvt].	SM		58.4 40.2	S-12	SS	16-29-50/4"	>50	0.8 1.3	●					S-12@40ft %G-15.3 %S-26.5 %F-58.2
45		45.8 - 48.0 Very dense, gray, (ML), wet fine sandy SILT, moderate dilatancy, [TILL, Qvt].	ML		52.9 45.8	S-13	SS	9-15-38	>50	0.8 1.5					>>●	
50		48.0 - 58.0 Very dense, gray, (SM), moist, silty, fine to coarse SAND, little gravel, little clay, [TILL, Qvt].	SM		50.6 48.0	S-14	SS	15-50/1"	>50	0.3 0.6					>>●	
55		58.0 - 63.0 Very dense, gray, (ML), wet, fine sandy SILT, moderate dilatancy, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	ML		40.6 58.0	S-15	SS	50/2"	>50	0.0 0.2					>>●	

Log continued on next page

>>● Auger and Rod stuck in hole, hole abandoned at 55 ft bgs on 02/06/2013. Off set 5 ft and drill to 55 ft bgs, begin sampling on 02/07/2013. No recovery Sample S-15 at 55 ft bgs.

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Roddy Gilseth

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-013

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 555 116th AVE NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/6/2013  
 DRILL RIG: Diedrich D-120 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,450.45 E: 1,634,948.07  
 ELEVATION: 98.61  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
60	4.9-inch bit, Mud Rotary	58.0 - 63.0 Very dense, gray, (ML), wet, fine sandy SILT, moderate dilatancy, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	ML		35.6	S-16	SS	50/5"	>50	0.3 0.4					>>	
		63.0 - 83.0 Hard, gray, (CL), moist, silty, low plasticity CLAY, trace sand, trace fine gravel, highly fractured, slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	CL		63.0	S-17	SS	50/5"	>50	0.3 0.4						>>
65																
70	Trace fine sand locally, 2-inch seam of silt, 1/4-inch vertical band of highly fractured clay in sample S-18 at 70 ft bgs.						S-18	SS	31-50/6"	>50	1.0 1.0					
75		Partings of silt.				S-19	SS	22-37-50/5"	>50	1.4 1.4						>>
80		Log continued on next page														

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Roddy Gilseth

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-013

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 555 116th AVE NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/6/2013  
 DRILL RIG: Diedrich D-120 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,450.45 E: 1,634,948.07  
 ELEVATION: 98.61  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
80	4.9-inch bit, Mud Rotary	63.0 - 83.0 Hard, gray, (CL), moist, silty, low plasticity CLAY, trace sand, trace fine gravel, highly fractured, slickensided, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	CL		15.6	S-20	SS	22-50/6"	>50	0.5 1.0					>>
83.0 - 88.0 Very dense, gray, (ML), moist, SILT, slow dilatancy, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].		ML													
88.0 - 91.5 Hard, gray, (CL), moist, silty CLAY, 4-inch silt lens, distorted bedding some fracturing and slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].		CL		10.6											
91.5				7.1											
		Borehole completed at 91.5 ft. Backfilled with 3/8-inch bentonite chips, surfaced with concrete patch.													
95															
100															

ST LOG 11393533 ST PROJECT.GPJ 113.935333 SOUND TRANSIT GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Roddy Gilseth

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-014

SHEET 1 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/28/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,521.9 E: 1,635,087.77

ELEVATION: 110.72  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
0	4.9-inch bit, Mud Rotary	0.0 - 0.3 Asphalt Pavement.	SM	[Cross-hatched pattern]	0.3										
		0.3 - 4.8 Compact, Mottled gray-brown and orange, (SM), moist, silty, fine to coarse SAND, some fine gravel, scattered organics, [FILL, Hf].			S-1	SS	5-9-10	19	0.5 1.5						
			S-2	SS	4-5-6	11	0.5 1.5								
5		4.8 - 7.0 Loose, dark brown, (SM), moist, silty, fine to coarse SAND, some gravel, trace organics, [FILL, Hf].	SM	106.0 4.8	S-3	SS	2-3-2	5	1.5 1.5						S-3@5ft %G-24.8 %S-47.5 %F-27.7
		7.0 - 9.5 Firm, gray-green, (ML), moist, low plasticity SILT and SAND, trace organics, [FILL, HF].	ML	103.7 7.0	S-4	SS	2-2-6	8	0.3 1.5						S-4@7.5ft %G- %S- %F-53.4
10		9.5 - 12.0 Compact, gray, (SM), damp, silty, fine to coarse SAND, some fine gravel, scattered laminations, [FILL, Hf].	SM	101.2 9.5	S-5	SS	6-12-14	26	1.5 1.5						
		12.0 - 30.0 Very dense, gray to brown-gray, (SM), damp, fine to coarse SAND and SILT, little fine gravel, [TILL, Qvt].	SM	98.7 12.0	S-6	SS	50/6"	>50	0.3 0.5						>>
15					S-7	SS	15-50/1"	>50	0.3 0.6						>>
20					S-8	SS	50/5"	>50	0.3 0.4						S-8@20ft %G-7.6 %S-56.9 %F-35.5
					S-9	SS	50/4"	>50	0.4 4.0					>>	
30			80.7												

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-014

SHEET 2 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/28/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,521.9 E: 1,635,087.77

ELEVATION: 110.72  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20		30	40	
					DEPTH (Ft)						PL	MC		LL		
30	4.9-inch bit, Mud Rotary	30.0 - 33.0 Very dense, gray-brown, (ML), wet SILT, non-plastic, lens in [Till, Qvt].	ML	(Graphic Log Symbols)	30.0	S-10	SS	20-50/5"	>50	0.3 0.9					>>	
33.0 - 38.0 Very dense, gray, (SM), wet, fine to coarse SAND, some silt, crudely interbedded with sandy gravel, lens in [Till, Qvt].		SM	(Graphic Log Symbols)	77.7 33.0	S-11	SS	27-50/4"	>50	0.5 0.8	●					>>	S-11@35ft %G-0.5 %S-83.2 %F-16.3
38.0 - 43.0 Very dense, dark gray, (ML), wet, sandy SILT, scattered thin layers of clayey silt, lens in [Till, Qvt].		ML	(Graphic Log Symbols)	72.7 38.0	S-12	SS	28-50/3"	>50	0.8 0.8						>>	
43.0 - 59.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace to some fine gravel, lenses of clayey silt, [Till, Qvt].		SM	(Graphic Log Symbols)	67.7 43.0	S-13	SS	50/3"	>50	0.3 0.3						>>	Rough drilling from 46 to 59 ft bgs.
					S-14	SS	50/3"	>50	0.3 0.3	●					>>	S-14@50ft %G-1.1 %S-64.5 %F-34.4
				S-15	SS	50/3"	>50	0.3 0.3						>>		
59.0 - 51.7		SP-SM	(Graphic Log Symbols)	51.7 59.0										>>	Change in drill action at 59 ft bgs.	
60		Log continued on next page														

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.935333SOUND TRANSIT.GDT 6/23/14



# RECORD OF BOREHOLE E330-B-014

SHEET 3 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/28/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,521.9 E: 1,635,087.77

ELEVATION: 110.72  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
60	4.9-inch bit, Mud Rotary	59.0 - 63.0 Very dense, dark gray, (SP-SM), moist, fine SAND, little silt, thinly bedded with organic rich sandy silt, compressed peat horizon, [PRE-VASHON FLUVIAL DEPOSITS, Qpnl].	SP-SM		47.7 63.0	S-16	SS	35-50/5"	>50	0.9 0.9					>>
65		63.0 - 68.0 Hard, gray, (CL), damp, silty CLAY, trace sand, low plasticity, laminated at 10° from horizontal, scattered sand seams, scattered slickensided fractures, low plasticity, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		42.7 68.0	S-17	SS	32-33-32	>50	1.5 1.5					>>
70		68.0 - 83.0 Hard, gray, (CL), moist, low plasticity CLAY, trace sand, laminated at 90° from horizontal, fissured, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL			S-18	SS	10-19-25	44	1.5 1.5					◆
75						S-19	SS	16-26-33	>50	1.5 1.5					◆
80		Becomes wet at 80 ft bgs.				S-20	SS	14-20-22	42	1.5 1.5					◆
85		83.0 - 90.0 Hard, gray, (CL), moist, low plasticity, silty CLAY, homogeneous, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		27.7 83.0	S-21	SS	12-27-31	>50	1.5 1.5					>>
90		Log continued on next page			20.7										

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-014

SHEET 4 of 4

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/28/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,521.9 E: 1,635,087.77

ELEVATION: 110.72  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20		30	40
											PL	MC		LL	
90	4.9-inch bit, Mud Rotary	90.0 - 101.4 Hard, gray, (ML), moist, SILT, trace sand, low plasticity, laminated at 80° to 90° from horizontal, highly fissured with slickensided fractures, interbedded with clayey silt and sandy silt, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		90.0	S-22	SS	16-16-21	37	<u>1.5</u> 1.5			◆		
95					S-23	SS	16-32-34	>50	<u>1.5</u> 1.5	●		>> ◆	S-23@95ft %G- %S- %F-97.5		
100					S-24	SS	24-44-50/5"	>50	<u>0.7</u> 1.4			>> ◆	Sample S-24 at 100 ft bgs slightly disturbed by driving on rocks and pull back from drill.		
101.4					Borehole completed at 101.4 ft.  Backfilled with 3/8-inch bentonite chips, surfaced with cold patch asphalt.				9.3						

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 4 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-014B

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/29/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,538.59 E: 1,635,165.73

ELEVATION: 114.15  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS				
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40					
					DEPTH (Ft)						PL	MC	LL						
0	4.9-inch bit, Mud Rotary	0.0 - 0.3 Asphalt Pavement.	SM	[Cross-hatched pattern]	113.9														
0.3																			
		0.3 - 3.0 Compact, gray-brown to dark brown, (SM), moist, silty, fine to coarse SAND, trace fine gravel, trace organics, [FILL, Hf].																	
		3.0 - 6.0 Dense, greenish gray, (SM), moist, silty, fine to coarse SAND, some fine gravel, [FILL, Hf].	SM																
5		6.0 - 9.0 Very dense, gray-brown, (ML), damp, sandy SILT, non-plastic, little fine gravel, thinly bedded with silty sand, [TILL, Qvt].	ML																
10		9.0 - 22.5 Very dense, gray-brown, (SM), damp, fine to coarse SAND and SILT, trace to some fine gravel, [TILL, Qvt].	SM	[Soil profile pattern]	105.2														
15																			
20																			

Log continued on next page

S-2@2.5ft  
 %G-21.0  
 %S-55.5  
 %F-23.5

S-7@15ft  
 %G-2.7  
 %S-58.5  
 %F-38.8

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-014B

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/29/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,538.59 E: 1,635,165.73  
 ELEVATION: 114.15  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
20	4.9-inch bit, Mud Rotary	9.0 - 22.5 Very dense, gray-brown, (SM), damp, fine to coarse SAND and SILT, trace to some fine gravel, [TILL, Qvt].	SM	(Graphic Log Symbols)	91.7	S-8	SS	50/3"	>50	0.2 0.3					>>
		22.5													
25		22.5 - 27.5 Very dense, gray, (SP-SM), damp, fine to coarse SAND, little silt, trace gravel, [TILL, Qvt].	SP-SM	(Graphic Log Symbols)		S-9	SS	50/3"	>50	0.3 0.3					>>
		86.7													
30		27.5 - 39.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace to little fine gravel, lenses of fine to coarse sand, [TILL, Qvt].	SM	(Graphic Log Symbols)	86.7	S-10	SS	50/3"	>50	0.1 0.3	●				>>
	27.5														
35						S-11	SS	50/3"	>50	0.0 0.3				>>	
40		39.0 - 42.5 Very dense, gray, (SP), wet, fine to coarse SAND, some fine to coarse gravel, stratified, sand lens in [TILL, Qvt].	SP	(Graphic Log Symbols)	75.2										
	39.0														

>> S-10@30ft  
 %G-4.3  
 %S-64.2  
 %F-31.5  
 Rough drilling from 30 to 36 ft bgs.  
  
 >> No recovery Sample S-11 at 35 ft bgs, lithology inferred from drill action.  
  
 Driller's Note: sandy soil from 36 to 39 ft bgs based on drill action.

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-014B

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/29/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,538.59 E: 1,635,165.73  
 ELEVATION: 114.15  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
40	4.9-inch bit, Mud Rotary	39.0 - 42.5 Very dense, gray, (SP), wet, fine to coarse SAND, some fine to coarse gravel, stratified, sand lens in [TILL, Qvt].	SP		71.7 42.5	S-12	SS	50/4"	>50	0.3 0.3					>>	
45		42.5 - 52.5 Very dense, gray-brown, (SM), damp, silty, fine to coarse SAND, some fine to coarse gravel, [TILL, Qvt].	SM			S-13	SS	50/3"	>50	0.3 0.3					>>	
		Cobble encountered at 48 ft bgs.														
50								S-14	SS	50/1"	>50	0.1 0.1				
55		52.5 - 64.0 Very dense, gray-brown, (GP), wet, sandy, fine to coarse GRAVEL, [PRE-VASHON FLUVIAL DEPOSITS, Qpnt].	GP		61.7 52.5	S-15	SS	50/4"	>50	0.3 0.3					>>	
60	Log continued on next page															

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-014B

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/29/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,538.59 E: 1,635,165.73

ELEVATION: 114.15  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
60	4.9-inch bit, Mud Rotary	52.5 - 64.0 Very dense, gray-brown, (GP), wet, sandy, fine to coarse GRAVEL, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	GP		50.2	S-16	SS	50/4"	>50	0.0 0.3					>>	No recovery Sample S-16 at 60 ft bgs. lithology inferred from drill action and cuttings. Large gravels and cobbles observed in drill fluid from 60 to 64 ft bgs.
65		64.0 - 67.5 Very dense, gray, (ML), moist, SILT, little sand, non-plastic, non-dilatant, massive, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].			ML											>>
70		67.5 - 73.0 Hard, gray, (CL), silty CLAY, low plasticity, laminated with sandy silt and clayey silt at 45° from horizontal, scattered slickensided fractures, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL		46.7 67.5	S-18	SS	19-30-50/4"	>50	1.5 1.3					>>	
75		73.0 - 88.0 Very dense, gray, (ML), wet, non-plastic SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].			ML											
80		Log continued on next page														

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT GDT 6/23/14

# RECORD OF BOREHOLE E330-B-014B

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th St

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 3/29/2013  
 DRILL RIG: B-60 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,538.59 E: 1,635,165.73  
 ELEVATION: 114.15  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
80	4.9-inch bit, Mud Rotary	73.0 - 88.0 Very dense, gray, (ML), wet, non-plastic SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].  Slow dilatancy in Sample S-20.	ML				S-20	SS	50/6"	>50	0.4 0.5	●	●	●	●	S-20@80ft %G- %S- %F-97.4
85		Rapid dilatancy in Sample S-21.					S-21	SS	50/5"	>50	0.4 0.4	>>				
90		88.0 - 90.8 Hard, gray, (ML), moist, SILT, low plasticity, interbedded with sandy silt, fissured, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].					ML	26.2 88.0	S-22	SS	49-50/4"	>50	0.8 0.8	>>		
90.8	Borehole completed at 90.8 ft.  Backfilled with 3/8-inch bentonite chips, surfaced with cold patch asphalt.						23.4 90.8					>>				
95																
100																

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: John Bennet

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-015

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/11-12/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,594 E: 1,635,220

ELEVATION: 116  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10 20 30 40						
											PL      MC      LL 20      40      60      80						
0	4.9-inch Diameter Bit, Mud Rotary	0.0 - 0.2 Asphalt Pavement.	GM	[Graphic Log]	0.2												
		0.2 - 4.5 Very dense, gray-brown, (GM), moist, silty, fine to coarse GRAVEL and SAND, diamict structure, some iron oxide staining, [TILL, Qvt].															
						S-1	SS	11-31-49	>50	0.8 1.5						S-1@2.5ft %G-41.1 %S-32.3 %F-26.6	
5			4.5 - 9.5 Very dense, gray-brown, (SM), moist, gravelly, silty, fine to coarse SAND, diamict structure, [TILL, Qvt].	SM	[Graphic Log]	111.5 4.5											
								S-2	SS	22-50/3"	>50	0.6 0.8					
			Becomes friable.					S-3	SS	50/6"	>50	0.2 0.5					
10			9.5 - 12.0 Very dense, gray-brown, wet, gravelly, fine to coarse SAND, little silt, sand lens in [TILL, Qvt].	SP-SM	[Graphic Log]	106.5 9.5											
								S-4	SS	50/6"	>50	0.2 0.5					Gravelly drilling at 10 ft bgs.
			12.0 - 23.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, little gravel, diamict structure, friable, [TILL, Qvt].  Lithology inferred from blow count.	SM	[Graphic Log]	104.0 12.0											
								S-5	SS	50/3"	>50	0.0 0.3					No recovery Sample S-5 at 12.5 ft bgs.
								S-6	SS	120/5"	>50	0.3 0.4					
20			Log continued on next page														

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014





# RECORD OF BOREHOLE E330-B-015

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/11-12/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,594 E: 1,635,220

ELEVATION: 116  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
20	4.9-inch Diameter Bit, Mud Rotary	12.0 - 23.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, little gravel, diamict structure, friable, [TILL, Qvt].	SM		93.0	S-7	SS	50/5"	>50	0.0 0.4					>> No recovery Sample S-9 at 20 ft bgs.	
		23.0													Driller notes that the soil drills like sand at approximately 23 ft bgs.	
25		23.0 - 38.0 Very dense, gray-brown, (SP-SM/SM), wet, fine to coarse SAND, little silt, little gravel, to silty, fine to coarse SAND, little gravel, diamict structure, friable, [TILL, Qvt].	SP-SM /SM			S-8	SS	150/6"	>50	0.5 0.5	●					>> S-8@25ft %G-11.7 %S-63.7 %F-24.6
						S-9	SS	100/4"	>50	0.3 0.3					>> Gravelly drilling from 30 to 35 ft bgs.	
					S-10	SS	80/6"	>50	0.5 0.5					>>		
40		38.0 - 43.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, little gravel, diamict structure, friable, [TILL, Qvt].	SM		78.0 38.0											

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-015

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/11-12/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,594 E: 1,635,220

ELEVATION: 116  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
40	4.9-inch Diameter Bit, Mud Rotary	38.0 - 43.0 Very dense, gray, (SM), wet, silty, fine to coarse SAND, little gravel, diamict structure, friable, [TILL, Qvt].	SM		73.0	S-11	SS	55/6"	>50	0.5 0.5					>> ●  Driller notes harder drilling at 43 ft bgs.  >> ●  ● S-13@50ft %G-14.1 %S-75.8 %F-10.1  >> ●  Gravelly drilling at 54 ft bgs.  >> ●
		43.0 - 45.3 Very dense, gray, (SM), wet, silty, fine to coarse SAND, little gravel, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].			43.0										
45		45.3 - 48.0 Very dense, gray, (ML), wet, fine sandy SILT, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	ML		70.7	S-12	SS	100/6"	>50	0.5 0.5					
		48.0 - 53.0 Very dense, gray, (SP-SM), wet, fine to coarse SAND, some gravel, little silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].			45.3										
50		53.0 - 58.0 Very dense, gray with greenish tint, (SP), wet, fine to coarse SAND, trace silt, little gravel, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP-SM		68.0	S-13	SS	65/6"	>50	0.5 0.5	●				
		58.0 - 63.0 Very dense, gray with greenish tint, (ML), moist, fine sandy SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].			63.0										
55	63.0 - 63.0 Very dense, gray with greenish tint, (ML), moist, fine sandy SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	SP		53.0	S-14	SS	70/6"	>50	0.5 0.5						
60	58.0 - 63.0 Very dense, gray with greenish tint, (ML), moist, fine sandy SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		58.0											

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-015

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/11-12/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,594 E: 1,635,220

ELEVATION: 116  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft			NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						PL	MC	LL			
60	4.9-inch Diameter Bit, Mud Rotary	58.0 - 63.0 Very dense, gray with greenish tint, (ML), moist, fine sandy SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		53.0	S-15	SS	95/6"	>50	0.5 0.5					>>	
		63.0														
65		63.0 - 68.0 Hard, gray with faint greenish tint, (CL), moist, low plasticity CLAY, with faint interbeds of clayey silt, fracturing and small slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CL			S-16	SS	20-25-30	>50	1.5 1.5						>>
70		68.0 - 73.0 Hard, gray, (CH), moist, high plasticity CLAY, fine shell fragments, disturbed zones and small slickensides, thin interbeds of silt, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		48.0	S-17	SS	10-18-33	>50	1.5 1.5		-----				>>
		68.0														S-17@70ft %G- %S- %F-95.3
75		73.0 - 78.0 Hard, gray, (ML), moist, SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		43.0	S-18	SS	36-50/6"	>50	1.0 1.0					>>	
	73.0															
80		78.0 - 96.5 Hard, gray, (CH), moist, high plasticity CLAY, highly fractured and slickensided, joints ranging from 45° to 70° from horizontal, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH		38.0											
	78.0															

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-015

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/11-12/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,594 E: 1,635,220

ELEVATION: 116  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS						
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40							
					DEPTH (Ft)						PL	MC	LL								
80	4.9-inch Diameter Bit, Mud Rotary	78.0 - 96.5 Hard, gray, (CH), moist, high plasticity CLAY, highly fractured and slickensided, joints ranging from 45° to 70° from horizontal, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	CH														>>◆				
85		4-inch zone of silt at 85 ft bgs.						S-20	SS	15-28-27	>50	$\frac{1.5}{1.5}$								>>◆	
90		High angle jointing from 45° to 90° from horizontal.						S-21	SS	9-13-19	32	$\frac{1.5}{1.5}$		●	◆					S-21@90ft %G- %S- %F-98.8	
95		Some disturbed zones and small slickensides.				S-22	SS	14-21-34	>50	$\frac{1.5}{1.5}$								>>◆			
		Borehole completed at 96.5 ft. Backfilled with 3/8-inch bentonite chips.			19.5 96.5																

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-016

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA    DRILLING METHOD: Mud Rotary    DATUM: Sound Transit East Coordinate System    ELEVATION: 120  
 PROJECT NUMBER: 113-93533.0320    DRILLING DATE: 9/12-13/2013    COORDINATES: N: 555,602    E: 1,635,300    INCLINATION: -90  
 LOCATION: 600 116th Ave. NE    DRILL RIG: B-59 Mobile Drill Truck    WELL TAG#: BIJ760

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES						PENETRATION RESISTANCE BLOWS / ft		NOTES WATER LEVELS  WELL INSTALLATION					
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40				
0	4.9-inch Diameter Bit, Mud Rotary	0.0 - 0.2 Asphalt Pavement. 0.2 - 7.0 Very dense, gray-brown, (SM), moist, fine to coarse SAND and SILT, little gravel, diamict structure friable, [TILL, Qvt].	SM		0.2												Flush mount steel monument, cemented to 1 ft bgs.  2-inch diameter PVC riser from 0.3 to 55 ft bgs.  Backfilled with bentonite chips from 0.5 to 53 ft bgs. S-1@2.5ft %G-10.2 %S-59.0 %F-30.8 Gravelly drilling at 4.5 ft bgs.		
5							S-1	SS	15-25-28	>50	1.1 1.5								
							S-2	SS	50/6"	>50	0.3 0.5								
10		7.0 - 12.0 Very dense, gray, (SM), moist, silty, fine to coarse SAND, little gravel, diamict structure, friable, [TILL, Qvt].	SM		113.0 7.0														
							S-3	SS	75/6"	>50	0.5 0.5								
							S-4	SS	80/6"	>50	0.4 0.5								
15		12.0 - 18.0 Very dense, gray-brown, (SM), wet, fine to coarse SAND and GRAVEL, some silt, diamict structure, friable, [TILL, Qvt].	SM		108.0 12.0														
							S-5	SS	70/6"	>50	0.5 0.5								
							S-6	SS	65/6"	>50	0.5 0.5								
20		18.0 - 28.0 Very dense, gray, (SM), moist to wet, silty, fine to coarse SAND, predominately fine sand, little gravel, [TILL, Qvt].	SM		102.0 18.0														

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-016

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/12-13/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,602 E: 1,635,300

ELEVATION: 120  
 INCLINATION: -90  
 WELL TAG#: BIJ760

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
20	4.9-inch Diameter Bit, Mud Rotary	18.0 - 28.0 Very dense, gray, (SM), moist to wet, silty, fine to coarse SAND, predominately fine sand, little gravel, [TILL, Qvt].	SM		92.0	S-7	SS	35-50/3"	>50	0.7 0.8					>>
25					28.0	S-8	SS	100/4"	>50	0.3 0.3					>>
30					28.0	S-9	SS	100/5"	>50	0.4 0.4					>>
35		SP-SM	28.0 - 38.0 Very dense, gray, (SP-SM), moist, gravelly, fine to coarse SAND, little silt, diamict structure, friable, [TILL, Qvt].		92.0	S-10	SS	65/6"	>50	0.5 0.5					>>
40					38.0									>>	
40					38.0										>>
40			38.0 - 48.0 Very dense, gray with a hint of green, (SM), moist, gravelly, silty, fine to coarse SAND, diamict structure, friable, [TILL, Qvt].	SM											>>
40			Log continued on next page												>>

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-016

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/12-13/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,602 E: 1,635,300

ELEVATION: 120  
 INCLINATION: -90  
 WELL TAG#: BIJ760

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS WELL INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
40	4.9-inch Diameter Bit, Mud Rotary	38.0 - 48.0 Very dense, gray with a hint of green, (SM), moist, gravelly, silty, fine to coarse SAND, diamict structure, friable, [TILL, Qvt].	SM	(Graphic Log Symbols)	72.0	S-11	SS	70/6"	>50	0.5 0.5					>>
45						S-12	SS	50/3"	>50	0.0 0.3					>>
48.0 - 53.0		SP-SM	(Graphic Log Symbols)	48.0	S-13	SS	100/4"	>50	0.3 0.3					>>	
50					S-14	SS	100/6"	>50	0.4 0.5					>>	
53.0 - 58.0		SP-SM	(Graphic Log Symbols)	67.0											
55															
58.0 - 60.3	SW	(Graphic Log Symbols)	62.0												
60															

Log continued on next page

Gravelly drilling at 43.5 ft bgs.

No recovery Sample S-12 at 45 ft bgs.

Gravelly drilling at 45.5 bgs.

Backfilled with 10-20 filter sand from 53 to 67 ft bgs. Gravelly drilling from 53 to 55 ft bgs.

S-14@55ft  
 %G-24.4  
 %S-64.8  
 %F-10.8  
 2-inch diameter slotted PVC size #10 from 55 to 65 ft bgs.

ST LOG 11393533 ST PROJECT.GPJ 113.935333SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-016

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/12-13/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,602 E: 1,635,300

ELEVATION: 120  
 INCLINATION: -90  
 WELL TAG#: BIJ760

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
60	4.9-inch Diameter Bit, Mud Rotary	60.3 - 63.0 Very dense, gray, (ML), wet, sandy SILT, rapid dilatancy, brown discoloration possibly from organics, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SW	* * * * *	59.8 60.3	S-15	SS	62/6"	>50	0.5 0.5					>>	
			ML													
65		63.0 - 69.5 Very dense, gray-green, (SP), wet, fine to coarse SAND, trace silt, trace gravel, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].		. . . . .	57.0 63.0	S-16	SS	50/6"	>50	0.5 0.5						>>
			SP	. . . . .												
70		69.5 - 73.0 Hard, gray, (CH), moist, silty CLAY, disturbed appearance, small shell fragments, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].		/ / / / /	50.5 69.5	S-17	SS	11-21-34	>50	1.5 1.5						>>
			CH	/ / / / /												
75		73.0 - 83.0 Hard, gray with greenish tint, (ML), moist, SILT, trace clay locally and pieces of highly fractured and slickensided clay mixed in, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].			47.0 73.0	S-18	SS	20-50/6"	>50	1.0 1.0						S-18@75ft %G- %S- %F-99.5
			ML													
80		Log continued on next page														

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014





# RECORD OF BOREHOLE E330-B-016

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 600 116th Ave. NE

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 9/12-13/2013  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,602 E: 1,635,300

ELEVATION: 120  
 INCLINATION: -90  
 WELL TAG#: BIJ760

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						PL	MC	LL			
80	4.9-inch Diameter Bit, Mud Rotary	73.0 - 83.0 Hard, gray with greenish tint, (ML), moist, SILT, trace clay locally and pieces of highly fractured and slickensided clay mixed in, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		37.0 83.0	S-19	SS	28-50/6"	>50	0.5 0.5						
85		83.0 - 89.0 Hard, gray, (CH), moist, high plasticity CLAY, disturbed appearance, fine shell fragments, few high angle slickensided joints from 70° to 90° from horizontal, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	CH			S-20	SS	11-17-21	38	1.5 1.5						<p>Slough from 85 to 91 ft bgs.</p>
90		89.0 - 91.0 Very dense, gray, (ML), moist, sandy SILT, fine shell fragments, diamict structure, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		31.0 89.0	S-21	SS	25-50/6"	>50	1.0 1.0						
	Borehole completed at 91.0 ft.				29.0 91.0											

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-017

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/7-5/9  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,769.21 E: 1,635,451.4

ELEVATION: 129.64  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40
					DEPTH (Ft)						PL	MC	LL		
0	Air Knife Excavation	0.0 - 9.0 Air knife excavation, lithology not observed.												Soils from air knife excavation likely fill due to close proximity to known underground utilities.	
10		9.0 - 11.5 Very dense, gray, (SM), moist, gravelly, silty fine to coarse SAND, diamict structure, [TILL, Qvt].	SM	9.0	S-1	SS	50/5"	>50	0.3 0.4						Water encountered at 9 ft bgs during air knife excavation.
15	4.9-inch Diameter Bit, Mud Rotary	11.5 - 14.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace gravel, diamict structure, very friable, [TILL, Qvt].	SM	11.5	S-2	SS	50/6"	>50	0.5 0.5	●				S-2@12.5ft %G-1.5 %S-61.5 %F-37.0	
15		14.0 - 17.0 Very dense, gray, (SP), wet, fine to coarse SAND, trace silt, trace gravel, diamict structure, includes 2-inch seam of silty fine sand, [TILL, Qvt].	SP	14.0	S-3	SS	40-50/3"	>50	0.8 0.8					Gravelly drilling at 14 ft bgs.	
20		17.0 - 23.0 Very dense, gray, (ML), moist, sandy SILT, trace gravel, diamict structure, [TILL, Qvt].	ML	17.0											
		Log continued on next page													

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E330-B-017

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/7-5/9  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,769.21 E: 1,635,451.4

ELEVATION: 129.64  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	PENETRATION RESISTANCE BLOWS / ft						
											10	20	30	40			
20	4.9-inch Diameter Bit, Mud Rotary	17.0 - 23.0 Very dense, gray, (ML), moist, sandy SILT, trace gravel, diamict structure, [TILL, Qvt].	ML		106.6 23.0	S-4	SS	50/5"	>50	0.4 0.4	●	●	●	●	S-4@20ft %G-2.7 %S-33.7 %F-63.6		
25		23.0 - 33.0 Very dense, gray, (SP-SM), moist, fine to coarse SAND, little silt, trace gravel, diamict structure, friable, [TILL, Qvt].				SP-SM		S-5	SS	50/3"	>50	0.2 0.3	>>				
30		No recovery Sample S-6 at 30 ft bgs. lithology inferred from drill action.	SM		S-6			SS	50/4"	>50	0.0 0.3	>>					>>
35		33.0 - 51.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace fine gravel, diamict structure, [TILL, Qvt].			S-7			SS	50/3"	>50	0.3 0.3	>>					>>
40	Log continued on next page																

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-017

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/7-5/9  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,769.21 E: 1,635,451.4

ELEVATION: 129.64  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	PENETRATION RESISTANCE BLOWS / ft							
											10	20	30	40				
40	4.9-inch Diameter Bit, Mud Rotary	33.0 - 51.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace fine gravel, diamict structure, [TILL, Qvt].	SM		78.6 51.0	S-8	SS	50/4"	>50	0.3 0.3								
		Gravel content increasing.				S-9	SS	50/5"	>50	0.4 0.4								
		2-inch layer of (SP) gravelly, fine to coarse SAND, trace silt and organics at 50 ft bgs.				S-10	SS	50/5"	>50	0.4 0.4								
51.0 - 63.0		Very dense, greenish gray, (SM), moist, gravelly, silty, fine to coarse SAND, diamict structure, [TILL, Qvt].				SM		S-11	SS	50/4"	>50	0.3 0.3						
60	Log continued on next page																	

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-017

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/7-5/9  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,769.21 E: 1,635,451.4

ELEVATION: 129.64  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
60	4.9-inch Diameter Bit, Mud Rotary	51.0 - 63.0 Very dense, greenish gray, (SM), moist, gravelly, silty, fine to coarse SAND, diamict structure, [TILL, Qvt].  Gravel content decreasing, very friable.	SM	[Graphic Log: SM]	66.6	S-12	SS	50/4"	>50	0.3					>> Gravelly drilling from 60 to 65 ft bgs.
63.0															
65		63.0 - 68.0 Very dense, greenish gray, (GP), wet, sandy, GRAVEL, [ADVANCE OUTWASH, Qva].	GP	[Graphic Log: GP]	61.6	S-13	SS	50/3"	>50	0.3					>> Water inferred at 65 ft based on wet soil samples.
68.0															
70		68.0 - 73.0 Very dense, grayish green, (ML), wet, SILT and fine to coarse SAND, fine organics, and micaceous particles, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	ML	[Graphic Log: ML]	56.6	S-14	SS	28-50/6"	>50	1.0		●			>> S-14@70ft %G-0.0 %S-40.0 %F-60.0
73.0															
75	73.0 - 78.0 Very dense, gray, (SP/SM/ML), wet, fine to coarse SAND, interbedded with silty SAND and SILT, trace fine organics and micaceous particles, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP /SM /ML	[Graphic Log: SP/SM/ML]	51.6	S-15	SS	38-50/5"	>50	0.9					>>	
78.0															
80		78.0 - 83.0 Very dense, greenish gray, (SP-SM), wet, fine to coarse SAND, some gravel, little silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP-SM	[Graphic Log: SP-SM]											
		Log continued on next page													

ATD-05/08/2013  
Wet Soil

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-017

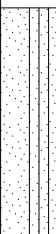

SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 5/7-5/9  
 DRILL RIG: B-59 Mobile Drill Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,769.21 E: 1,635,451.4

ELEVATION: 129.64  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (Ft)						PL	MC	LL		
80	4.9-inch Diameter Bit, Mud Rotary	78.0 - 83.0 Very dense, greenish gray, (SP-SM), wet, fine to coarse SAND, some gravel, little silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP-SM		46.6	S-16	SS	50/3"	>50	0.3 0.3					S-17@85ft %G- %S- %F-93.9
85		83.0 - 90.9 Hard, gray, (CL), moist, interbedded silty CLAY and SILT, thin lamination of fine sand, trace fine gravel and fine organics, clay is highly fractured with small slickensides, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].			CL		83.0	S-17	SS	28-50/4"	>50	0.8 0.8	●		
90		2-inch layer of silty clay, highly fractured with small slickensides.	S-18	SS			34-50/5"	>50	0.9 0.9						
90.9		Borehole completed at 90.9 ft. Backfilled with 3/8-inch bentonite chips, surfaced with Railroad Ballast.					38.7 90.9								

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Larry Inselman

LOGGED: Mike Wolczko  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-018

SHEET 1 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/27/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,911.65 E: 1,635,467.09

ELEVATION: 144.13  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES				PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS		
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30		40	
					DEPTH (Ft)						PL	MC	LL			
0	6.25-inch Diameter Bit, Mud Rotary	0.0 - 0.5 Loose, brown (GP-GM), moist, fine to coarse GRAVEL, some sand, little silt, [FILL, Hf].	GP-GM		143.6	S-1	SS	4-4-4	8	1.0 1.5	◆					No recovery in SPT sample S-2 at 2 ft bgs, oversized sampler driven after SS for sample recovery.  S-3@5ft %G-21.4 %S-54.1 %F-24.5
0.5		0.5 - 2.0 Loose, brown, (SM), moist, silty, fine to coarse SAND, trace fine gravel, [FILL, Hf].	SM		142.1											
2.0		2.0 - 4.5 Firm, mottled reddish yellow, brown and black, (ML), low plasticity SILT and SAND, some fine gravel, [FILL, Hf].	ML		139.6	S-2	SS	5-3-4	7	0.0 1.5	◆					
4.5		4.5 - 7.0 Compact, brown, (SM), moist to wet, silty, fine to coarse SAND, trace fine gravel, dark brown laminations in random orientations, [FILL, Hf].	SM		137.1	S-3	SS	5-6-10	16	0.0 1.5	◆	◆				
7.0		7.0 - 28.0 Very dense, light brownish gray, (SM), moist, fine to coarse SAND and SILT, trace to little fine gravel, [TILL, Qvt].				S-4	SS	42-50/4"	>50	0.8 0.8					>>	
10		Heterogeneous.				S-5	SS	50/6"	>50	0.5 0.5					>>	
15		Some fine to coarse gravel, non-stratified.	SM			S-6	SS	29-40-50/4"	>50	1.1 1.3	●				>>	
20	Little fine to coarse gravel.				S-7	SS	50/6"	>50	0.5 0.5					>>		
		Log continued on next page													S-6@12.5ft %G-12.8 %S-55.4 %F-31.8	

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-018

SHEET 2 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/27/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,911.65 E: 1,635,467.09

ELEVATION: 144.13  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40		
					DEPTH (Ft)						PL	MC	LL			
20	6.25-inch Diameter Bit, Mud Rotary	7.0 - 28.0 Very dense, light brownish gray, (SM), moist, fine to coarse SAND and SILT, trace to little fine gravel, [TILL, Qvt].  Increasing sand and gravel between 20 and 25 ft bgs.	SM		116.1	S-8	SS	50/5"	>50	0.5 0.5					>>	Distinct color change and increasing sand and gravel between 20 and 25 ft bgs.
25		116.1			S-9	SS	50/3"	>50	0.3 0.3						>>	
30		116.1			S-10	SS	50/3"	>50	0.5 0.5							
33.0		28.0 - 33.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, some fine to coarse gravel, heterogeneous, non-stratified, [TILL, Qvt].	SM		111.1	S-11	SS	50/2"	>50	0.4 0.4					>>	Gravelly drilling 33 to 35 ft bgs.
35	111.1															
40		33.0 - 43.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace fine gravel, heterogenous, nonstratified, [TILL, Qvt].			SM											
		Log continued on next page														

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 5/22/2014





# RECORD OF BOREHOLE E330-B-018

SHEET 3 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/27/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,911.65 E: 1,635,467.09

ELEVATION: 144.13  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10 20 30 40					
											PL MC LL					
40	6.25-inch Diameter Bit, Mud Rotary	33.0 - 43.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace fine gravel, heterogenous, nonstratified, [TILL, Qvt].	SM		101.1	S-12	SS	50/3"	>50	0.3 0.3	●				S-12@40ft %G-3.0 %S-52.0 %F-45.0	
		43.0 - 48.0 Very dense, gray, (SM), moist, silty, fine to coarse SAND, little fine to coarse gravel, heterogeneous, non-stratified, [TILL, Qvt].			43.0											
45			Little fine to coarse gravel.	SM			S-13	SS	100/4"	>50	0.3 0.3	●				
			48.0 - 58.0 Very dense, gray, (SM), moist, fine to coarse SAND and SILT, trace gravel, cobbles, [TILL, Qvt].	SM		96.1	S-14	SS	100/3"	>50	0.3 0.3	●				Intermittent drill chatter from 50 to 55 ft bgs, sample shoe plugged with cobble, Sample S-14 at 50 ft bgs.
50																
		Some fine to coarse gravel.						S-15	SS	100/4"	>50	0.2 0.3	●			
55																
		58.0 - 63.0 Very dense, gray, (GP-GM), wet, fine to coarse GRAVEL, some sand, little silt, cobbles, [ADVANCE OUTWASH, Qva].	GP-GM		86.1						●				Drilling in sand and gravel layers from 57.5 to 60 ft bgs based on drill action.	
60		Log continued on next page			58.0											

ST LOG 11393533 ST PROJECT.GPJ 113.935333SOUND TRANSIT.GDT 6/23/14

XREFD: 6826272013

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-018

SHEET 4 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/27/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,911.65 E: 1,635,467.09

ELEVATION: 144.13  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	PENETRATION RESISTANCE BLOWS / ft				
											10	20	30	40	
60	6.25-inch Diameter Bit, Mud Rotary	58.0 - 63.0 Very dense, gray, (GP-GM), wet, fine to coarse GRAVEL, some sand, little silt, cobbles, [ADVANCE OUTWASH, Qva].	GP-GM		81.1	S-16	SS	100/4"	>50	0.3					>> Gravelly drilling from 60 to 65 ft bgs. Wet soil encountered at 60 ft bgs.  >> S-17@65ft %G-37.1 %S-51.1 %F-11.8  Smoother drilling at 68 ft bgs, possibly sand layer between more gravelly layers.  >>  >>
		63.0													
65		63.0 - 68.0 Very dense, gray, (SP-SM), wet, fine to coarse SAND and GRAVEL, little silt, little cobbles, [ADVANCE OUTWASH, Qva].	SP-SM		76.1	S-17	SS	100/6"	>50	0.5	0.3	●			
		68.0													
70		68.0 - 78.0 Very dense, gray to dark gray, (SP-SM), wet, fine to coarse SAND, trace silt, layered with fine to coarse SAND, little silt, trace fine gravel, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP-SM		75	S-18	SS	65/6"	>50	0.5	0.5				
	76														
75		78.0 - 83.0 Very dense, dark gray, (SP-SM), wet, fine to coarse SAND, trace silt, layered with fine to medium SAND, little silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP-SM		78	S-19	SS	75/6"	>50	0.5	0.5				
	79														
80		80.0 - 83.0 Very dense, dark gray, (SP-SM), wet, fine to coarse SAND, trace silt, layered with fine to medium SAND, little silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP-SM		81										
	82														

Log continued on next page

ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT GDT 6/23/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



# RECORD OF BOREHOLE E330-B-018

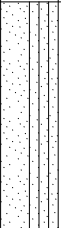
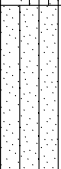
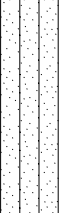
SHEET 5 of 5

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: BNSF S of NE 8th St.

DRILLING METHOD: Mud Rotary  
 DRILLING DATE: 2/27/2013  
 DRILL RIG: BK-81 Truck

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 555,911.65 E: 1,635,467.09

ELEVATION: 144.13  
 INCLINATION: -90

DEPTH (Ft)	BORING METHOD	SOIL PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (Ft)	NUMBER	TYPE	BLOWS per 6 in <small>140 lb hammer 30 inch drop</small>	N	REC ATT	10	20	30	40		
80	6.25-inch Diameter Bit, Mud Rotary	78.0 - 83.0 Very dense, dark gray, (SP-SM), wet, fine to coarse SAND, trace silt, layered with fine to medium SAND, little silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SP-SM		61.1	S-20	SS	72/6"	>50	0.4 0.5					>> 12-inches of slough in Sample S-20 at 80 ft bgs.  Hole caving between samples.  S-21@85ft %G-0.9 %S-82.0 %F-17.1	
		83.0 - 88.0 Very dense, gray, (SM), wet, fine to coarse SAND, some silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].			SM		83.0	S-21	SS	70/6"	>50	0.4 0.5				
85			88.0 - 90.5 Hard, gray grading to greenish gray, (ML), moist, low plasticity SILT, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	ML				56.1	S-22	SS	50/6"	>50	0.2 0.5			
90					88.0											
		Borehole completed at 90.5 ft. Backfilled with 3/8-inch bentonite chips, surfaced with Railroad Ballast.			53.6 90.5											

1 in to 3 ft  
 DRILLING CONTRACTOR: Holocene Drilling Inc.  
 DRILLER: Jerrod Thompson

LOGGED: Jeff Schwartz  
 CHECKED: David P. Findley  
 DATE: 5/22/2014



ST LOG 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 6/23/14

# RECORD OF BOREHOLE E335-AN-001

SHEET 1 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 9/30/2013-10/2/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,837 E: 1,633,073

ELEVATION: 150  
 INCLINATION: -50  
 WELL TAG # BIJ796

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										<div style="display: flex; justify-content: space-between; align-items: center;"> <span>PL</span> <span>MC</span> <span>LL</span> </div> <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 5px;"> <span>20</span> <span>40</span> <span>60</span> <span>80</span> </div>				
0	Air Knife Excavation	0.0 - 0.6 Asphalt Pavement.												12-inch diameter flush mount steel monument cemented in place to 1 ft along angle borehole.  Backfilled with bentonite chips from 0.5 to 24 ft along angle borehole.
		0.6 - 0.9 Crushed gravel.	GP		0.9									
		0.9 - 3.0 Compact, brown, (GP), fine to coarse GRAVEL, some sand, [FILL, Hf].	GP											
5	Sonic-6-inch Diameter Core/6-inch Diameter Casing	3.0 - 5.5 Very dense, gray-brown, moist, (SM), fine to coarse SAND, some silt, some gravel, [TILL, Qvt].	SM		3.0									
		5.5 - 18.0 Very dense, gray-brown, (SM), moist, silty, fine to medium SAND, some fine gravel, [TILL, Qvt].	SM		5.5	1	4.5 4.5							
10						2	8.0 8.0							
15														
20		18.0 - 30.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine gravel, [TILL, Qvt].	SM		18.0	3	7.0 7.0							

Log continued on next page

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 9/8/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-001

SHEET 2 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 9/30/2013-10/2/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,837 E: 1,633,073

ELEVATION: 150  
 INCLINATION: -50  
 WELL TAG # BJ796

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
20	Sonic-6-inch Diameter Core/6-inch Diameter Casing	18.0 - 30.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine gravel, [TILL, Qvt].	SM		30.0	3	7.0 7.0							
25		Scattered lenses of fine to medium sand.				4	5.0 5.0							
30		Massive structure.	GM		39.0	5	9.0 9.0							
35		30.0 - 39.0 Very dense, gray, (GM), moist, sandy, silty, fine to coarse, GRAVEL, faceted, subrounded, particles up to 3-inches in diameter, massive, [TILL, Qvt].			Friable from 37 to 39 ft along angle borehole.	6	1.0 1.0							
40		39.0 - 40.0 Very dense, gray, (GP-GM), moist, fine to coarse GRAVEL, some fine to coarse sand, little silt, [TILL, Qvt].	GP-GM											
		Log continued on next page												

Backfilled with bentonite/cement grout from 24 to 133 ft along angle borehole.

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 9/8/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-001

SHEET 3 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 9/30/2013-10/2/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,837 E: 1,633,073

ELEVATION: 150  
 INCLINATION: -50  
 WELL TAG # BJ796

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
40	Sonic-6-inch Diameter Core/6-inch Diameter Casing	40.0 - 46.8 Dense, gray, (SP-SM), moist to wet, silty, SAND, some faceted, subrounded gravel, disturbed, friable, appears dilated with pin size voids, [TILL, Qvt].	SP-SM		40.0	7	8.0 8.0							
45		46.8 - 48.0 Hard, gray, (MH), moist, plastic SILT, thinly laminated with sandy silt, slickensided fractures 40° to 50° from core axis, stringers and lenses of organic rich sandy silt, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	MH		46.8									
50		48.0 - 50.0 Very dense, gray, (SM), moist, silty, fine to coarse SAND, little fine to coarse, faceted, subrounded gravel, [TILL, Qvt].  Sub-vertical, polished shear surface at 49 ft along angle borehole.	SM		48.0	8	2.0 2.0							
55		50.0 - 55.0 Very dense, gray-brown, (SP-SM), moist, gravelly, fine to medium SAND, little silt, [TILL, Qvt].  6-inch thick friable Till zone at 51 ft along angle borehole.	SP-SM		50.0									
55		Becomes wet. 55.0 - 59.0 Dense, brown, (SP-SM), moist, SAND, trace to little silt, scattered gravel, trace organics, trace iron oxide staining, [ADVANCE OUTWASH, Qva].	SP-SM		55.0	9	10.0 10.0							
60		59.0 - 63.5 Very dense, brown, (SM), moist, silty SAND, some gravel, [ADVANCE OUTWASH, Qva].  Log continued on next page	SM		59.0									

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 9/8/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-001

SHEET 4 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 9/30/2013-10/2/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,837 E: 1,633,073

ELEVATION: 150  
 INCLINATION: -50  
 WELL TAG # BJJ796

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
60	Sonic-6-inch Diameter Core/6-inch Diameter Casing	59.0 - 63.5 Very dense, brown, (SM), moist, silty SAND, some gravel, [ADVANCE OUTWASH, Qva].  Compact to dense at 61 ft along angle borehole.  Becomes gray.	SM											
65		63.5 - 67.5 Dense to very dense, gray, (SW), moist to wet, SAND, some faceted, subrounded gravel, trace silt, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SW		63.5	10	10.0 10.0							
		67.5 - 68.5 Compact, gray, (SM), moist to wet, clayey, silty SAND, some gravel, [PRE-VASHON FLUVIAL DEPOSITS, Qpnf].	SM		67.5									
70		68.5 - 71.0 Hard, gray, (CL/CH), moist, silty CLAY to CLAY, some sand, trace coarse gravel, disturbed texture, polished shear surfaces, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	CL/CH		68.5									
		71.0 - 73.0 Dense, gray, (ML), moist, clayey SILT, low plasticity, scattered slickensides, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	ML		71.0									
75		73.0 - 77.0 Hard, gray, (CL), moist, silty CLAY, some sand, trace coarse gravel, flakey texture, scattered slickensides and polished shear surfaces, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].  Fractures at 90° from core axis.	CL		73.0	11	10.0 10.0							
80		77.0 - 80.0 Hard, gray, (CH), moist, CLAY, high plasticity, irregular bedding, disturbed shearing slickensided fractures at 80° to 90° from core axis, lenses of sandy silt, sheared texture, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	CH		77.0									
		Log continued on next page												

Vibrating Wire Piezometer installed at 67 ft along angle borehole. SN:1302425

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 9/8/14

# RECORD OF BOREHOLE E335-AN-001

SHEET 5 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 9/30/2013-10/2/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,837 E: 1,633,073

ELEVATION: 150  
 INCLINATION: -50  
 WELL TAG # BIJ796

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
80	Sonic-6-inch Diameter Core/6-inch Diameter Casing	80.0 - 82.5 Hard, gray, (ML), moist, clayey SILT, low plasticity, thinly interbedded with sandy silt, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		80.0									
		Sandy silt seam from 81.5 to 82.5 ft along angle borehole.												
		60° and 80° fractures at 82.5 ft along angle borehole.												
85		82.5 - 92.5 Hard, gray, (ML), moist, SILT, polished shear surfaces, highly fractured from drill action, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML			12	10.0 10.0							
	Angular clasts of fine sand at 89.5 ft along angle borehole.													
90		Block texture, with rotated, sub-vertical fractures.												
95		92.5 - 98.0 Hard, gray, (CL), moist, silty CLAY, thin laminations of sandy silt, fractured, polished shear surfaces, slickensided, 0° to 30° from core axis, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	CL		92.5									
							13	10.0 10.0						
100		98.0 - 100.0 Very dense, grayish-brown, (ML), moist, non-plastic SILT, rapid dilatancy, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		98.0									
		Log continued on next page												

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 9/8/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014





# RECORD OF BOREHOLE E335-AN-001

SHEET 6 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 9/30/2013-10/2/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,837 E: 1,633,073

ELEVATION: 150  
 INCLINATION: -50  
 WELL TAG # BJJ796

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
100	Sonic-6-inch Diameter Core/6-inch Diameter Casing	100.0 - 101.6 Very dense, grayish-brown, (ML), moist, SILT with sand, rapid dilatancy, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		100.0									Vibrating Wire Piezometer installed at 100 ft along angle borehole. SN:1303403
101.6		101.6 - 133.0 Hard, gray, (ML/CL), moist, clayey SILT to silty CLAY, moderately fractured with angles 40° to 80° from core axis, occasional slickensided fractures, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].				14	10.0 10.0							
110		Blocky texture, slickensides at 20° to 60° from core axis.	ML/CL											
115		Mechanical partings, lenses of light brown silt.												
120		Friable from 113 to 116 ft along angle borehole.												
120		Log continued on next page												

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 9/8/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-001

SHEET 7 of 7

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 9/30/2013-10/2/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,837 E: 1,633,073

ELEVATION: 150  
 INCLINATION: -50  
 WELL TAG # BJ796

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
120	Sonic-6-inch Diameter Core/6-inch Diameter Casing	101.6 - 133.0 Hard, gray, (ML/CL), moist, clayey SILT to silty CLAY, moderately fractured with angles 40° to 80° from core axis, occasional slickensided fractures, disturbed [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML/CL	[Hatched pattern]		16	10.0 10.0							
125														
130														
133.0		Boring completed at 133.0 ft.			133.0								Hole overdrilled from 130 to 133 ft along angle borehole prior to VWP installation.	
135														
140														

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 9/8/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-002

SHEET 1 of 6

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/7/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,815.00 E: 1,633,076.00

ELEVATION: 149  
 INCLINATION: -60  
 WELL TAG # BIJ797

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft	NOTES WATER LEVELS  GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER			TYPE
0	Air Knife Excavation	0.0 - 8.0 Air knife Excavation								12-inch diameter flush mount steel monument cemented in place to 1 ft along angle borehole.  Backfilled with bentonite/cement grout from 24 to 133 ft along angle borehole.	
5		8.0 - 9.0 Compact, brown, (SM), moist, silty SAND, trace gravel, [FILL, Hf].	SM		8.0						
10		9.0 - 12.0 Loose, gray, (GP), GRAVEL, trace silt, drain rock, [FILL, Hf].	GP		9.0	1	$\frac{4.5}{4.5}$				
15	Sonic-6-inch Diameter Core/6-inch Diameter Casing	12.0 - 17.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine gravel, [TILL, Qvt].	SM		12.0	2	$\frac{5.0}{5.0}$				
20		Lenses of fine to medium sand, trace silt from 16.5 to 17 ft along angle 17.0 - 20.0 Very dense, gray-brown, (SM), moist, silty, fine to medium SAND and fine GRAVEL, friable, well developed sockets around gravel clasts, local iron oxide staining, [TILL, Qvt].	SM		17.0	3	$\frac{3.0}{3.0}$				

Log continued on next page

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-002

SHEET 2 of 6

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/7/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,815.00 E: 1,633,076.00

ELEVATION: 149  
 INCLINATION: -60  
 WELL TAG # BJJ797

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
20	Sonic-6-inch Diameter Core/6-inch Diameter Casing	17.0 - 22.0 Very dense, gray-brown, (SM), moist, silty, fine to medium SAND and fine GRAVEL, friable, well developed sockets around gravel clasts, local iron oxide staining, [TILL, Qvt].	SM											
		22.0 - 43.9 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine gravel, friable, [TILL, Qvt].			22.0	4	5.0 5.0							
25		Grades to sand, some gravel, little silt from 25 to 26 ft along angle borehole.  Some fine to coarse gravel, 2 to 3-inch diameter.												
		5	4.0 5.0											
30		Compact, moist to wet zone from 29 to 30 ft along angle borehole.	SM											
		6	5.0 5.0											
35		Scattered cobbles, 6-inch diameter.												
	7	5.0 5.0												
40		Log continued on next page												

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-002

SHEET 3 of 6

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/7/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,815.00 E: 1,633,076.00

ELEVATION: 149  
 INCLINATION: -60  
 WELL TAG # BJ797

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
40	Sonic-6-inch Diameter Core/6-inch Diameter Casing	22.0 - 43.9 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine gravel, friable, [TILL, Qvt].	SM			8	5.0 5.0							
45		43.9 - 45.0 Dense, gray, (SP-SM), moist to wet, fine to medium SAND, trace to little silt, interbedded with SILT, [PRE-VASHON LACUSTRINE DEPOSITS, Qpn].	SP-SM		43.9									
		45.0 - 46.2 Hard, gray, (ML), moist, clayey SILT to silty CLAY, laminated with blocky texture, angular clasts of Pre-Vashon Lacustrine deposits in sandy silt matrix, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML/CL		45.0									
		46.2 - 47.4 Hard, gray, (CL/CH), moist, silty CLAY to CLAY, laminated with silt, slickensided, angular clasts of Pre-Vashon Lacustrine deposits in sandy silt matrix, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg]. Wet seam from 45.9 to 46.2 ft along angle borehole.	CL/CH		46.2									
		47.4 - 48.5 Dense, gray, (SM), wet, silty, fine SAND, distorted bedding, rotated fragments of silty clay, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	SM		47.4	9	5.0 5.0							
		48.5 - 50.0 Hard, gray, (ML), moist, clayey SILT, low plasticity, laminated silt, sandy silt and lenses of fine to medium sand, slicked and polished sub-vertical surfaces, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		48.5									
		50.0 - 51.5 Very dense, gray, (SM), moist, silty, fine to medium SAND, little fine gravel, [TILL, Qvt?].	SM		50.0									
		51.5 - 53.2 Dense, gray, (SP/SP-SM), moist to wet, SAND, trace to little silt, trace gravel, diamict structure, [TILL, Qvt?].	SP/SP-SM		51.5									
		53.2 - 57.0 Very dense, gray, (SP-SM), moist, SAND, little silt, trace faceted, subrounded gravel, well developed sockets in matrix around gravel clasts, diamict structure, [TILL, Qvt?].	SP-SM		53.2									
55		57.0 - 57.5 Very dense, gray, (SM), silty, fine to medium SAND, some fine gravel, [TILL, Qvt?].	SM		57.0	10	10.0 10.0							
		57.5 - 60.0 Very dense, gray-brown, (SM), damp to moist, silty, fine to medium SAND, some fine to coarse gravel, iron oxide staining, rubbly texture, [ADVANCE OUTWASH, Qva].	SM		57.5									
60		Log continued on next page												

Vibrating wire piezometer installed at 47.4 ft along angle borehole. SN:1303404

Disturbed zone, chaotic stratigraphy from 43.9 to 57.5 ft along angle borehole

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-002

SHEET 4 of 6

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/7/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,815.00 E: 1,633,076.00

ELEVATION: 149  
 INCLINATION: -60  
 WELL TAG # BJ797

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL	MC	LL		
60	Sonic-6-inch Diameter Core/6-inch Diameter Casing	60.0 - 62.0 Dense, brown, (SP), moist to wet, SAND, trace silt. [ADVANCE OUTWASH, Qva].	SP		60.0									
		62.0 - 63.3 Very dense, gray-brown, (SM), moist to wet, silty, fine to medium SAND, micaceous particles, oxide staining along sub-vertical zones. [ADVANCE OUTWASH, Qva].	SM		62.0									
		63.3 - 65.0 Very dense, gray, (GP), wet, sandy GRAVEL, trace silt. [ADVANCE OUTWASH, Qva].	GP		63.3									
65		65.0 - 67.5 Dense, brown, (SP), moist to wet, fine to medium SAND, trace silt. [ADVANCE OUTWASH, Qva].  Little faceted, subrounded gravel, trace to little silt.	SP		65.0	11	$\frac{10.0}{10.0}$							
		67.5 - 74.7 Very dense, gray, (GP), moist, sandy, fine to coarse GRAVEL, trace clay, matrix supported. [TILL, Qvt?] or [Diamict, Qpgd?].	GP		67.5									
75		74.7 - 80.0 Hard, gray, (CL), silty CLAY, thinly bedded with silt and sandy silt, trace gravel, well developed sockets in matrix around gravel clasts, polished shear surfaces. [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].  Interbed of gravelly sand from 75.5 to 77.8 ft along angle borehole.	CL		74.7	12	$\frac{10.0}{10.0}$							
80		Log continued on next page												

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-002

SHEET 5 of 6

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/7/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,815.00 E: 1,633,076.00

ELEVATION: 149  
 INCLINATION: -60  
 WELL TAG # BJJ797

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft	NOTES WATER LEVELS  GRAPHIC
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER		
									20	
80	Sonic-6-inch Diameter Core/6-inch Diameter Casing	80.0 - 88.0 Hard, gray, (ML), moist, clayey SILT, low plasticity, scattered fine gravel, rubbly, blocky texture, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		80.0		13	8.0 8.0		Rubbly texture based on drill action at 80 along angle borehole.
85		Thinly laminated with silt and sandy silt, scattered slickensides.								
90		88.0 - 92.0 Hard, gray, (ML), moist to wet, sandy SILT, trace fine gravel, slow dilatancy, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		88.0					
95		92.0 - 100.0 Hard, gray, (ML), damp to moist, clayey SILT, scattered faint, distorted, sub-vertical laminations of sandy silt, trace fine gravel as dropstones, rubbly texture, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		92.0		14	12.0 12.0		
100		Log continued on next page								

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-002

SHEET 6 of 6

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/7/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,815.00 E: 1,633,076.00

ELEVATION: 149  
 INCLINATION: -60  
 WELL TAG # BJJ797

DISTANCE ALONG BOREHOLE (FT)	BORING METHOD	SOIL PROFILE					SAMPLES		PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS GRAPHIC	
		DESCRIPTION	USCS	GRAPHIC LOG	DISTANCE ALONG BOREHOLE (FT)	RUN	REC ATT	NUMBER	TYPE	20 40 60 80				
										PL      MC      LL 20    40    60    80				
100	Sonic-6-inch Diameter Core/6-inch Diameter Casing	100.0 - 110.0 Hard, gray, (CL), moist, silty CLAY, thinly laminated with clayey silt and sandy silt, moderately fissured with polished surfaces oriented sub-parallel to core axis and normal to core axis, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgj].	CL	[Hatched Pattern]	100.0									[Hatched Pattern]
105		Randomly oriented polished surfaces.		15	10.0 10.0									
110		Boring completed at 110.0 ft.			110.0									
115														
120														

INCLINED SONIC 11393533 ST PROJECT.GPJ 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014





# RECORD OF BOREHOLE E335-AN-003

SHEET 1 of 3

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/9/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,864 E: 1,633,075

ELEVATION: 150  
 INCLINATION: -90  
 WELL TAG # BIJ798

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						SAMPLES			PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS  WELL INSTALLATION
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	N-VALUE	10 20 30 40				
					DEPTH (Ft)						PL      MC      LL 20    40    60    80				
0	Air Knife Excavation	0.0 - 6.0 Air knife excavation to 6 ft bgs.		X	144.0										3-inch diameter PVC casing installed from 0.3 to 60 ft bgs for downhole shearwave test.  Backfilled with bentonite/cement grout from 1 to 60 ft bgs.
5		6.0 - 31.3 Very dense, gray-brown, (SM), moist, silty, fine to medium SAND, some fine gravel, [TILL, Qtz].  Becomes friable.		O	6.0	1									
10	Sonic-6-inch Diameter Core/6 to 8-inch Diameter Casing			O		2									
15			SM	O		3	0.5 0.5	S-1	SS	>50			>>		
20			O		4	0.8 0.3	S-2	SS	>50				>>		
25			O		5	0.5 0.5	S-3	SS	>50				>>		
25			O		6	0.8 0.8	S-4	SS	>50				>>		
25			O												

RECORD OF SONIC BOREHOLE WITH SPT 11393533 ST PROJECT GP.J 113.935333 SOUND TRANSIT. GDT 8/18/14

Log continued on next page

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-003

SHEET 2 of 3

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/9/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,864 E: 1,633,075

ELEVATION: 150  
 INCLINATION: -90  
 WELL TAG # BJ798

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						SAMPLES			PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	N-VALUE	10 20 30 40				
					DEPTH (Ft)						PL	MC	LL		
25	Sonic-6-inch Diameter Core/6 to 8-inch Diameter Casing	6.0 - 31.3 Very dense, gray-brown, (SM), moist, silty, fine to medium SAND, some fine gravel, [TILL, Qvt].	SM		118.7	7	0.2 0.3	S-5	SS	>50					WELL INSTALLATION
		2.5 2.5													
		0.5 0.5													
		Fine to coarse gravel.	SM		117.0	8	2.5 2.5	S-6	SS	>50					
		Dense to compact zone from 31 to 31.3.													
		31.3 - 33.0 Very dense, gray-brown, (SC), moist, clayey, fine to medium SAND, some gravel, friable, [TILL, Qvt].	SC		31.3	9	0.5 0.5	S-7	SS	>50					
		33.0 - 35.0 Very dense, gray, (SM), moist, silty, fine to medium SAND, some fine to coarse gravel, [TILL, Qvt].	SM		33.0										
		35.0 - 36.3 Very dense, moist, (SM), gravelly, silty, SAND, trace clay, diamict structure, [TILL, Qvt].	SM		115.0	11	0.1 0.1	S-9	SS	>50					
		36.3 - 39.3 Hard, gray, (ML), clayey SILT, low plasticity, thinly bedded, moderately fractured with blocky texture and distorted bedding, diamict structure, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg].	ML		113.7										
		Wet seam of sand, trace silt from 38.5 to 39.3 ft bgs.	SM		110.7	12	1.5 1.5 2.5 2.5	S-10	SS	>50					
		39.3 - 40.0 Dense, gray, (SM), moist, silty, fine to medium SAND, trace fine gravel, irregular lenses of fine to medium sand, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg] and Diamict.			110.0										
		40.0 - 45.0 Very dense/hard, gray, (ML/SM), moist to wet, interbeds of clayey SILT, and fine to medium SAND, trace to some silt and clayey silt thinly laminated with bedding at 20° from horizontal, trace subrounded gravel clasts, disturbed diamict shear and slickensided surfaces, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpg] and Diamict.	ML/SM		105.0	13	0.5 0.5	S-11	SS	>50					
		45.0 - 50.0 Very dense, gray, (SW), moist, fine to coarse SAND, fine to coarse gravel and cobbles, matrix supported, [ADVANCE OUTWASH, Qva].	SW												
50					100.0	15	5.0 5.0	S-13	SS	>50					Vibrating wire piezometer installed at 45 ft bgs. SN:1302426

RECORD OF SONIC BOREHOLE WITH SPT 11393533 ST PROJECT GP.J 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014



# RECORD OF BOREHOLE E335-AN-003

SHEET 3 of 3

PROJECT: Sound Transit East Link/WA  
 PROJECT NUMBER: 113-93533.0320  
 LOCATION: 110th and 4th Ave. NE

DRILLING METHOD: Sonic  
 DRILLING DATE: 10/9/2013  
 DRILL RIG: TSI 150CC

DATUM: Sound Transit East Coordinate System  
 COORDINATES: N: 554,864 E: 1,633,075

ELEVATION: 150  
 INCLINATION: -90  
 WELL TAG # BIJ798

DEPTH (Ft)	BORING METHOD	SOIL PROFILE						SAMPLES			PENETRATION RESISTANCE BLOWS / ft				NOTES WATER LEVELS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	RUN	REC ATT	NUMBER	TYPE	N-VALUE	10 20 30 40				
					DEPTH (Ft)										
50	Sonic-6-inch Diameter Core/6 to 8-inch Diameter Casing	50.0 - 55.0 Dense, brown, (SP-SM), moist, fine to medium SAND, trace to little silt, trace subrounded gravel, subtle stratified 1 to 2-inch layers of sub-horizontal, micaceous, silty sand, [PRE-VASHON FLUVIAL DEPOSITS, Qpnt].	SP-SM		50.0	16	10.0 10.0	S-14	SS	>50	>>				
55		55.0 - 56.0 Very dense, gray-brown, (ML/SM), damp, sandy SILT to silty SAND, [PRE-VASHON FLUVIAL DEPOSITS, Qpnt].	ML/SM		95.0 55.0										
		56.0 - 58.5 Very dense, (GP), damp, sandy, fine GRAVEL, trace clay, [ADVANCE OUTWASH, Qva].	GP		94.0 56.0										
		58.5 - 60.0 Hard, gray, (ML), moist, clayey SILT, low plasticity, thinly bedded, [PRE-VASHON GLACIOLACUSTRINE DEPOSITS, Qpgl].	ML		91.5 58.5										
60		Boring completed at 60.0 ft.			90.0 60.0										
65															
70															
75															

RECORD OF SONIC BOREHOLE WITH SPT 11393533 ST PROJECT GP.J 113.93533SOUND TRANSIT.GDT 8/18/14

1 in to 3 ft  
 DRILLING CONTRACTOR: Holt Services Inc.  
 DRILLER: Pete Rosenberg

LOGGED: Dave Yonemitsu  
 CHECKED: David P. Findley  
 DATE: 3/11/2014





PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-BTC-3p</b>	SHEET 1 OF 2
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link LOCATION : 110th Ave NE between NE 4th & NE 6th, Bellevue. (227173.2 N, 1304932.1 E, South State Plane)

ELEVATION : 161.4 feet (NAVD88) DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington

DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig

WATER LEVELS : High of 31.1' bgs (7/7/2010). See graph for additional details START : 6/19/2010 END : 6/20/2010 LOGGER : M. Bouchédid

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION  <b>SOIL NAME (USCS GROUP SYMBOL),</b> COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	RECOVERY (ft)					
					Surface is 10"-thick asphalt concrete.	Potholed top 9' to clear utilities.
5						
	10.0					Began drilling at 8:37am on 6/19/2010 with hollow-stem auger.
	11.5	1.5	SS-1	10-22-38 (60)	<b>SILTY SAND, SM</b> , brown, moist, very dense, fine to medium sand, nonplastic fines, fine to coarse subrounded gravel.	<b>See laboratory results for SS-1.</b>
15	15.0					
	16.5	0.7	SS-2	10-26-45 (71)	<b>SILTY SAND (SM)</b> , brown, moist, very dense, fine to coarse sand, predominantly fine to medium sand, estimated 30% nonplastic fines, estimated less than 10% fine to coarse subrounded gravel, 1" rounded gravel at bottom of sample.	
20	20.0					
	20.8	0.4	SS-3	20-50/3" (50/3")	<b>SILTY SAND, SM</b> , brown, moist, very dense, fine to medium sand, predominantly fine sand, nonplastic fines, fine subrounded gravel scattered throughout sample.	<b>See laboratory results for SS-3.</b>
25	25.0					
	25.5	0.3	SS-4	50/5.5" (50/5.5")	<b>SILTY SAND WITH GRAVEL (SM)</b> , brown, moist, very dense, fine to coarse sand, predominantly fine to medium sand, estimated 30% nonplastic fines, estimated 15-20% fine subrounded gravel.	Very chattery drilling at 22'. Driller notes hard drilling, probably large gravel.
30						Cuttings have higher moisture content.



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-BTC-3p</b>	SHEET 2 OF 2
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link                                      LOCATION : 110th Ave NE between NE 4th & NE 6th, Bellevue. (227173.2 N, 1304932.1 E, South State Plane)  
 ELEVATION : 161.4 feet (NAVD88)                                      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington  
 DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig

WATER LEVELS : High of 31.1' bgs (7/7/2010). See graph for additional details.                                      START : 6/19/2010                                      END : 6/20/2010                                      LOGGER : M. Bouché

DEPTH BELOW GROUND SURFACE (ft)		STANDARD PENETRATION TEST RESULTS		SOIL DESCRIPTION	COMMENTS	
INTERVAL (ft)		RECOVERY (ft)	#TYPE	6"-6"-6" (N)	SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
30.0	30.8	0.5	SS-5	42-50/3" (50/3")	<b>SILTY SAND WITH GRAVEL, SM</b> , brown with orange iron-oxide staining, moist, very dense, predominantly fine to medium sand, nonplastic fines, fine to coarse subrounded gravel.	See laboratory results for SS-5.
35.0	35.7	0.5	SS-6	45-50/2" (50/2")	<b>SILTY SAND WITH GRAVEL (SM)</b> , same as above.	Very chattery drilling at 37'.
40.0	40.5	0.3	SS-7	50/6" (50/6")	<b>WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM)</b> , brown and gray, dry, very dense, fine to coarse subrounded gravel, estimated 5-10% nonplastic fines, fine to coarse sand.	
45.0	45.3	0.2	SS-8	50/3" (50/3")	<b>WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM)</b> , similar to above, except moist.	Switched to mud rotary drilling after SS-8.
50.0		0.0	SS-9	50/0" (50/0")	<b>NO RECOVERY.</b>	Sampler bouncing on rock. Drilled to 55', very chattery drilling, grinding on cobble at 53'.  Hole caved in to 50' after pulling rods. Driller notes gravel is continually caving in. Hole abandoned at 55'.
55.0					Bottom of hole at 55.0 ft below ground surface.	<b>PIEZOMETER INSTALLATION LOG:</b> Ecology Tag: BBK 238. Well is 2-inch diameter schedule 40 PVC with 0.01" slotted screen installed from 30' to 40'.  0' to 2' - Flush concrete monument. 2' to 25' - 3/8" Bentonite chips. 25' to 41' - Colorado silica sand. 41' to 50' - 3/8" Bentonite chips. 50' to 55' - Collapsed native material.
60.0						



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-BTC-4p</b>	SHEET 1 OF 5
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Int. 110th Ave NE & NE 6th, Bellevue. (227372.0 N, 1304945.7 E, South State Plane)  
 ELEVATION : 166 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington  
 DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig  
 WATER LEVELS : High of 56.5' bgs (7/7/2010). See graph for additional data.      START : 6/21/2010      END : 6/23/2010      LOGGER : T. Valentine

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	RECOVERY (ft)	#TYPE			
				Surface is 12"-thick asphalt.	Potholed top 9' to clear utilities.
5					
10	10.0				Began drilling at 9:00am on 6/21/2010 with hollow-stem auger.
	11.0	0.8	SS-1	16-50/6" (50/6")	
				<b>SILTY SAND (SM)</b> , brown, moist, very dense, fine sand, estimated 25-35% nonplastic fines, estimated 10-15% fine to coarse subangular to subrounded gravel.	Very chattery drilling from 10' to 15'.
15	15.0				
	15.3	0.2	SS-2	50/3" (50/3")	
				<b>SILTY SAND (SM)</b> , similar to above, except dry, estimated 15-25% nonplastic fines.	
20	20.0				
	20.3	0.3	SS-3	50/3" (50/3")	
				<b>SILTY SAND, SM</b> , brown, moist, very dense, fine to medium sand, predominantly fine sand, nonplastic fines, fine subangular to subrounded gravel.	See laboratory results for SS-3.
25	25.0				
	25.4	0.4	SS-4	50/5" (50/5")	
				<b>SILTY SAND (SM)</b> , same as above.	
30					





<b>PROJECT NUMBER:</b> 393372.H3.03.04.04.01	<b>BORING NUMBER:</b> B-C-BTC-4p	SHEET 3 OF 5
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Int. 110th Ave NE & NE 6th, Bellevue. (227372.0 N, 1304945.7 E, South State Plane)

ELEVATION : 166 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington

DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig

WATER LEVELS : High of 56.5' bgs (7/7/2010). See graph for additional data. START : 6/21/2010      END : 6/23/2010      LOGGER : T. Valentine

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION  <b>SOIL NAME (USCS GROUP SYMBOL),</b> COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	RECOVERY (ft)	RECOVERY (ft)				
60.0 60.9	0.8		SS-11	35-50/5" (50/5")	<b>WELL GRADED SAND WITH SILT AND GRAVEL, SW-SM.</b> dark gray, wet, very dense, predominantly medium to coarse sand, nonplastic fines, fine to coarse angular to subrounded gravel.	<b>See laboratory results for SS-11.</b> Drilling stopped at 14:30pm on 6/21/2010. Drilling resumed at 7:30am on 6/22/2010.
65 65.0 66.0	1.2		SS-12	27-50/6" (50/6")	<b>SILTY SAND, SM,</b> dark gray, wet, very dense, fine sand, nonplastic fines, homogeneous appearance.	<b>See laboratory results for SS-12.</b>
70 70.0 70.8	1.0		SS-13	40-50/4" (50/4")	<b>SILTY SAND (SM),</b> similar to above, except fine sand with silt lens from 70.6' to 70.8'.	Driller notes gravels at 69'.
75 75.0 75.4	0.5		SS-14	50/5" (50/5")	<b>SILTY SAND (SM),</b> dark gray, wet, very dense, fine to medium sand, estimated 15-25% nonplastic fines.	
80 80.0 80.5	0.5		SS-15	50/6" (50/6")	<b>SANDY SILT, ML,</b> dark brownish-gray, wet, hard, nonplastic fines, fine sand.	<b>See laboratory results for SS-15.</b> Switched to mud rotary drilling after SS-15.
85 85.0 85.2	0.2		SS-16	50/2" (50/2")	<b>SILTY SAND (SM),</b> dark gray, wet, very dense, fine to medium sand, estimated 15-25% nonplastic fines.	
90						





PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-BTC-4p</b>	SHEET 4 OF 5
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link LOCATION : Int. 110th Ave NE & NE 6th, Bellevue. (227372.0 N, 1304945.7 E, South State Plane)

ELEVATION : 166 feet (NAVD88) DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington

DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig

WATER LEVELS : High of 56.5' bgs (7/7/2010). See graph for additional data. START : 6/21/2010 END : 6/23/2010 LOGGER : T. Valentine

DEPTH BELOW GROUND SURFACE (ft)		STANDARD PENETRATION TEST RESULTS		SOIL DESCRIPTION	COMMENTS
INTERVAL (ft)	RECOVERY (ft)	#TYPE	6"-6"-6" (N)	SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
95.0 95.3	0.2	SS-18	50/3" (50/3")	<b>SILT, ML</b> , gray, moist, hard, nonplastic to low plasticity, fine sand, homogeneous appearance.	See laboratory results for SS-18.  Driller notes gravel at 98' but soft drilling.
100.0 100.3	0.2	SS-19	50/3" (50/3")	<b>SILTY SAND WITH GRAVEL (SM)</b> , gray, moist, very dense, fine to coarse sand, predominantly fine to medium sand, estimated 15% nonplastic fines, estimated 25% fine subrounded gravel scattered throughout sample.	Driller notes silt at 101'.
105.0 106.3	1.5	SS-20	37-42-50/4" (92/10")	<b>LEAN CLAY, CL</b> , gray, moist, hard, plastic, fine sand, homogeneous appearance.	See laboratory results for SS-20.
110.0 110.4	0.4	SS-21	50/5" (50/5")	<b>LEAN CLAY (CL)</b> , similar to above, except dry to slightly moist, estimated less than 5% fine sand.	Driller notes sand at 117'.
115					
120					



<b>PROJECT NUMBER:</b> <b>393372.H3.03.04.04.01</b>	<b>BORING NUMBER:</b> <b>B-C-BTC-4p</b>
<b>SHEET 5 OF 5</b>	
<b>SOIL BORING LOG</b>	

PROJECT : Sound Transit East Link	LOCATION : Int. 110th Ave NE & NE 6th, Bellevue. (227372.0 N, 1304945.7 E, South State Plane)
ELEVATION : 166 feet (NAVD88)	DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington
DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig	
WATER LEVELS : High of 56.5' bgs (7/7/2010). See graph for additional data.	START : 6/21/2010      END : 6/23/2010      LOGGER : T. Valentine

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (ft)	#TYPE	STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
				6"-6"-6" (N)	SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
120.0	0.2		SS-22	50/3" (50/3")	<p><b>POORLY GRADED SAND WITH SILT (SP-SM).</b> gray, wet, very dense, fine to coarse sand, predominantly fine to medium sand, estimated 10% nonplastic fines.</p> <p>Bottom of hole at 120.3 ft below ground surface.</p>	<p>Drilling completed at 13:37pm on 6/22/2010. Continued with piezometer installation on 6/23/2010.</p> <p><b>PIEZOMETER INSTALLATION LOG:</b> <b>Ecology Tag: BBK 239.</b> Well is 2-inch diameter schedule 40 PVC with 0.01" slotted screen installed from 80' to 90'.</p> <p>0' to 2' - Flush concrete monument. 2' to 78' - Bentonite-cement grout. 78' to 92' - Colorado silica sand. 92' to 94' - 3/8" Bentonite chips. 94' to 120.3' - Bentonite-cement grout.</p>
125						
130						
135						
140						
145						
150						



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-ES-10p</b>	SHEET 1 OF 4
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Parcel NE of Bellevue City Hall, NE 6th St. (227399.5 N, 1305311.1 E, South State Plane)  
 ELEVATION : 137.4 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington  
 DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 85 truck-mounted rig  
 WATER LEVELS : High of 33.3' bgs (12/8/2010). See graph for additional data.      START : 8/13/2010      END : 8/16/2010      LOGGER : S. Brancheau

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS	
	RECOVERY (ft)	#TYPE				6"-6"-6" (N)
				Surface is topsoil with long grass and weeds.	Began drilling at 12:03pm on 8/13/2010 with hollow-stem auger.	
5	5.0					
	6.5	1.2	SS-1	<b>SILTY SAND (SM)</b> , bluish-gray from 5'-5.5', light gray with brown interbedding from 5.5'-6.3', dry to slightly moist, medium dense, fine to medium sand, predominantly fine sand, estimated 20-25% nonplastic fines, estimated 5% fine subangular to subrounded gravel.		
10	10.0					
	10.9	0.9	SS-2	<b>SILTY SAND, SM</b> , light brownish-gray, dry to slightly moist, very dense, predominantly fine sand, nonplastic fines, fin to coarse subangular to subrounded gravel.	See laboratory results for SS-2.	
15	15.0					
	15.5	0.4	SS-3	<b>SILTY SAND (SM)</b> , same as above.		
20	20.0				Driller notes coarse gravels at 18'. Slightly chattery drilling.	
	20.8	0.7	SS-4	<b>SILTY SAND WITH GRAVEL, SM</b> , dark brownish-gray, dry to moist, very dense, fine to coarse sand, nonplastic fines, fine angular to subrounded gravel, gravel lodged in split spoon shoe.	See laboratory results for SS-4.	
					Slightly chattery drilling from 20' to 25'.	
25	25.0					
	25.4	0.4	SS-5	<b>SILTY SAND WITH GRAVEL (SM)</b> , dark bluish-gray, moist to slightly wet, very dense, fine to coarse sand, predominantly fine to medium sand, estimated 30% nonplastic fines, estimated 30% fine to coarse subangular to subrounded gravel.	Very chattery drilling, coarse gravels at 25.5' Gravels up to 6" in diameter visible in cuttings.	
30						



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-ES-10p</b>	SHEET 2 OF 4
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Parcel NE of Bellevue City Hall, NE 6th St. (227399.5 N, 1305311.1 E, South State Plane)  
 ELEVATION : 137.4 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington  
 DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 85 truck-mounted rig  
 WATER LEVELS : High of 33.3' bgs (12/8/2010). See graph for additional data. START : 8/13/2010      END : 8/16/2010      LOGGER : S. Brancheau

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	RECOVERY (ft)	#TYPE			
30.0	0.2	SS-6	50/3" (50/3")	<b>SILTY SAND (SM)</b> , brownish-gray, dry to slightly moist, very dense, predominantly fine to medium sand, estimated 30% nonplastic fines, estimated 10% fine subangular gravel.	Very chattery drilling from 30' to 33'.
35.0	0.3	SS-7	50/6" (50/6")	<b>SILTY GRAVEL WITH SAND, GM</b> , dark gray, wet, very dense, fine to coarse angular to subrounded gravel, nonplastic fines, fine to coarse sand.	See laboratory results for SS-7.  Very chattery drilling from 35' to 40'. Driller notes that gravels are loose.
35.5					
40.0	1.5	SS-8	8-24-40 (64)	<b>40'-41' - A: SILT (ML)</b> , olive-gray to gray, moist, hard, nonplastic to low plasticity fines, trace fine sand. <b>41'-41.5' - B: POORLY GRADED SAND WITH SILT (SP-SM)</b> , dark gray, wet, very dense, fine to medium sand, estimated 10-15% nonplastic fines.	Drilling rate increases from 42.5' to 45'.
41.5					
45.0	0.9	SS-9	47-50/5" (50/5")	<b>SILT WITH SAND, ML</b> , dark gray, wet, hard, nonplastic fines, fine sand, trace medium sand at bottom of sample.	Driller notes 3" of heave before SS-9. See laboratory results for SS-9. 12" of sand heave on top of sample.
45.9					
50.0	1.4	SS-10	20-45-50/5" (95/11")	<b>SILT WITH SAND (ML)</b> , similar to above, 3" fine to medium sand at 50.5'.	9" of sand heave on top of sample. Drilling stopped at at 15:45pm on 8/13/2010  Resumed drilling 8:12am on 8/16/2010 with mud rotary.
51.4					
55.0	1.0	SS-11	30-50/6" (50/6")	<b>SANDY SILT, ML</b> , dark gray with 1/8" dark brown lenses from 55' to 55.2', wet, hard, nonplastic fines, fine sand.	See laboratory results for SS-11.
56.0					
60.0					



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-ES-10p</b>	SHEET 3 OF 4
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Parcel NE of Bellevue City Hall, NE 6th St. (227399.5 N, 1305311.1 E, South State Plane)  
 ELEVATION : 137.4 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington  
 DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 85 truck-mounted rig  
 WATER LEVELS : High of 33.3' bgs (12/8/2010). See graph for additional data. START : 8/13/2010      END : 8/16/2010      LOGGER : S. Brancheau

DEPTH BELOW GROUND SURFACE (ft)		STANDARD PENETRATION TEST RESULTS		SOIL DESCRIPTION	COMMENTS
INTERVAL (ft)	RECOVERY (ft)	#TYPE	6"-6"-6" (N)	SOIL NAME (USCS GROUP SYMBOL), COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
65.0	1.0	SS-13	33-50/6" (50/6")	<b>65'-65.5' - A: SILT WITH SAND (ML)</b> , same as above. <b>65.5'-66' - B: SILT (ML)</b> , dark olive-gray, moist to slightly wet, hard, nonplastic fines, estimated 10-15% fine sand.	
66.0					
70.0	0.0	SS-14	50/0" (50/0")	<b>NO RECOVERY.</b>	
75.0	0.6	SS-15	43-50/4" (50/4")	<b>SILTY SAND, SM</b> , dark gray, wet, very dense, predominantly fine sand, nonplastic fines, trace fine gravel.	<b>See laboratory results for SS-15.</b> 4" of sand and gravel slough on top of sample.
75.8					
80.0	0.3	SS-16	50/5" (50/5")	<b>SILTY SAND (SM)</b> , same as above.	4" of sand and gravel slough on top of sample.  Drilling rate slows significantly at 82', driller notes possibly grinding on boulder.
80.4					
85.0	0.4	SS-17	50/5" (50/5")	<b>SANDY SILT (ML)</b> , dark gray, dry to moist, hard, nonplastic fines, estimated 30-35% fine sand.	Sampler bounced final 20 blows with no advancement.
85.4					
90.0					



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-ES-10p</b>	SHEET 4 OF 4
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Parcel NE of Bellevue City Hall, NE 6th St. (227399.5 N, 1305311.1 E, South State Plane)  
 ELEVATION : 137.4 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington  
 DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 85 truck-mounted rig  
 WATER LEVELS : High of 33.3' bgs (12/8/2010). See graph for additional data.      START : 8/13/2010      END : 8/16/2010      LOGGER : S. Brancheau

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION  <b>SOIL NAME (USCS GROUP SYMBOL),</b> COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	RECOVERY (ft)					
90.0	0.3		SS-18	50/5" (50/5")	<b>SANDY SILT (ML)</b> , similar to above except estimated 40% fine to medium sand.	
95.0 95.3	0.2		SS-19	50/3" (50/3")	<b>SANDY SILT or SILT WITH SAND (ML)</b> , dark gray, dry to slightly moist, hard, nonplastic fines, estimated 25-35% fine sand, 1/4" fine to medium sand lens at 95.1'.	
100.0 100.3	0.0		SS-20	50/4" (50/4")	<b>NO RECOVERY.</b>  Bottom of hole at 100.3 ft below ground surface.	<b>PIEZOMETER INSTALLATION LOG:</b> <b>Ecology Tag: BBT 709.</b> Well is 1-inch schedule 40 PVC with bottom at 80' and 0.01" slotted screen installed from 30' to 40'.  0' to 1' - Flush concrete monument. 1' to 26' - 3/8" Bentonite chips. 26' to 41' - Colorado silica sand. 41' to 60' - 3/8" Bentonite chips. 60' to 100.3' - Portland cement-grout.  <b>VIBRATING WIRE PIEZOMETER INFORMATION:</b> Installed at 80' in Portland cement-grout mix.  <b>SN: 10-2938.</b>
105						
110						
115						
120						



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-ES-11p</b>	SHEET 1 OF 3
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link LOCATION : Windermere Building, 112th Ave NE & NE 6th St, Bellevue. (227492.8 N, 1305709.3 E, South State Plane)

ELEVATION : 113.6 feet (NAVD88) DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington

DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig

WATER LEVELS : High of 10.5' bgs (12/8/2010). See graph for additional data. START : 6/24/2010 END : 6/24/2010 LOGGER : S. Brancheau

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION  <b>SOIL NAME (USCS GROUP SYMBOL),</b> COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	RECOVERY (ft)					
5	5.0				Surface is 4"-thick asphalt.	Began drilling at 7:39am on 6/24/2010 with hollow-stem auger.
	6.5	1.0	SS-1	3-4-7 (11)	<b>SILTY SAND or CLAYEY SAND (SM/SC)</b> , bluish-gray with orange iron-oxide staining throughout sample, slightly moist to moist, medium dense, fine to medium sand, estimated 20-35% nonplastic to low plasticity fines.	
10	10.0					
	11.5	1.2	SS-2	16-30-34 (64)	<b>SILTY SAND, SM</b> , medium gray, moist, very dense, predominantly fine sand, nonplastic fines, fine subangular to subrounded gravel.	See laboratory results for SS-2.
15	15.0					
	15.4	0.4	SS-3	50/5" (50/5")	<b>SILTY SAND (SM)</b> , same as above, possibly less fines.	Very chattery drilling at 16'.
20	20.0					
	21.5	1.6	SS-4	37-37-50 (87)	<b>SILTY SAND, SM</b> , light to medium gray, moist to slightly wet, very dense, fine to medium sand, predominantly fine sand, nonplastic fines.	See laboratory results for SS-4.
25	25.0					
	26.5	1.8	SS-5	32-40-44 (84)	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , light to medium gray, wet, very dense, fine to medium sand, predominantly fine sand, estimated 10% nonplastic fines.	
30						Slight decrease in drill rate from 28' to 30'.



PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-ES-11p</b>	SHEET 2 OF 3
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Windermere Building, 112th Ave NE & NE 6th St, Bellevue. (227492.8 N, 1305709.3 E, South State Plane)

ELEVATION : 113.6 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington

DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig

WATER LEVELS : High of 10.5' bgs (12/8/2010). See graph for additional data.      START : 6/24/2010      END : 6/24/2010      LOGGER : S. Brancheau

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION  <b>SOIL NAME (USCS GROUP SYMBOL).</b> COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
	RECOVERY (ft)	RECOVERY (ft)				
30.0 31.3	2.0		SS-6	17-43-50/4" (93/10")	<b>POORLY GRADED SAND WITH SILT, SP-SM.</b> dark gray, wet, very dense, predominantly fine sand, nonplastic fines, 1/4" clay chunk at 30.5'.	<b>See laboratory results for SS-6.</b> Switched to mud rotary drilling after SS-6. Driller notes 8' of heave after SS-6.
35 35.0 36.5	1.5		SS-7	33-36-45 (81)		
40 40.0 41.5	1.5		SS-8	34-26-40 (66)	<b>SILT, ML.</b> 40'-40.5' is light gray and wet, 40.5'-41' is brown and dry to slightly moist, 41'-41.5' is olive gray and dry to slightly moist, hard, nonplastic fines, fine sand.	<b>See laboratory results for SS-8.</b>
45 45.0 46.5	1.5		SS-9	36-38-50/6" (88/12")	<b>SILTY SAND (SM),</b> olive-gray, wet, very dense, fine to medium sand, estimated 20-25% nonplastic fines. Top 1" is silt.	
50 50.0 50.3	0.0		SS-10	50/3" (50/3")	<b>NO RECOVERY.</b>	Chatterty and grindy drilling at 50'.
55 55.0 56.5	1.6		SS-11	50-34-42 (76)	<b>SANDY SILT (ML),</b> dark gray, dry to slightly moist, hard, nonplastic fines, estimated 35% fine sand, homogeneous appearance.	
60						





PROJECT NUMBER: <b>393372.H3.03.04.04.01</b>	BORING NUMBER: <b>B-C-ES-11p</b>	SHEET 3 OF 3
<b>SOIL BORING LOG</b>		

PROJECT : Sound Transit East Link      LOCATION : Windermere Building, 112th Ave NE & NE 6th St, Bellevue. (227492.8 N, 1305709.3 E, South State Plane)

ELEVATION : 113.6 feet (NAVD88)      DRILLING CONTRACTOR : Gregory Drilling, Inc., Redmond, Washington

DRILLING METHOD AND EQUIPMENT : Hollow stem auger/Mud rotary drilling, 140-lb auto hammer with 30" drop, CME 75 truck-mounted rig

WATER LEVELS : High of 10.5' bgs (12/8/2010). See graph for additional data.      START : 6/24/2010      END : 6/24/2010      LOGGER : S. Brancheau

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)		STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS	
	RECOVERY (ft)	#TYPE				6"-6"-6" (N)
60.0	1.6	SS-12	31-29-31 (60)	<b>SANDY SILT, ML</b> , similar to above except slightly moist, less fines and trace fine subrounded gravel.	See laboratory results for SS-12.	
61.5						
65	1.6	SS-13	29-17-30 (47)	<b>SANDY SILT (ML)</b> , same as above.		
65.0						
66.5						
70	1.5	SS-14	18-17-21 (38)	<b>70'-70.5' - A: SANDY SILT (ML)</b> , same as above. <b>70.5'-71.5' - B: FAT CLAY (CH)</b> , dark brown, moist, hard, plastic, trace fine sand, homogeneous appearance.		
70.0						
71.5						
75	1.5	SS-15	13-16-19 (35)	<b>FAT CLAY, CH</b> , same as above except 1/2" gravel piece at 75.5' and 1/8" sand lens at 76.2'.	See laboratory results for SS-15.	
75.0						
76.5						
80	1.0	SS-16	37-50/6" (50/6")	<b>SILT (ML)</b> , dark gray, dry to moist, hard, nonplastic to low plasticity fines, estimated 10% fine sand, trace fine subrounded gravel.  Bottom of hole at 81.0 ft below ground surface.	Drilling completed at 12:52pm on 6/24/2010.  <b>PIEZOMETER INSTALLATION LOG:</b> <b>Ecology Tag: BBK 240.</b> Well is 1-inch diameter schedule 40 PVC with 0.01" slotted screen installed from 40' to 50'.  0' to 1' - Flush concrete monument. 1' to 36' - 3/8" Bentonite chips. 36' to 50' - Colorado silica sand. 50' to 52' - 3/8" Bentonite chips. 52' to 81' - Bentonite-cement grout.	
80.0						
81.0						
85						
90						

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

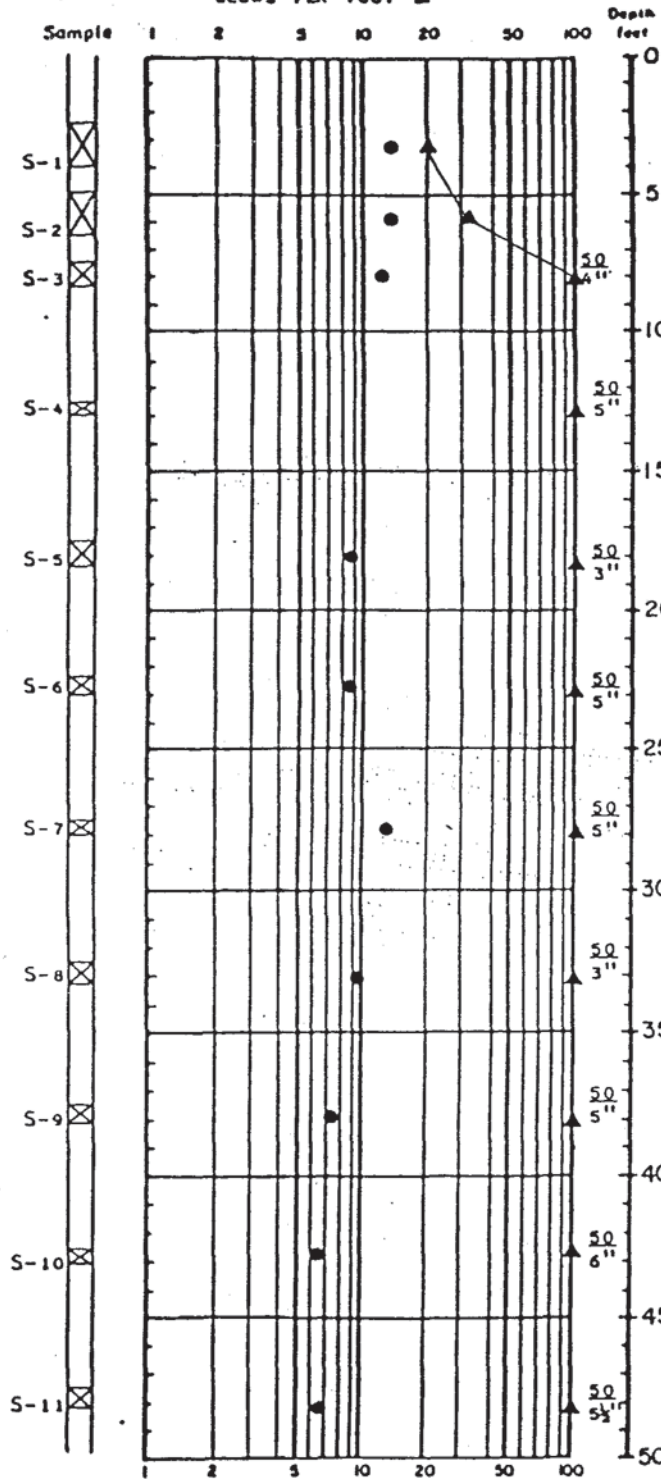
B-1 (494)

SOIL INTERPRETATION

15550 B-1

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

SOIL INTERPRETATION



GROUND SURFACE ELEVATION APPROXIMATELY 161 FEET.

ASPHALT PAVEMENT OVER TILL-LIKE FILL

MEDIUM DENSE, WET, GRAY AND BROWN, SILTY, SLIGHTLY GRAVELLY, FINE TO COARSE SAND. (MODERATELY WEATHERED TILL) **QUT**

**Sm-25**

VERY DENSE, WET, GRAY, SILTY, SLIGHTLY GRAVELLY, FINE TO COARSE SAND.

(GRADING TO UNWEATHERED TILL, SOME IRON STAINING)

VERY DENSE, MOIST TO WET, GRAY, SILTY, SLIGHTLY GRAVELLY, FINE TO MEDIUM SAND.

(INCREASING GRAVEL INFERRED FROM DRILLING ACTION)

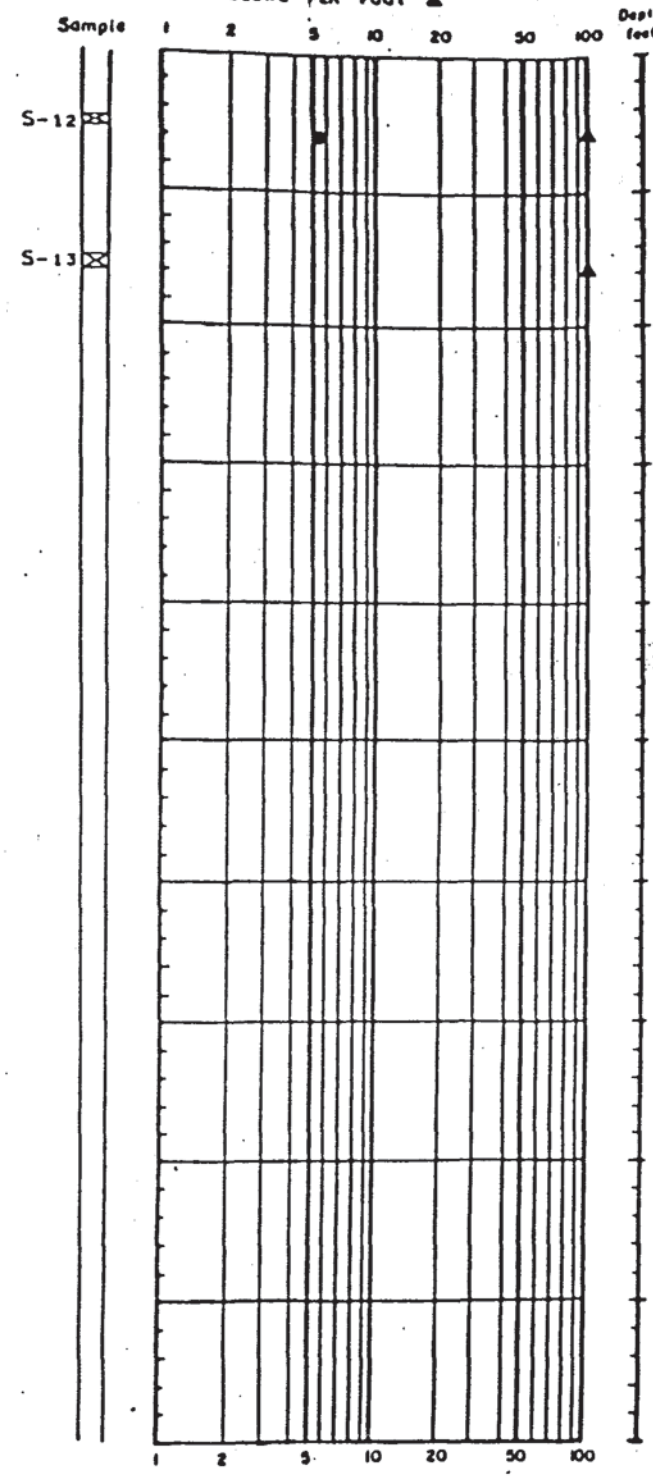
VERY DENSE, WET, GRAY, GRAVELLY, SLIGHTLY SILTY, FINE TO COARSE SAND, WITH ISOLATED SANDY LENS. **SW-Sm 10**

(DRILLING ACTION LESS GRAVELLY)

(DRILLING ACTION VERY GRAVELLY, PROBABLE COBBLES)

VERY DENSE, WET, GRAY, GRAVELLY, MEDIUM TO COARSE SAND WITH TRACES OF SILT. (OUTWASH MATERIAL). **SP-Sm 5 QUA**

WATER CONTENT PERCENT ●



**SP-Sm 5 QUA**

(DRILLING ACTION SMOOTHER-LESS GRAVELLY)

VERY DENSE, WET, GRAY, SLIGHTLY GRAVELLY, MEDIUM TO COARSE SAND WITH TRACE OF SILT.

BOTTOM OF BORING AT 57.9 FEET. COMPLETED 2/4/81.

WATER CONTENT PERCENT ●

LEGEND

- ☒ 2" O.D. Split Spoon Sample
- ☒ 3" O.D. Shelby Sample
- No Sample Recovery
- ATD At Time of Drilling
- Water Level
- Observation Well
- Liquid Limit
- Plastic Limit
- PP Pocket Penetrometer (tsf)
- tv Terrene (tsf)

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

LEGEND

- ☒ 2" O.D. Split Spoon Sample
- ☒ 3" O.D. Shelby Sample
- No Sample Recovery
- ATD At Time of Drilling
- Water Level
- Observation Well
- Liquid Limit
- Plastic Limit
- PP Pocket Penetrometer (tsf)
- tv Terrene (tsf)

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

**BORING LOG B-4**

497

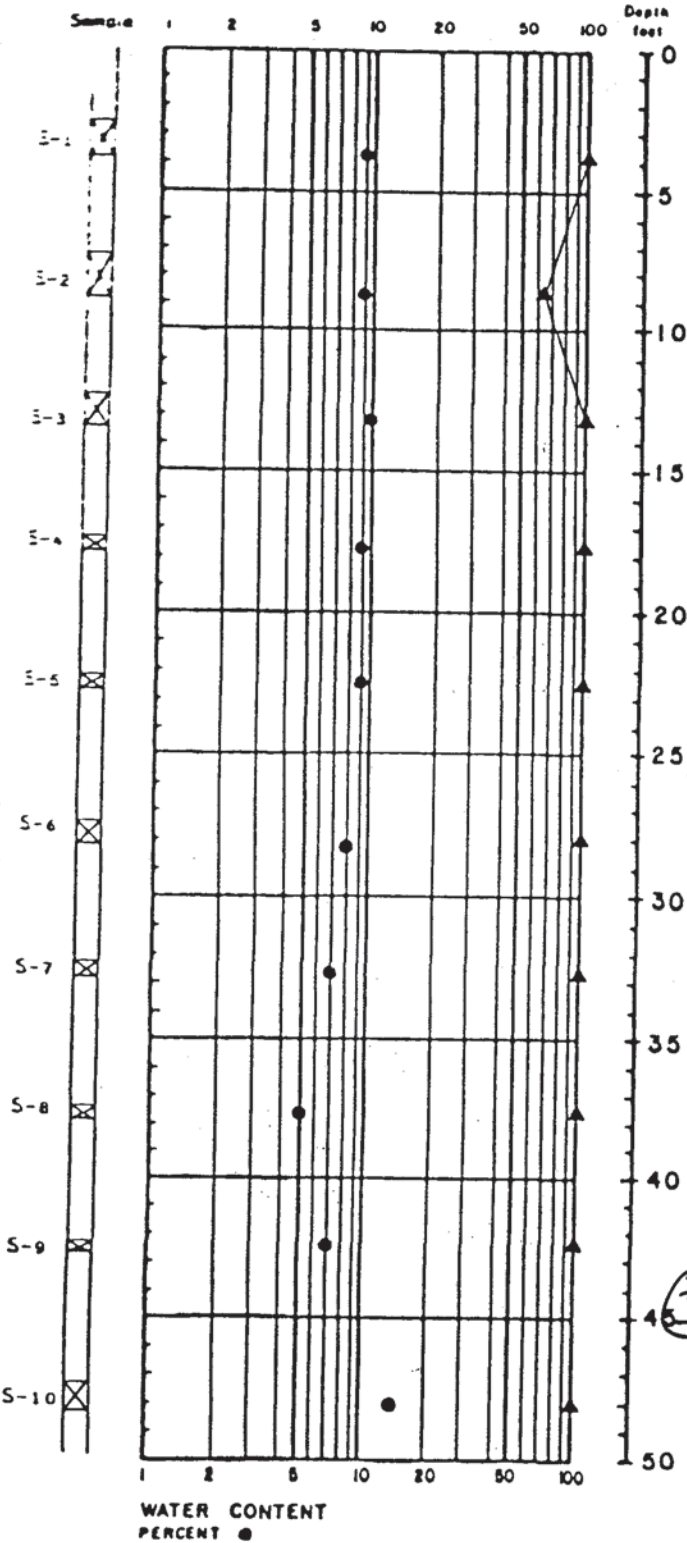
15550 B-4

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

**SOIL INTERPRETATION**

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

**SOIL INTERPRETATION**



GROUND SURFACE ELEVATION APPROXIMATELY 134 FEET.

0.5 ASPHALT PAVEMENT.  
VERY DENSE, DAMP, BROWN, SILTY, GRAVELLY, FINE SAND. (WEATHERED GLACIAL TILL).  
**Sm-25 QUT**

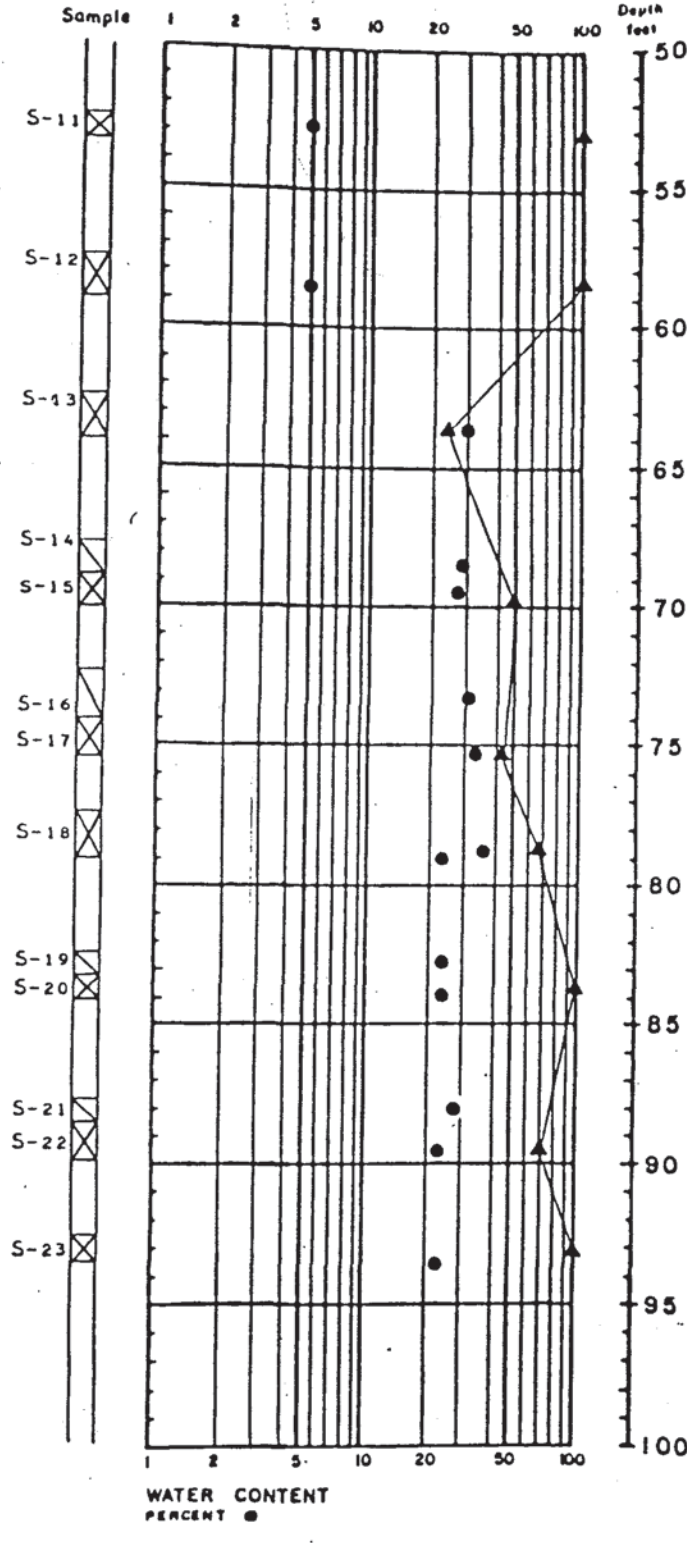
WET ZONE 8  
TILL BECOMES LESS WEATHERED WITH DEPTH. 9.5

1.5  
VERY DENSE, DAMP, BROWN TO GRAY, SILTY, GRAVELLY, FINE TO COARSE SAND. (GLACIAL TILL).  
↓

3.0 (COBBLES) OR ROCK INFERRED FROM DRILLING ACTION 3.0

3.5  
VERY DENSE, MOIST, GRAY AND BROWN, SLIGHTLY SILTY, SLIGHTLY SANDY, GRAVEL. (ADVANCE OUTWASH DEPOSIT).  
**GP-GM 10 QUA 34**

4.5  
VERY DENSE, MOIST, GRAY AND BROWN, SILTY, FINE SAND.  
**Sm-35**



51  
VERY DENSE, MOIST TO WET, BROWN, SLIGHTLY, SILTY, FINE GRAVELLY, FINE TO COARSE SAND. **QUA**

**SW-SM 6** ↓

60.5  
VERY STIFF TO HARD DAMP, GRAY, SILTY, CLAY.  
**CL-ML 95**

(PP ≥ 4.5 TSF) 68

(PP=4.3 TSF, 3.6 TSF) 73

THIN SANDY SILT PARTINGS OBSERVED IN SAMPLE. 75  
**CL-ML 90**

79  
HARD, DAMP, GRAY, SILT.  
**ML-95**

(PP ≥ 4.5 TSF) 82.5

(PP ≥ 4.5 TSF) 88

BOTTOM OF BORING 93.5 FEET. COMPLETED 5/15/81.

- LEGEND**
- ⊗ 2" O.D. Split Spoon Sample
  - ⊠ 3" O.D. Shelby Sample
  - No Sample Recovery
  - ▨ Bentonite Seal
  - ATOL Water Level (At Time of Drilling) Observation Well
  - Liquid Limit
  - Plastic Limit
  - PP Pocket Penetrometer (tsf)
  - tv Torvane (tsf)

- LEGEND**
- ⊗ 2" O.D. Split Spoon Sample
  - ⊠ 3" O.D. Shelby Sample
  - No Sample Recovery
  - ▨ Bentonite Seal
  - ATOL Water Level (At Time of Drilling) Observation Well
  - Liquid Limit
  - Plastic Limit
  - PP Pocket Penetrometer (tsf)
  - tv Torvane (tsf)

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

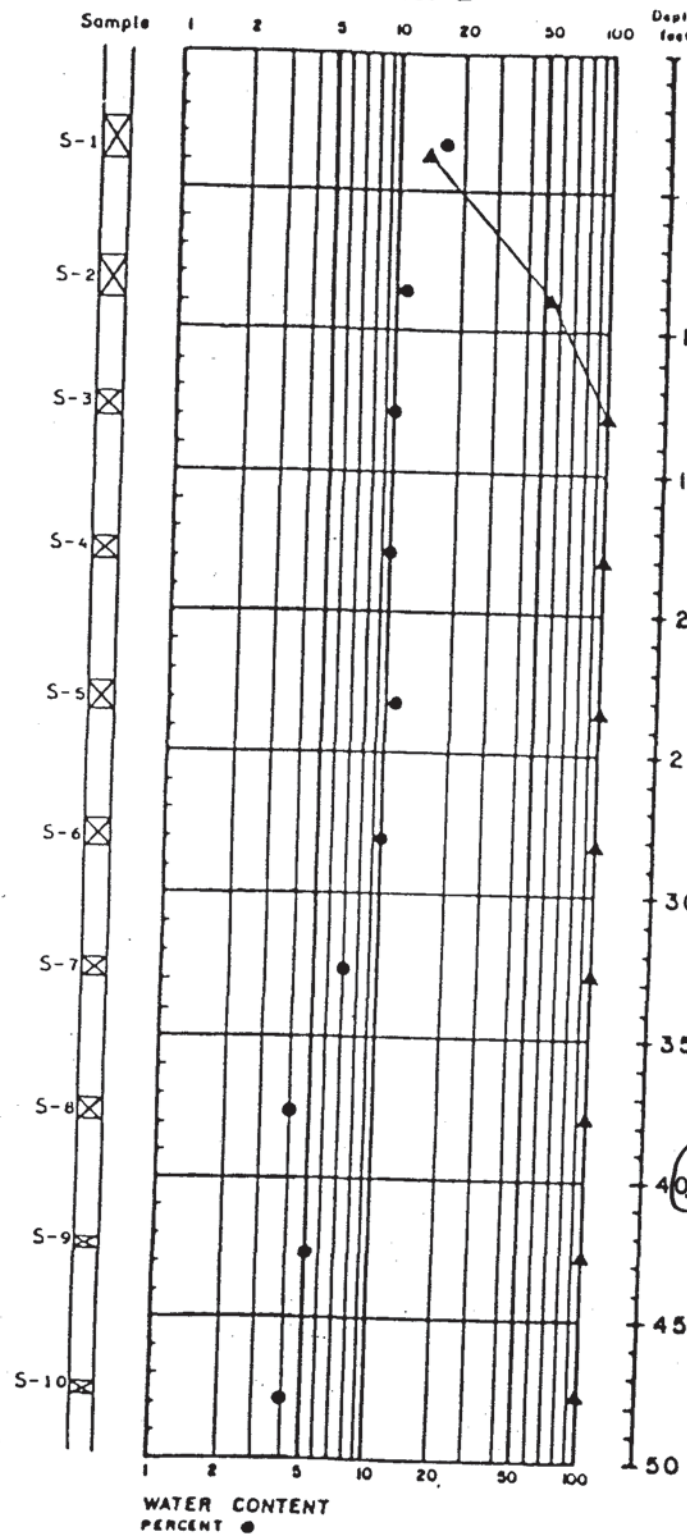
# BORING LOG B-5

498

15550 B-5

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

SOIL INTERPRETATION



GROUND SURFACE ELEVATION APPROXIMATELY 158 FEET.

0.5  
1.5  
ASPHALT PAVEMENT.  
MOIST, BROWN, SANDY, SILT. (FILL).  
STIFF, WET TO MOIST, BROWN TO GRAY, FINE SANDY, SILT. (WEATHERED GLACIAL TILL).

⑤

ML-80

SEEPAGE OBSERVED AT 7.5 FEET.

QJT<sup>6</sup>

VERY DENSE, DAMP, GRAYISH BROWN, GRAVELLY, SILTY, FINE TO COARSE SAND AND SANDY SILT. (GLACIAL TILL)

SM/ML-50



④

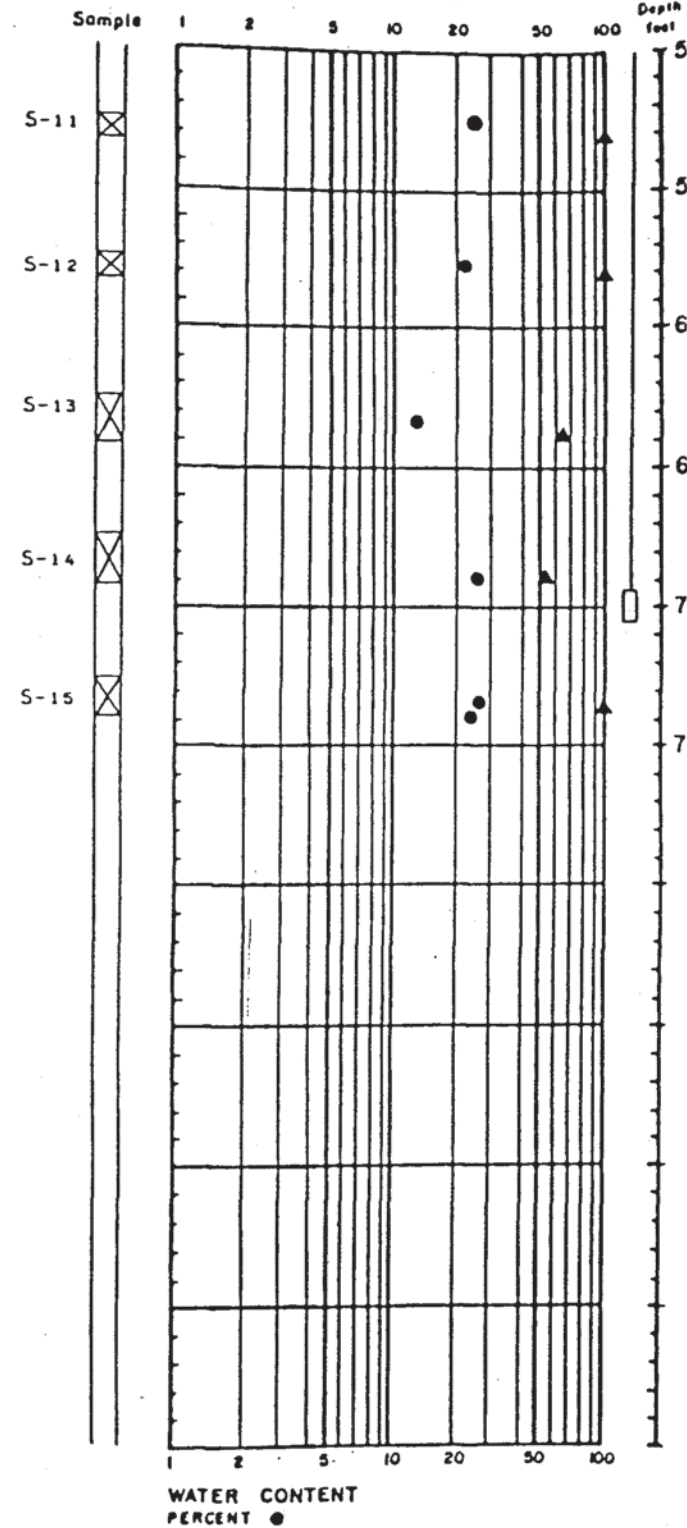
VERY DENSE, MOIST TO WET, BROWN, SLIGHTLY SILTY, GRAVELLY FINE TO COARSE SAND. (ADVANCE OUTWASH DEPOSIT).

SW-SM 10

QJA<sup>41.5</sup>

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

SOIL INTERPRETATION



VERY DENSE, WET, BLUE GRAY, SILTY, FINE SAND.

QJA

SM-40



VERY HARD, DAMP, BLUE GRAY, CLAYEY, SILT.

ML 95

VERY DENSE, WET, GRAY BLUE, SILTY, FINE SAND.

BOTTOM OF BORING 73.8 FEET. COMPLETED 5/8/81. SM-40

LEGEND

- ⊗ 2" O.D. Split Spoon Sample
- ⊠ 3" O.D. Shelby Sample
- No Sample Recovery
- ⊞ Bentonite Seal
- ATD Water Level (At Time of Drilling)
- Observation Well
- Liquid Limit
- Plastic Limit
- PP Pocket Penetrometer (test)
- te Torrone (test)

NOTE: Soil descriptions are interpretative and actual changes may be gradual.

LEGEND

- ⊗ 2" O.D. Split Spoon Sample
- ⊠ 3" O.D. Shelby Sample
- No Sample Recovery
- ⊞ Bentonite Seal
- ATD Water Level (At Time of Drilling)
- Observation Well
- Liquid Limit
- Plastic Limit
- PP Pocket Penetrometer (test)
- te Torrone (test)

NOTE: Soil descriptions are interpretative and actual changes may be gradual.

## Key to Exploration Logs

### Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:

Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

### Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance.

Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
Density		Consistency		
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

### Moisture

Dry	Little perceptable moisture
Dcmp	Some perceptable moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptable moisture, probably above optimum

### Minor Constituents

Estimated Percentage

Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

### Legends

#### Sampling Test Symbols

##### BORING SAMPLES

	Split Spoon
	Shelby Tube
	Cuttings
	Core Run
*	No Sample Recovery
P	Tube Pushed, Not Driven

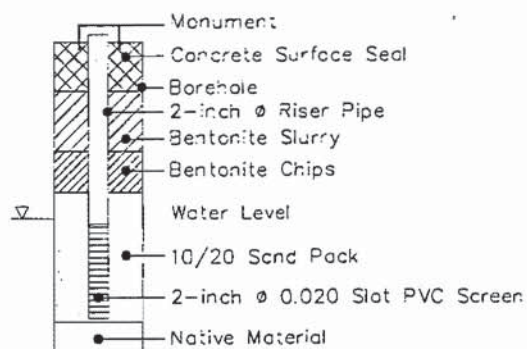
##### TEST PIT SAMPLES

	Grab (Jar)
	Bag
	Shelby Tube
	Bucket Sample

### Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	QU
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits
PID	Photoionization Reading
CA	Chemical Analysis

### Groundwater Observations



RAISED\_MON 1=1

**HARTCROWSER**

J-7263

2/00

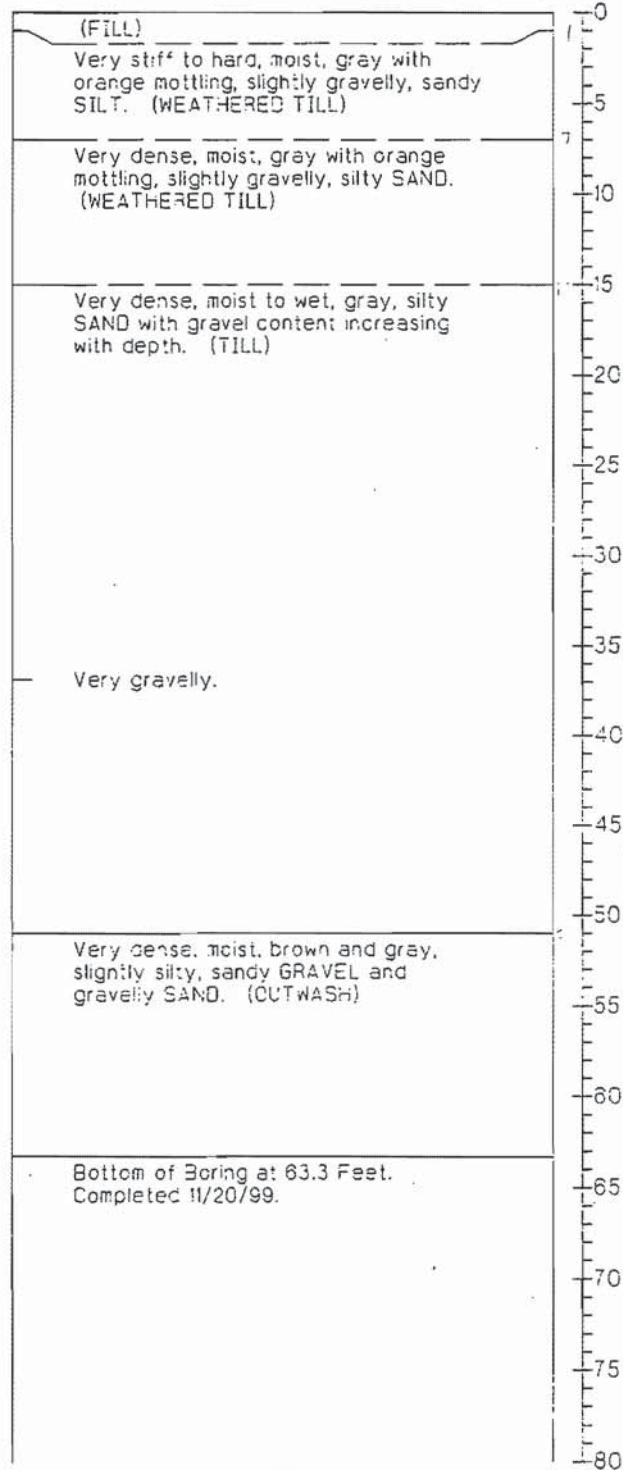
Figure A-1

# Boring Log HC-3

# 16860 HC-3

## Soil Descriptions

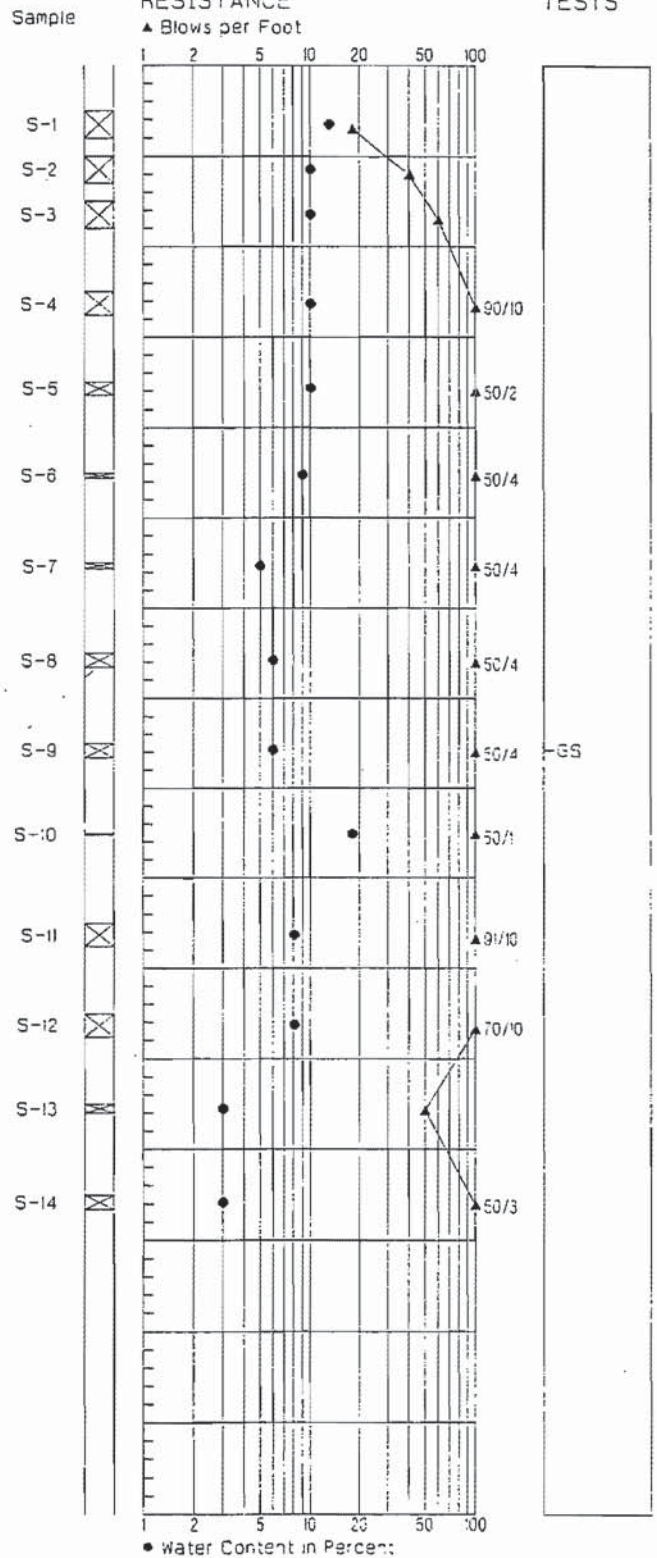
Approx. Ground Surface Elevation in Feet: 155



## STANDARD PENETRATION RESISTANCE

▲ Blows per Foot

## LAB TESTS

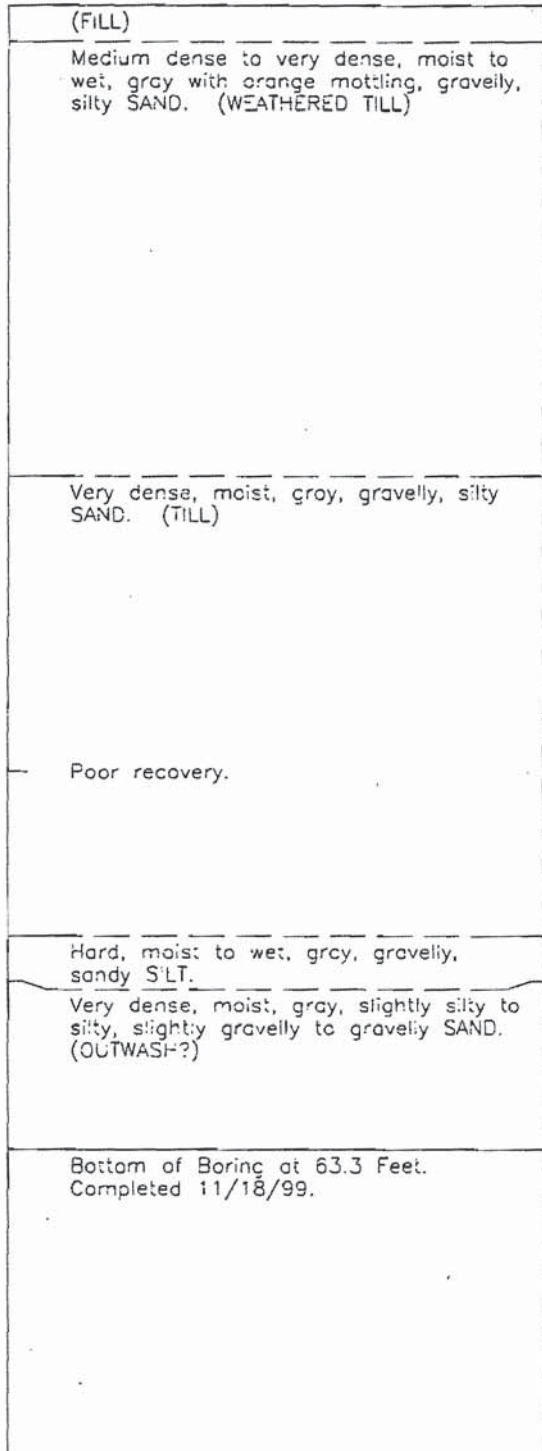


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

# Boring Log HC-6 16860 HC-6

## Soil Descriptions

Ground Surface Elevation in Feet: 156



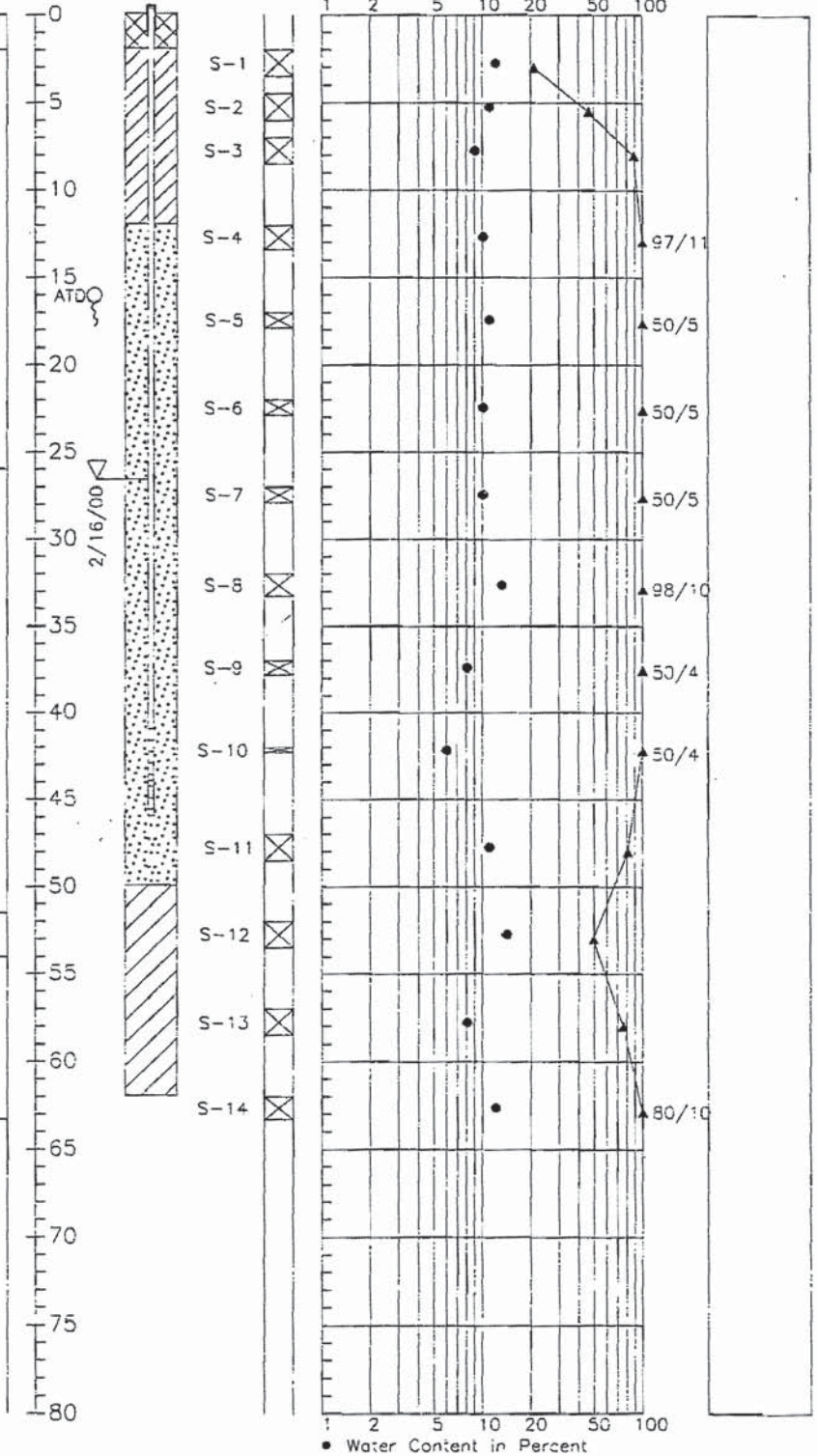
Depth in Feet

Sample

## STANDARD PENETRATION RESISTANCE

▲ Blows per Foot

LAB TESTS



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



**HARTCROWSER**

J-7263

11/99

Figure A-7

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTION	
Coarse Grained Soils	Gravel And Gravelly Soils	Clean Gravels (little or no fines)		GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little Or No Fines	
				GP		
		More Than 50% Coarse Fraction Retained On No. 4 Sieve	Gravels With Fines (appreciable amount of fines)		GM	Silty Gravels, Gravel-Sand-Silt Mixtures
				GC		
				SW		
	More Than 50% Material Larger Than No. 200 Sieve Size	Sand And Sandy Soils	Clean Sand (little or no fines)		SP	Poorly-Graded Sands, Gravelly Sands, Little Or No Fines
				SM		
More Than 50% Coarse Fraction Passing No. 4 Sieve		Sands With Fines (appreciable amount of fines)		SC	Clayey Sands, Sand-Clay Mixtures	
				ML		
Fine Grained Soils	Silt And Clays	Liquid Limit Less Than 50		CL	Inorganic Silts & Very Fine Sands, Rock Flour, Silty-Clayey Fine Sands; Clayey Silts w/ Slight Plasticity	
				OL		
				MH		
	More Than 50% Material Smaller Than No. 200 Sieve Size	Silt And Clays	Liquid Limit Greater Than 50		CH	Inorganic Clays Of Low To Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean
					OH	
					PT	
Highly Organic Soils				PT	pt	Peat, Humus, Swamp Soils With High Organic Contents
Topsoil				Humus And Duff Layer		
Fill				Highly Variable Constituents		

The Discussion In The Text Of This Report Is Necessary For A Proper Understanding Of The Nature Of The Material Presented In The Attached Logs

**Notes :**

Dual symbols are used to indicate borderline soil classification. Upper case letter symbols designate sample classifications based upon laboratory testing; lower case letter symbols designate classifications not verified by laboratory testing.

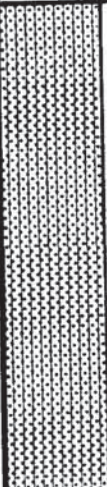



- I 2" O.D. SPLIT SPOON SAMPLER
- II 2.4" I.D. RING SAMPLER OR SHELBY TUBE SAMPLER
- P SAMPLER PUSHED
- \* SAMPLE NOT RECOVERED
- ∇ WATER LEVEL (DATE)
- ⊥ WATER OBSERVATION WELL

- C TORVANE READING, tsf
- qu PENETROMETER READING, tsf
- W MOISTURE, percent of dry weight
- pcf DRY DENSITY, pounds per cubic ft.
- LL LIQUID LIMIT, percent
- PI PLASTIC INDEX

## LEGEND



BORING NO. 2Logged By JBELEV. 137.5±Date 3/7/85

Graph	US CS	Soil Description	Depth (ft.)	Sample	(N) Blows Ft.	W (%)
	sm	tan/orange mottled silty SAND, fine, with gravel, moist, medium dense	5	I	28	15
		becomes gray with increased gravel content, very dense	10	I	100+	11
			15	I	100+	10
		becomes tan	20	I	100+	10
			25	I	100+	8
			30	I	100+	9
				35	I	100+
	sp	apparent water bearing sand lense in this zone from 28-32'	35	I	100+	12
	sp	gravelly SAND, fine, with iron staining, <del>moist to wet</del> , very dense	40	I	100+	11
	sm	tan gravelly silty SAND, fine, moist to wet, very dense		I	100+	16

Boring terminated at 42.75' below existing grade. Groundwater encountered at 30' during drilling. 3/4" PVC standpipe installed to bottom of boring, lower 30' slotted. A bentonite seal was placed at 2' below the surface and the hole backfilled with soil cuttings.

**Earth  
Consultants Inc.**  
GEOTECHNICAL ENGINEERING & GEOLOGY



**BORING LOG**  
GLOBE CENTER  
BELLEVUE, WASHINGTON

Proj. No. 2576

Date Apr. '85

Plate A3

**BORING NO. 4**

Logged By FC  
 Date 3/8/85

ELEV. 141±

Graph	US CS	Soil Description	Depth (ft.)	Sample	(N) Blows Ft.	W (%)
SM		tan silty SAND, fine to medium with gravel, moist, dense, sand becomes coarse below 4'	5	I	30	11
		grades to trace gravel	10	I	49	10
		with increased gravel	15	I	88	10
		cobble encountered at 20'	20	I	100	7
		becomes gray in color	25	I	100+	7
		zone of both gray and tan coloration	3/27/85	I	100+	10
			30	I	100+	8
		becomes gray	35	I	100+	7

Boring terminated at 37.8' below existing existing grade. No groundwater seepage encountered while drilling. 3/4" PVC standpipe installed to bottom of boring, lower 25' slotted. A bentonite seal was placed at 2' below the existing ground surface. Boring was backfilled with soil cuttings.



**BORING LOG**  
 GLOBE CENTER  
 BELLEVUE, WASHINGTON

Proj. No. 2576      Date Apr. '85      Plate A5

**BORING NO. 5**

Logged By DA

Date 3/11/85

ELEV. 141.5±

Graph	US CS	Soil Description	Depth (ft.)	Sample	(N) Blows Ft.	W (%)	
	sm	brown silty SAND, fine to medium, with gravel and concrete rubble (FILL)	0-5	H	52	8	
	sm	gray silty SAND, fine to medium, with gravel, moist, very dense  free water encountered in a sand lense at 13.5'  water bearing sand lenses encountered in this strata to 28'         cobbles encountered	5-10	H	76	10	
			10-13.5	▽	100+	10	
			13.5-15	3/27/85	H	100+	17
			15-20	H	100+	17	
			20-25	H	100+	17	
			25-30	H	100+	11	
			30-35	H	100+		
			35-40	H	100+	7	
			40-45	H	100+	8	
			45-50	H	100+	9	
				50-53	H	100+	13

Boring terminated at 53' below existing grade. Groundwater encountered from 12-28' during drilling. 3/4" PVC standpipe installed to bottom of boring, lower 40' slotted. A bentonite seal was placed at 2-3' and the boring was backfilled with soil cuttings.



**BORING LOG**  
 GLOBE CENTER  
 BELLEVUE, WASHINGTON

Proj. No. 2576

Date Apr. '85

Plate A6

**BORING NO. 6**

Logged By DA

ELEV. 147.5±

Date 3/11/85

Graph	US CS	Soil Description	Depth (ft.)	Sample	(N) Blows Ft.	W (%)	
		brown silty SAND, fine to medium, with gravel and concrete fragments, moist, loose (FILL)	0-5	I	100+	10	
	sm	gray/tan mottled silty SAND, fine to medium, with gravel and isolated cobbles, moist, very dense	5-10	I	100+	11	
	SM ML	grades from silty SAND to sandy SILT, seepage encountered in sand lenses at 8'	10-15	I	100+	10	
	sm		gray/tan mottled silty SAND, fine to medium, with gravel, moist, very dense no seepage encountered  becomes gray with increased gravel	15-20	II	100+	6
				20-25	II	100+	8
				25-30	II	100+	8
				30-35	II	100+	8
			gray/tan mottled gravelly silty SAND, fine, moist, very dense, some seepage encountered in sand lenses (minor sand lense at 28') (becomes gray at 32.5')	30-35	II	100+	6
	sp sm		gray SAND, fine to medium, with silt lenses, moist very dense	35-40	II	100+	17
	sm		gray silty SAND, fine to medium with gravel, moist, very dense  cobbles encountered at 51'	40-45	II	100+	9
				45-50	II	100+	9
				50-55	II	100+	--
55-60				II	100+	76	
			60-63	I	100+	66	

Boring terminated at 63' below existing grade. Slight groundwater seepage encountered at various levels as indicated. 3/4" PCV standpipe installed to bottom of boring, lower 50' slotted. A bentonite seal was placed at 2' and the boring was backfilled with cuttings.



**BORING LOG**  
GLOBE CENTER  
BELLEVUE, WASHINGTON

Proj. No. 2576

Date Apr. '85

Plate A7

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

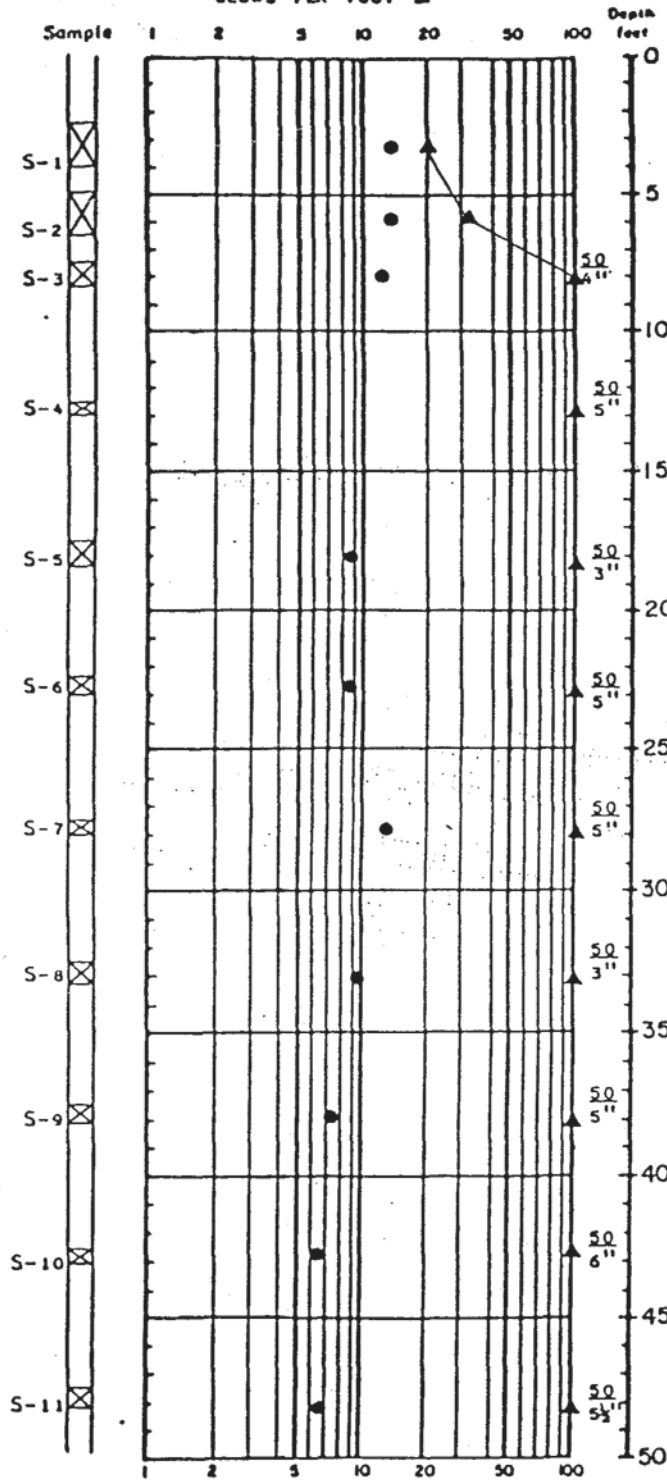
B-1 (494)

SOIL INTERPRETATION

15550 B-1

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

SOIL INTERPRETATION



GROUND SURFACE ELEVATION APPROXIMATELY 161 FEET.

ASPHALT PAVEMENT OVER TILL-LIKE FILL

MEDIUM DENSE, WET, GRAY AND BROWN, SILTY, SLIGHTLY GRAVELLY, FINE TO COARSE SAND. (MODERATELY WEATHERED TILL) **QUT**

**Sm-25**

7

VERY DENSE, WET, GRAY, SILTY, SLIGHTLY GRAVELLY, FINE TO COARSE SAND.

(GRADING TO UNWEATHERED TILL, SOME IRON STAINING)

12.5

VERY DENSE, MOIST TO WET, GRAY, SILTY, SLIGHTLY GRAVELLY, FINE TO MEDIUM SAND.

(INCREASING GRAVEL INFERRED FROM DRILLING ACTION)

30

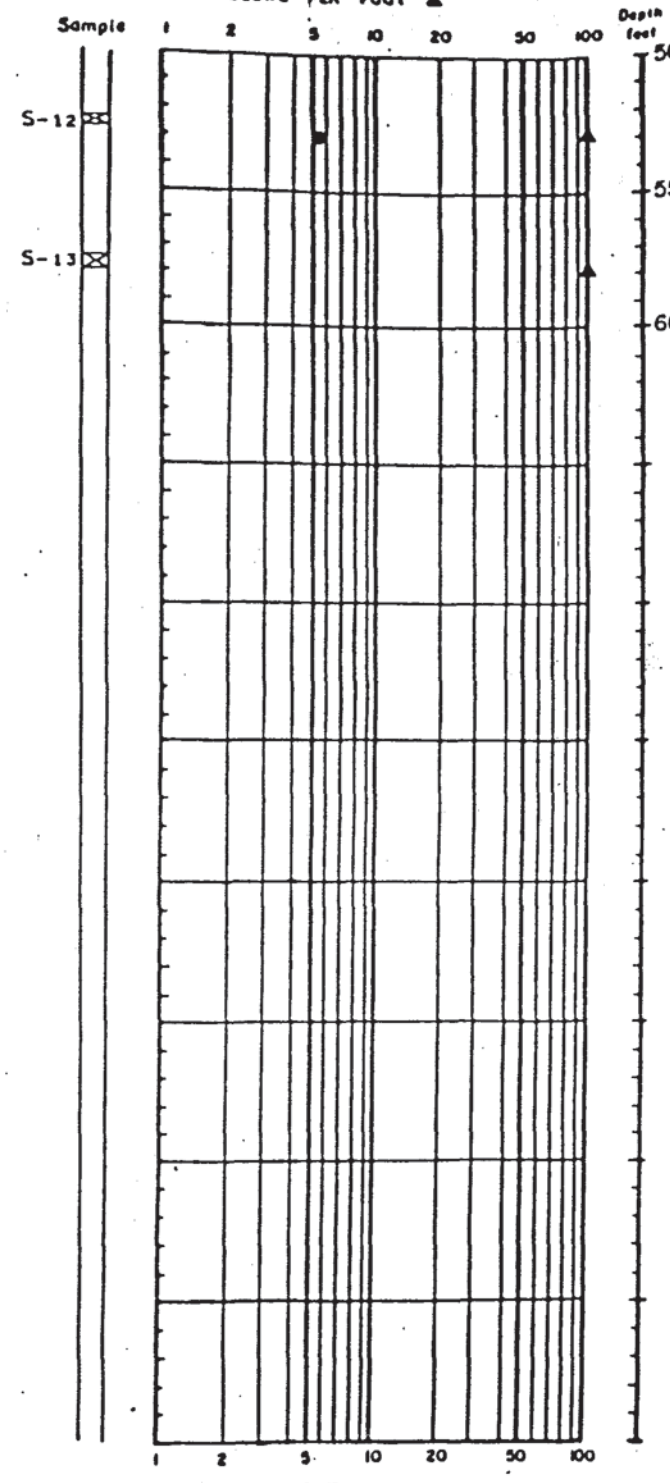
VERY DENSE, WET, GRAY, GRAVELLY, SLIGHTLY SILTY, FINE TO COARSE SAND, WITH ISOLATED SANDY LENS. **SW-Sm 10**

(DRILLING ACTION LESS GRAVELLY)

40

(DRILLING ACTION VERY GRAVELLY, PROBABLE COBBLES)

VERY DENSE, WET, GRAY, GRAVELLY, MEDIUM TO COARSE SAND WITH TRACES OF SILT. (OUTWASH MATERIAL). **SP-Sm 5 QUA**



**SP-Sm 5 QUA**

(DRILLING ACTION SMOOTHER-LESS GRAVELLY)

54.5

VERY DENSE, WET, GRAY, SLIGHTLY GRAVELLY, MEDIUM TO COARSE SAND WITH TRACE OF SILT.

57.9

DRY

BOTTOM OF BORING AT 57.9 FEET. COMPLETED 2/4/81.

LEGEND

☒ 2" O.D. Split Spoon Sample

☒ 3" O.D. Shelby Sample

• No Sample Recovery

ATD At Time of Drilling

Water Level

Observation Well

— Liquid Limit

— Plastic Limit

PP Pocket Penetrometer (tsf)

tv Terrene (tsf)

LEGEND

☒ 2" O.D. Split Spoon Sample

☒ 3" O.D. Shelby Sample

• No Sample Recovery

ATD At Time of Drilling

Water Level

Observation Well

— Liquid Limit

— Plastic Limit

PP Pocket Penetrometer (tsf)

tv Terrene (tsf)

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

**BORING LOG B-4**

497

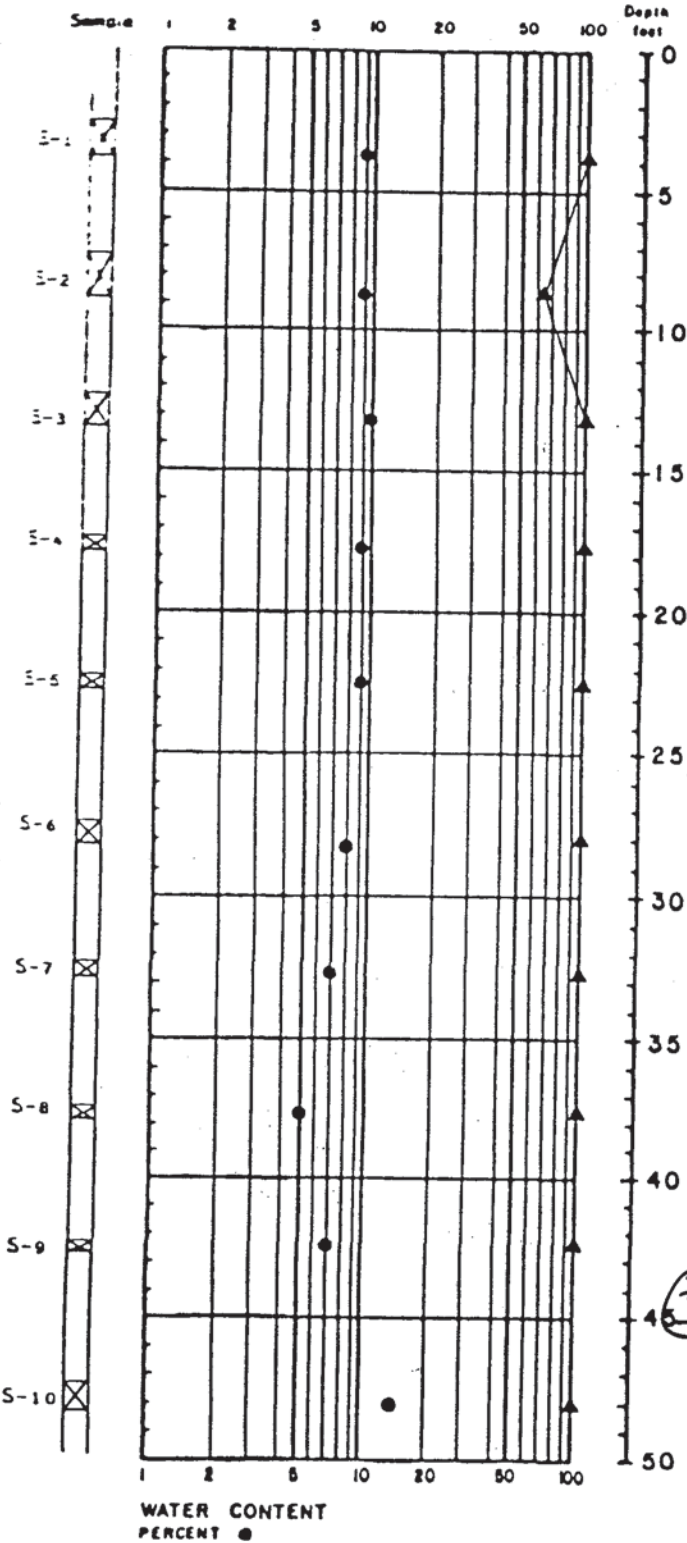
15550 B-4

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

**SOIL INTERPRETATION**

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

**SOIL INTERPRETATION**



GROUND SURFACE ELEVATION APPROXIMATELY 134 FEET.

0.5 ASPHALT PAVEMENT.  
VERY DENSE, DAMP, BROWN, SILTY, GRAVELLY, FINE SAND. (WEATHERED GLACIAL TILL).  
**Sm-25** **QUT**

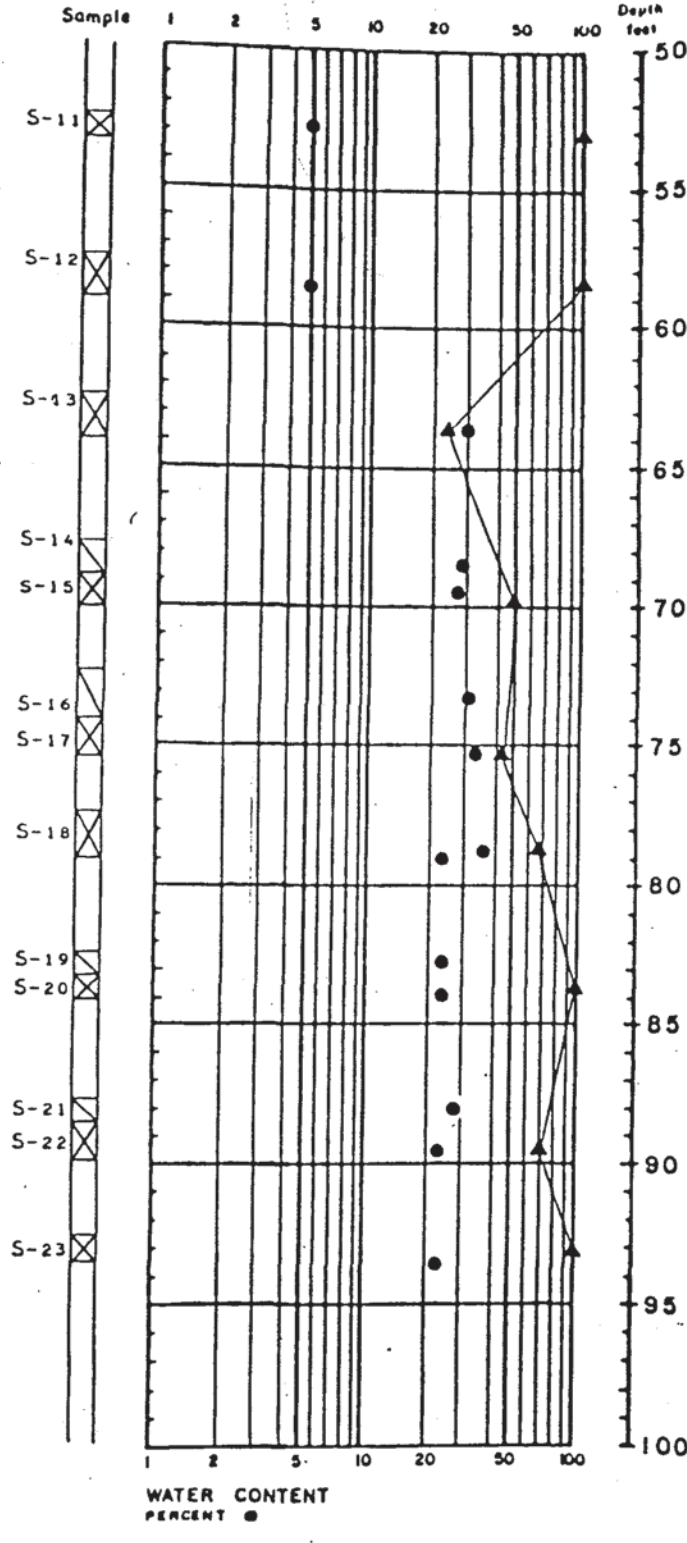
WET ZONE 8  
TILL BECOMES LESS WEATHERED WITH DEPTH. 9.5

1.5  
VERY DENSE, DAMP, BROWN TO GRAY, SILTY, GRAVELLY, FINE TO COARSE SAND. (GLACIAL TILL).  
↓

3.0 (COBBLES) OR ROCK INFERRED FROM DRILLING ACTION 3.0

3.5  
VERY DENSE, MOIST, GRAY AND BROWN, SLIGHTLY SILTY, SLIGHTLY SANDY, GRAVEL. (ADVANCE OUTWASH DEPOSIT).  
**GP-GM 10** **QUA** 3.4

4.5  
VERY DENSE, MOIST, GRAY AND BROWN, SILTY, FINE SAND.  
**Sm-35**



51  
VERY DENSE, MOIST TO WET, BROWN, SLIGHTLY, SILTY, FINE GRAVELLY, FINE TO COARSE SAND. **QUA**

**SW-SM 6**

60.5  
VERY STIFF TO HARD DAMP, GRAY, SILTY, CLAY.  
**CL-ML 95**

(PP ≥ 4.5 TSF) 68

(PP=4.3 TSF, 3.6 TSF) 73

THIN SANDY SILT PARTINGS OBSERVED IN SAMPLE. 75  
**CL-ML 90**

79  
HARD, DAMP, GRAY, SILT.  
**ML-95**

(PP ≥ 4.5 TSF) 82.5

(PP ≥ 4.5 TSF) 88

BOTTOM OF BORING 93.5 FEET. COMPLETED 5/15/81.

**LEGEND**

- ⊗ 2" O.D. Split Spoon Sample
- ⊠ 3" O.D. Shelby Sample
- No Sample Recovery
- ▨ Bentonite Seal
- ▽ ATD Water Level (At Time of Drilling) Observation Well
- Liquid Limit
- Plastic Limit
- PP Pocket Penetrometer (tsf)
- tv Torvane (tsf)

**LEGEND**

- ⊗ 2" O.D. Split Spoon Sample
- ⊠ 3" O.D. Shelby Sample
- No Sample Recovery
- ▨ Bentonite Seal
- ▽ ATD Water Level (At Time of Drilling) Observation Well
- Liquid Limit
- Plastic Limit
- PP Pocket Penetrometer (tsf)
- tv Torvane (tsf)

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

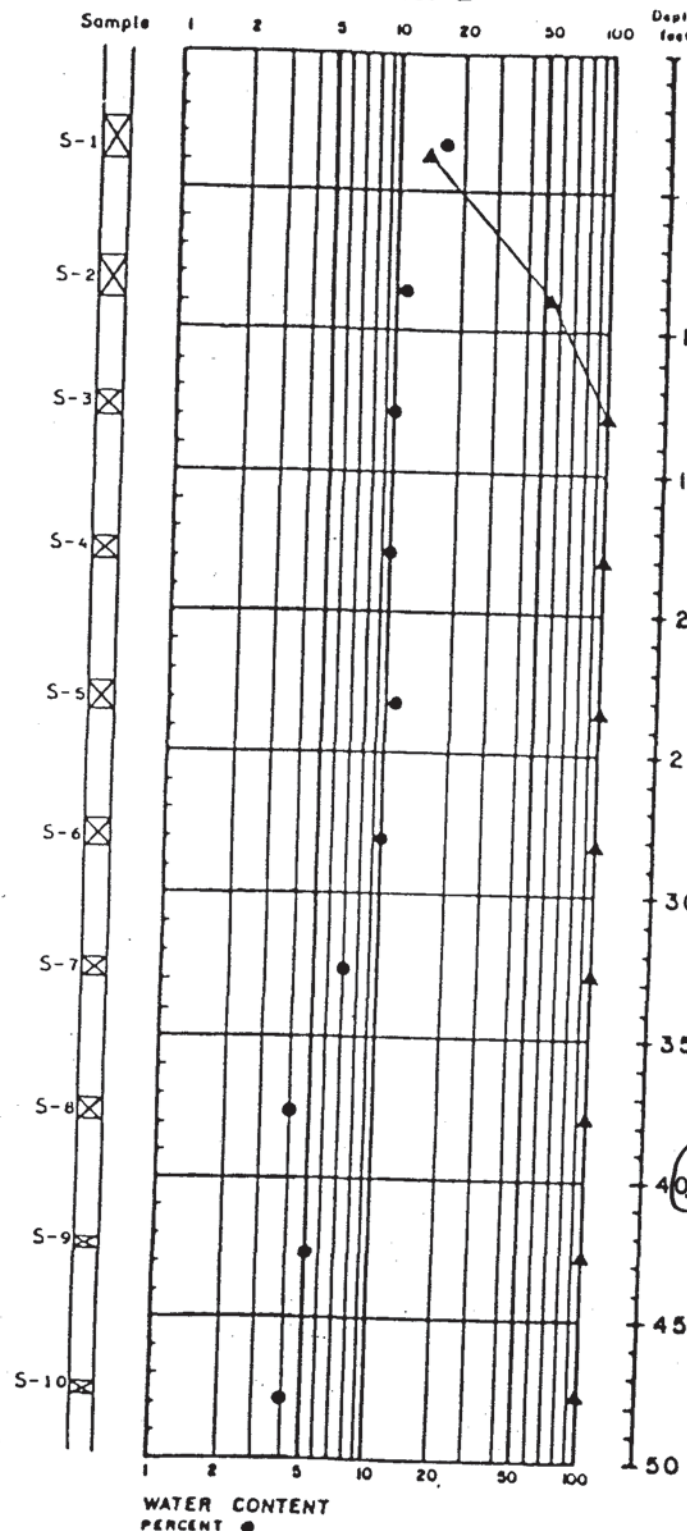
# BORING LOG B-5

498

15550 B-5

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

SOIL INTERPRETATION

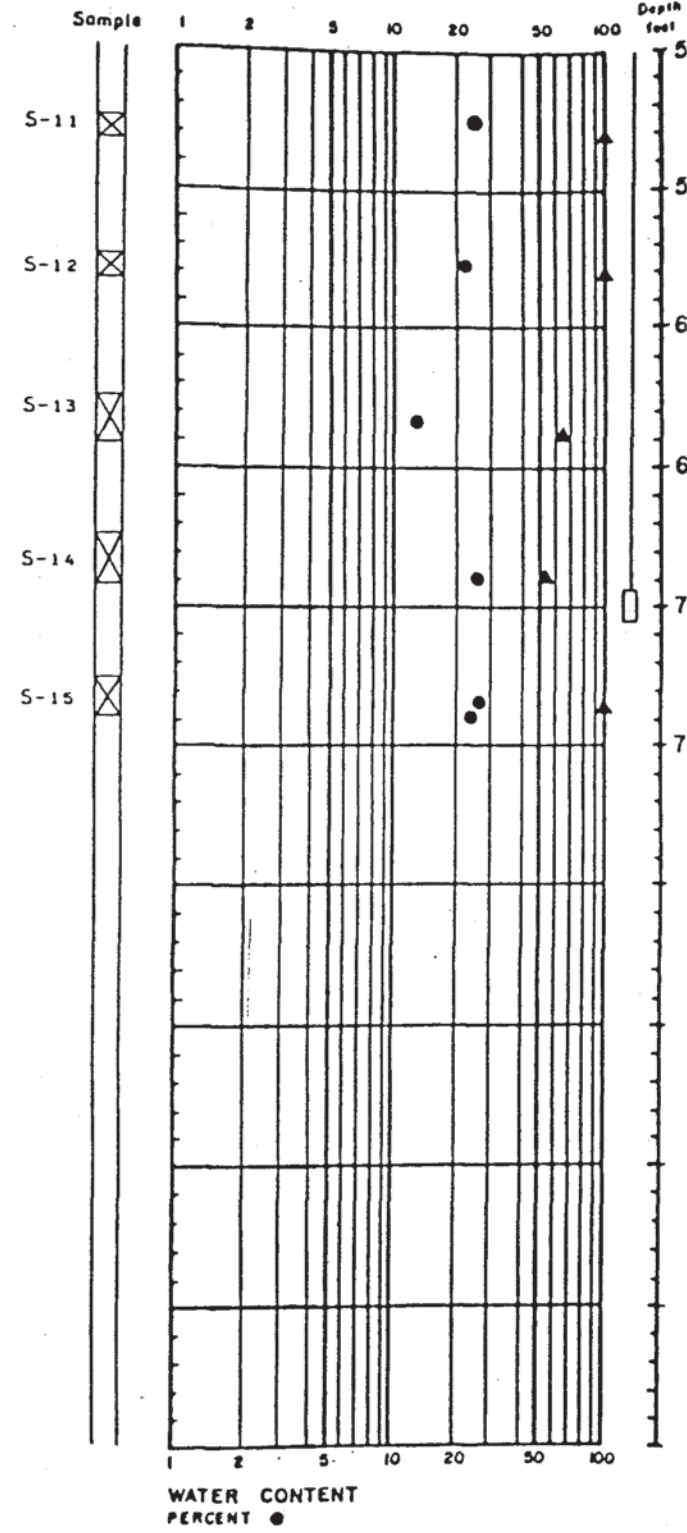


GROUND SURFACE ELEVATION APPROXIMATELY 158 FEET.

0.5  
1.5  
ASPHALT PAVEMENT.  
MOIST, BROWN, SANDY, SILT. (FILL).  
STIFF, WET TO MOIST, BROWN TO GRAY, FINE SANDY, SILT. (WEATHERED GLACIAL TILL).  
**ML-80**  
SEEPAGE OBSERVED AT 7.5 FEET. QJT<sup>6</sup>  
VERY DENSE, DAMP, GRAYISH BROWN, GRAVELLY, SILTY, FINE TO COARSE SAND AND SANDY SILT. (GLACIAL TILL)  
**SM/ML-50**  
40  
41.5  
VERY DENSE, MOIST TO WET, BROWN, SLIGHTLY SILTY, GRAVELLY FINE TO COARSE SAND. (ADVANCE OUTWASH DEPOSIT).  
**SW-SM 10** QUA<sup>41.5</sup>

STANDARD PENETRATION RESISTANCE  
(140 pound weight, 30 inch drop)  
BLOWS PER FOOT ▲

SOIL INTERPRETATION



VERY DENSE, WET, BLUE GRAY, SILTY, FINE SAND. **QUA**  
**SM-40**  
6/11/81  
61  
VERY HARD, DAMP, BLUE GRAY, CLAYEY, SILT.  
**ML 95**  
5/30/81  
68  
70  
73.5  
73.8  
VERY DENSE, WET, GRAY BLUE, SILTY, FINE SAND.  
BOTTOM OF BORING 73.8 FEET. **SM-40**  
COMPLETED 5/8/81.

LEGEND  
 ☒ 2" O.D. Split Spoon Sample  
 ☐ 3" O.D. Shelby Sample  
 • No Sample Recovery  
 [Hatched] Bentonite Seal  
 [ATD] Water Level (At Time of Drilling)  
 [Box] Observation Well  
 — Liquid Limit  
 — Plastic Limit  
 PP Pocket Penetrometer (test)  
 Tc Torrone (test)

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

LEGEND  
 ☒ 2" O.D. Split Spoon Sample  
 ☐ 3" O.D. Shelby Sample  
 • No Sample Recovery  
 [Hatched] Bentonite Seal  
 [ATD] Water Level (At Time of Drilling)  
 [Box] Observation Well  
 — Liquid Limit  
 — Plastic Limit  
 PP Pocket Penetrometer (test)  
 Tc Torrone (test)

NOTE: Soil descriptions are interpretive and actual changes may be gradual.

# APPENDIX A.2

## LABORATORY TEST RESULTS



# Moisture Contents

Sound Transit East Link - Golder Associates-E330

HMA Sample #	Golder Sample #	Location	Date Received	Date of Test	Tare #	Wt of Tare	Tare+ Wet	Tare+ Dry	Moisture %
7499-23	S-3	E320-B-160, 5'	3/21/2013	3/26/2013	BB	621.8	1057.5	1010.1	12.2
7499-24	S-7	E320-B-160, 15'	3/21/2013	3/26/2013	X10	235	684.8	643.4	10.1
7499-25	S-11	E320-B-160, 35'	3/21/2013	3/26/2013	S7	116.2	474.9	451.4	7.0
7499-26	S-3	E320-B-161, 5'	3/21/2013	3/26/2013	9A	162	766.7	699.4	12.5
7499-27	S-8	E320-B-161, 20'	3/21/2013	3/26/2013	3A	213.8	463.4	447.8	6.7
7499-28	S-16	E320-B-161, 35.5'	3/21/2013	3/26/2013	X7	193	639.3	577.6	16.0
7494l	S-14	E330-B-001, 34'	1/25/2013	1/30/2014	X9	230.8	1135	1069.1	7.9
7494m	S-18	E330-B-001, 45'	1/25/2013	1/30/2014	S1	118.3	912	861.4	6.8
7494n	S-21	E330-B-001, 53'	1/25/2013	1/30/2014	S8	113.3	782.4	722.6	9.8
7499-29	S-2	E330-B-002, 9'	3/21/2013	3/26/2013	X2	596	1650.2	1555.3	9.9
7499-30	S-8	E330-B-002, 29.5'	3/21/2013	3/26/2013	2A	217.6	1013.8	954	8.1
7499-31	S-13	E330-B-002, 54.5'	3/21/2013	3/26/2013	1A	213.2	1282.4	1212	7.0
7494h	S-10	E330-B-003, 24.5'	1/25/2013	1/30/2014	AJ	165	559.3	524.9	9.6
7494i	S-16	E330-B-003, 39'	1/25/2013	1/30/2014	X7	193.1	869.2	819.9	7.9
7494j	S-21	E330-B-003, 52'	1/25/2013	1/30/2014	9A	162.2	650.3	612.6	8.4
7494k	S-25	E330-B-003, 62'	1/25/2013	1/30/2014	X10	234.8	781.8	739.8	8.3
7510-7	S-3B	E330-B-003A, 7.5'	5/3/2013	5/7/2013	5A	114.2	719.8	654.2	12.1
7510-8	S-5	E330-B-003A, 12.5'	5/3/2013	5/7/2013	B3	115.3	658.2	595.5	13.1
7510-9	S-10	E330-B-003A, 30'	5/3/2013	5/7/2013	6A	114.7	450.3	408.9	14.1
7510-10	S-16	E330-B-003A, 60'	5/3/2013	5/7/2013	S10	114	543.5	500.3	11.2
7510-11	S-20	E330-B-003A, 80'	5/3/2013	5/7/2013	S4	118.4	623.2	552.9	16.2
7510-12	S-23	E330-B-003A, 90.5'	5/3/2013	5/7/2013	M6	117	450.8	425.1	8.3
7513-31	S-2	E330-B-004, 4'	5/24/2013	5/28/2013	X6	196.1	1630.2	1510.4	9.1
7513-32	S-7	E330-B-004, 17.5'	5/24/2013	5/28/2013	S8	113.4	1343.4	1267.3	6.6
7513-33	S-9	E330-B-004, 26'	5/24/2013	5/28/2013	X7	193.1	1065.1	1002.9	7.7
7513-34	S-12	E330-B-004, 33'	5/24/2013	5/28/2013	X5	198.1	1240.2	1147.7	9.7



SAMPLE IDENTIFICATION	Depth (ft)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			% GRAVEL	% SAND	% FINES	pH	RESISTIVITY ( $\Omega$ - cm)	ORGANIC CONTENT (%)	ASTM CLASSIFICATION <sup>1</sup>	SAMPLE DESCRIPTION <sup>1</sup>
			LL	PL	PI								
B-B-ES-10, SS-2	10.0-11.5	22						5.2				SP-SM	Dark brown, poorly graded SAND with silt
B-B-ES-10, SS-5	25.0-26.5	19						4.3				SP	Dark gray, poorly graded SAND
B-B-ES-10, SS-8	40.0-41.5	21				0.1	92.0	7.9				SP-SM	Dark gray, poorly graded SAND with silt
B-B-ES-10, SS-12	60.0-61.5	15				0.3	91.8	7.9				SP-SM	Dark gray, poorly graded SAND with silt
B-B-ES-10, SS-15	80.0-81.5	22						8.3				SP-SM	Dark gray, poorly graded SAND with silt
B-B-ES-10, SS-18	105.0-106.5	21				0.0	90.5	9.5				SP-SM	Dark gray, poorly graded SAND with silt

1. Soil classification and descriptions based on ASTM D 2487 or D 2488, as appropriate

Note: This table summarizes information presented elsewhere in the report and should be used in conjunction with the report text, other graphs and tables, and the exploration logs.



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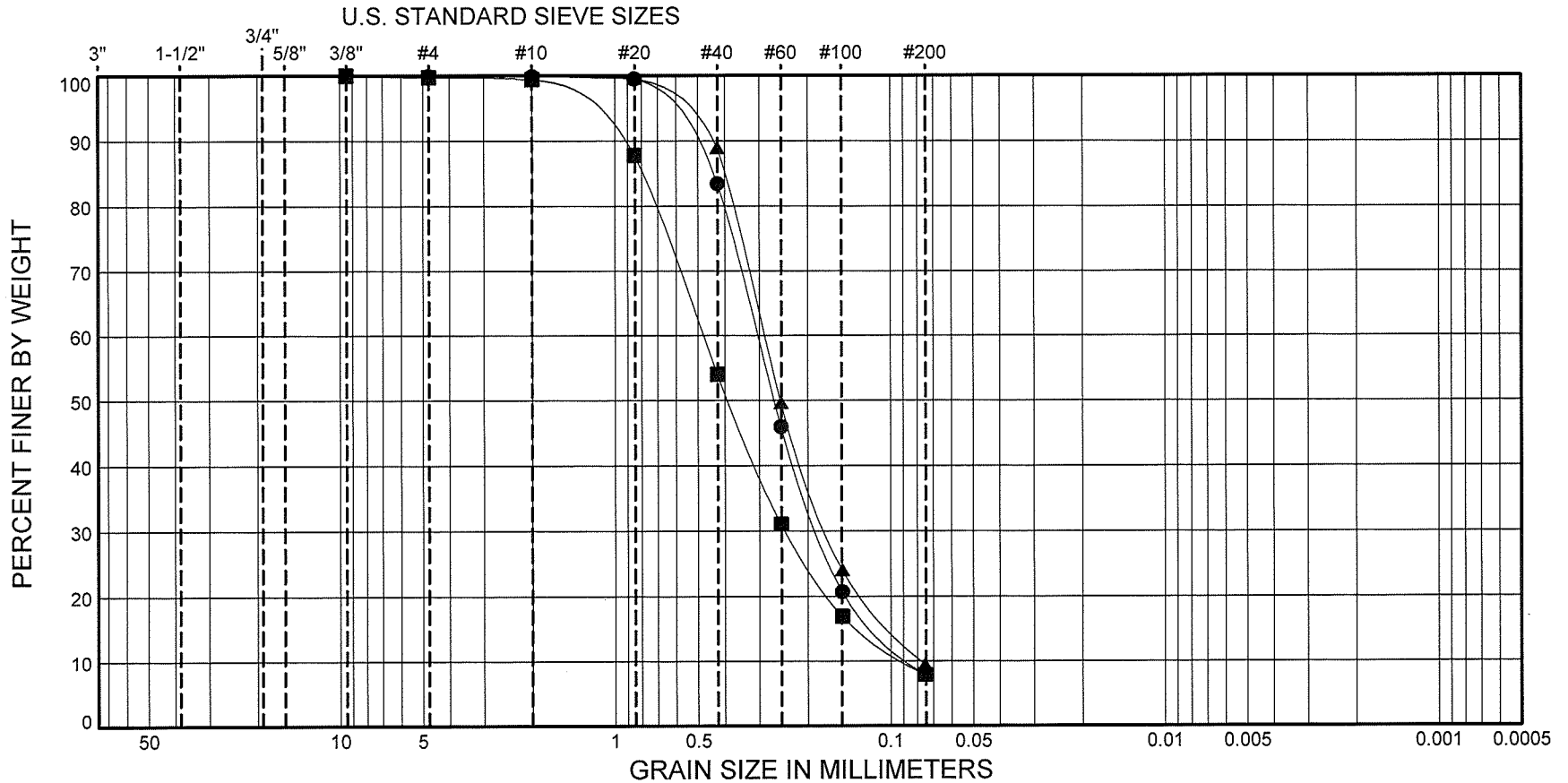
SUMMARY OF MATERIAL PROPERTIES

SOUND TRANSIT EASTLINK, PHASE 3  
KING COUNTY, WASHINGTON

BORING NAME  
B-B-ES-10

PROJECT NO.  
2009-142

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	B-B-ES-10	SS-8	40.0 - 41.5 (SP-SM) Dark gray, poorly graded SAND with silt	21				0.1	92.0	7.9
■	B-B-ES-10	SS-12	60.0 - 61.5 (SP-SM) Dark gray, poorly graded SAND with silt	15				0.3	91.8	7.9
▲	B-B-ES-10	SS-18	105.0 - 106.5 (SP-SM) Dark gray, poorly graded SAND with silt	21				0.0	90.5	9.5



SOUND TRANSIT EASTLINK, PHASE 3  
King County, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2009-142    BORING NAME: B-B-ES-10

SAMPLE IDENTIFICATION	Depth (ft)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			% GRAVEL	% SAND	% FINES	pH	RESISTIVITY ( $\Omega$ - cm)	ORGANIC CONTENT (%)	ASTM CLASSIFICATION <sup>1</sup>	SAMPLE DESCRIPTION <sup>1</sup>
			LL	PL	PI								
B-B-ES-11p, SS-3	15.0-16.5	22				11.0	82.0	7.0				SP-SM	Gray, poorly graded SAND with silt
B-B-ES-11p, SS-6	30.0-31.5	25						6.2				SP-SM	Dark yellowish brown, poorly graded SAND with silt
B-B-ES-11p, SS-8	40.0-41.5	24						9.2				SP-SM	Dark yellowish brown, poorly graded SAND with silt
B-B-ES-11p, SS-13	65.0-66.5	22				2.5	92.1	5.4				SP-SM	Olive brown, poorly graded SAND with silt
B-B-ES-11p, SS-14	70.0-71.5	22						4.4				SP	Dark olive brown, poorly graded SAND
B-B-ES-11p, SS-18	90.0-91.5	20						9.2				SP-SM	Dark gray, poorly graded SAND with silt
B-B-ES-11p, SS-23	115.0-116.5	23				0.0	89.0	11.0				SP-SM	Dark gray, poorly graded SAND with silt

1. Soil classification and descriptions based on ASTM D 2487 or D 2488, as appropriate

Note: This table summarizes information presented elsewhere in the report and should be used in conjunction with the report text, other graphs and tables, and the exploration logs.



HWA GEOSCIENCES INC.

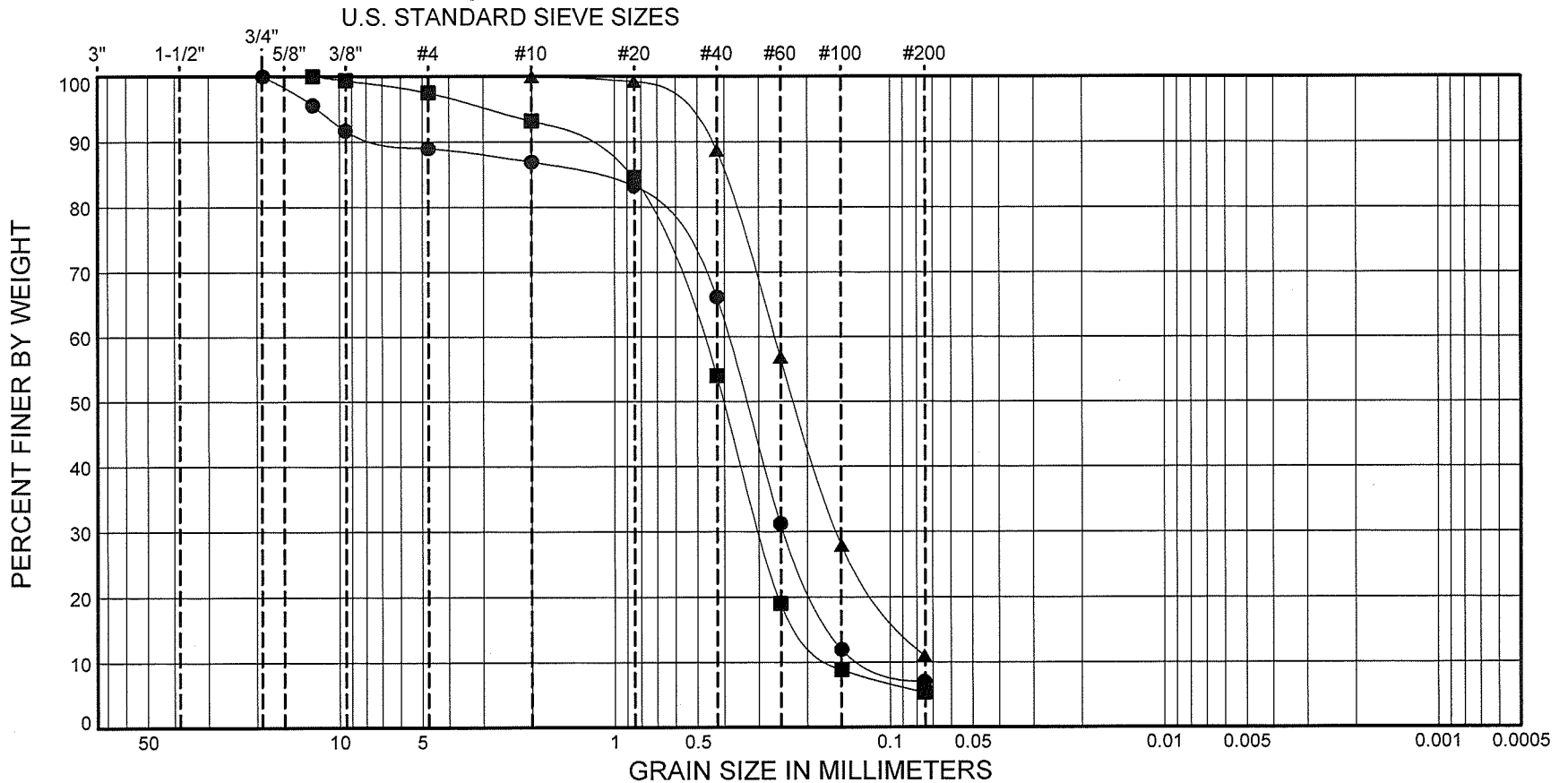
SUMMARY OF MATERIAL PROPERTIES

SOUND TRANSIT EASTLINK, PHASE 3  
KING COUNTY, WASHINGTON

BORING NAME  
B-B-ES-11p

PROJECT NO.  
2009-142

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	B-B-ES-11p SS-3	15.0 - 16.5	(SP-SM) Gray, poorly graded SAND with silt	22				11.0	82.0	7.0
■	B-B-ES-11p SS-13	65.0 - 66.5	(SP-SM) Olive brown, poorly graded SAND with silt	22				2.5	92.1	5.4
▲	B-B-ES-11p SS-23	115.0 - 116.5	(SP-SM) Dark gray, poorly graded SAND with silt	23				0.0	89.0	11.0

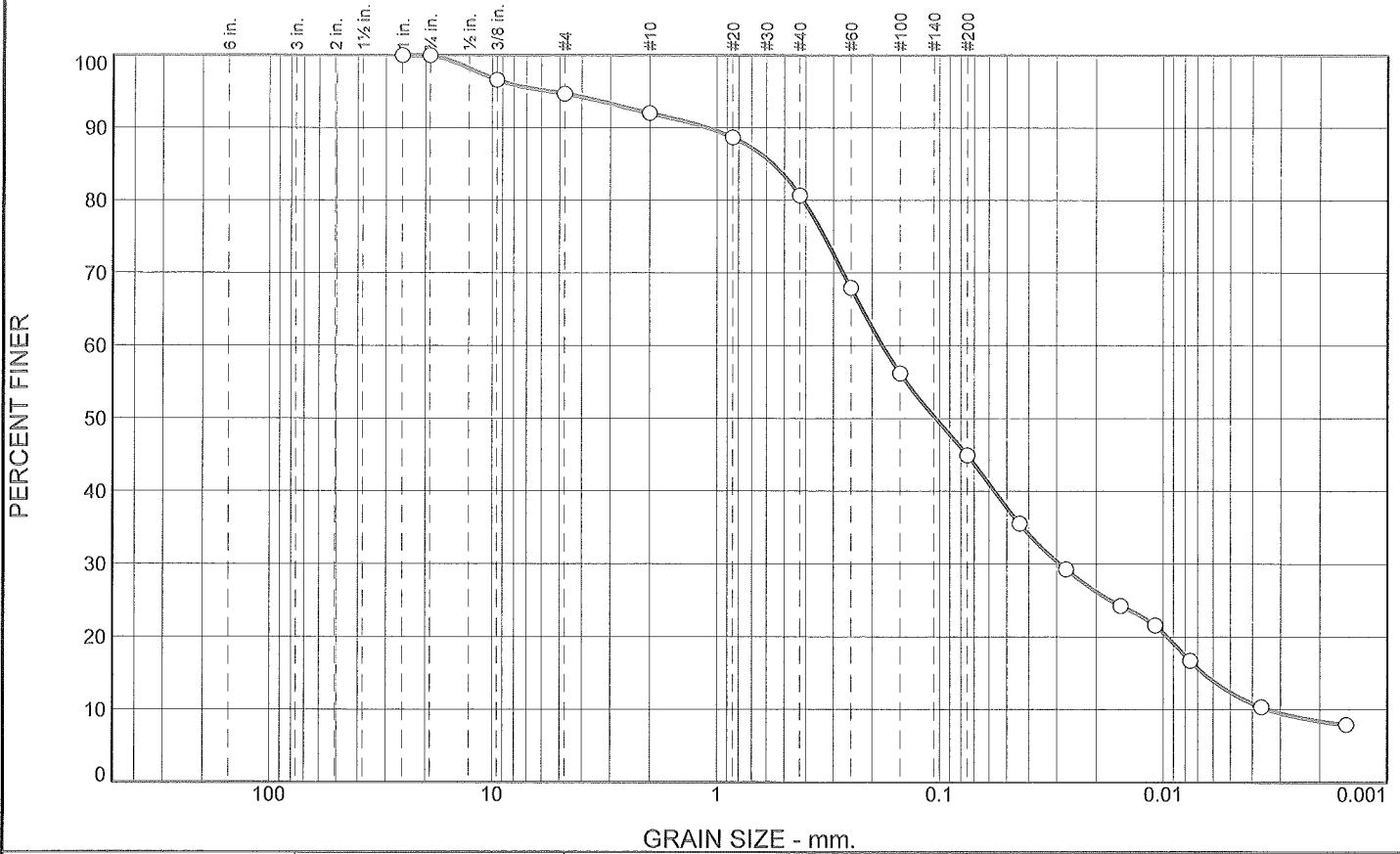


SOUND TRANSIT EASTLINK, PHASE 3  
King County, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2009-142    BORING NAME: B-B-ES-11p

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.3	2.7	11.3	35.8	32.6	12.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
3/8"	96.6		
#4	94.7		
#10	92.0		
#20	88.7		
#40	80.7		
#60	68.0		
#100	56.2		
#200	44.9		

**Material Description**

Silty Sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>90</sub>= 1.1024      D<sub>85</sub>= 0.5603      D<sub>60</sub>= 0.1802  
 D<sub>50</sub>= 0.1039      D<sub>30</sub>= 0.0291      D<sub>15</sub>= 0.0066  
 D<sub>10</sub>= 0.0034      C<sub>u</sub>= 53.15      C<sub>c</sub>= 1.39

**Classification**  
 USCS= SM      AASHTO= A-4(0)

**Remarks**

\* (no specification provided)

Source of Sample: Boring E330 - B-03  
 Sample Number: HMA7494h/Golder S10

Depth: 24.5'-25'

Date: 2/1/13

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
 Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

Tested By: Tara Pfaff

Checked By: JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

2/1/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330 - B-03

Depth: 24.5'-25'

Sample Number: HMA7494h/Golder S10

Material Description: Silty Sand

Date: 2/1/13

PL: NP

LL: NP

PI: NP

USCS Classification: SM

AASHTO Classification: A-4(0)

Tested by: Tara Pfaff

Checked by: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 366.60  
 Tare Wt. = 165.00  
 Minus #200 from wash = 44.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
524.90	165.00	1"	0.00	0.00	100.0
		3/4"	0.00	0.00	100.0
		3/8"	1496.20	1484.00	96.6
		#4	1364.50	1357.60	94.7
		#10	1183.40	1173.70	92.0
		#20	1080.30	1068.30	88.7
		#40	974.40	945.70	80.7
		#60	924.60	878.80	68.0
		#100	886.20	843.70	56.2
		#200	1060.90	1020.50	44.9

**Hydrometer Test Data**

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 92.0

Weight of hydrometer sample = 67.3

Hygroscopic moisture correction:

Moist weight and tare = 26.50

Dry weight and tare = 26.10

Tare weight = 13.90

Hygroscopic moisture = 3.3%

Table of composite correction values:

Temp., deg. C:           15.0           17.8           25.5

Comp. corr.:           -5.8           -5.0           -2.9

Meniscus correction only = -1.0

Specific gravity of solids = 2.7

Hydrometer type = 152H

Hydrometer effective depth equation:  $L = 16.298 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	19.5	30.0	25.5	0.0135	29.0	21.1	0.0439	35.6
5.00	19.5	25.5	21.0	0.0135	24.5	20.3	0.0273	29.3
15.00	19.5	21.9	17.4	0.0135	20.9	19.7	0.0155	24.2
30.00	19.5	20.0	15.5	0.0135	19.0	19.4	0.0109	21.6
60.00	19.5	16.5	12.0	0.0135	15.5	18.8	0.0076	16.7
250.00	19.3	12.0	7.4	0.0136	11.0	18.1	0.0036	10.3
1440.00	18.5	10.5	5.7	0.0137	9.5	17.9	0.0015	7.9



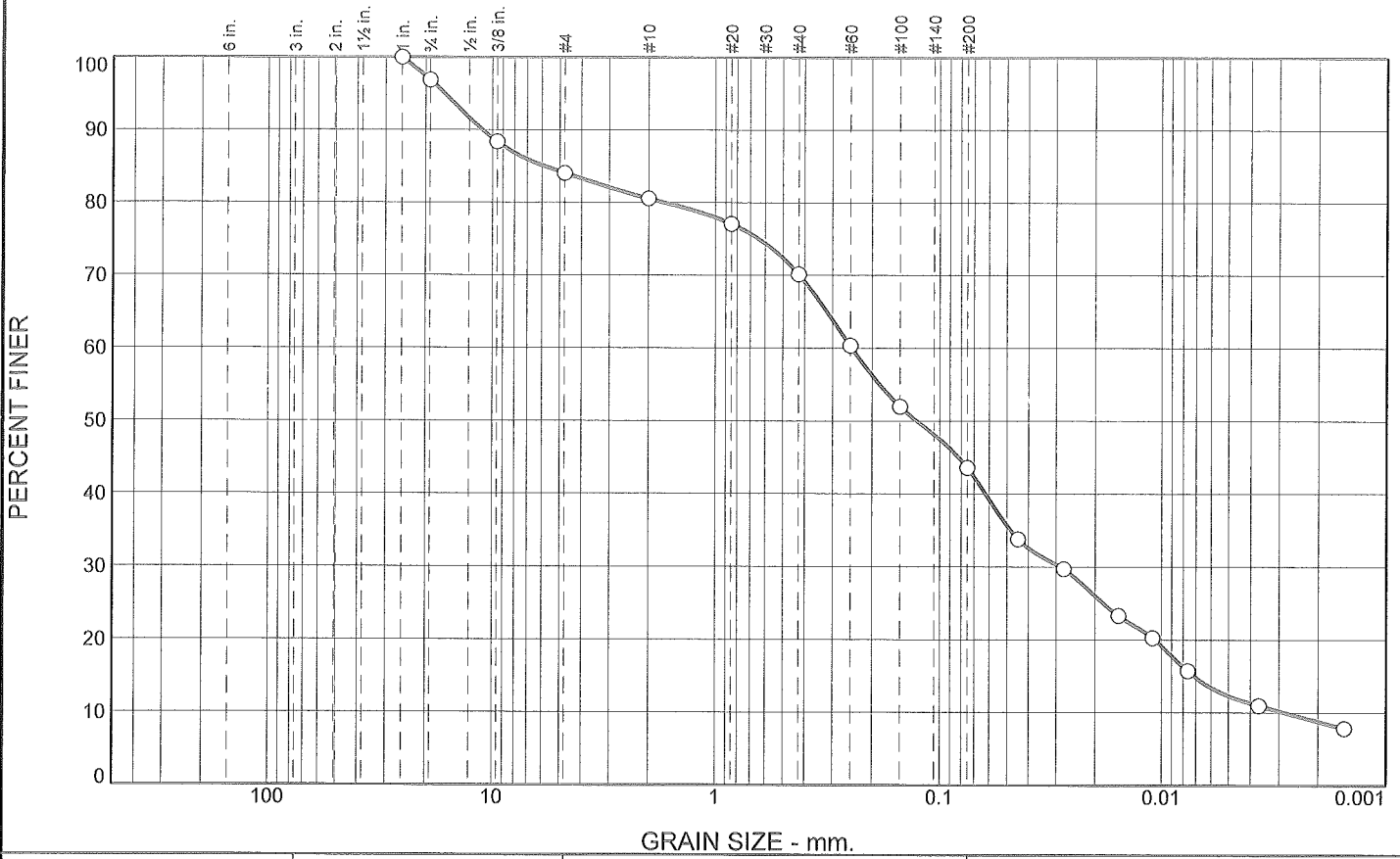
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	5.3	5.3	2.7	11.3	35.8	49.8	32.6	12.3	44.9

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
0.0034	0.0066	0.0096	0.0291	0.1039	0.1802	0.4104	0.5603	1.1024	5.4616

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.11	53.15	1.39

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.1	12.9	3.5	10.4	26.5	31.3	12.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	96.9		
3/8"	88.4		
#4	84.0		
#10	80.5		
#20	77.1		
#40	70.1		
#60	60.3		
#100	52.0		
#200	43.6		

**Material Description**

Silty Sand with Gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>90</sub>= 11.0786      D<sub>85</sub>= 5.8652      D<sub>60</sub>= 0.2458  
D<sub>50</sub>= 0.1264      D<sub>30</sub>= 0.0287      D<sub>15</sub>= 0.0072  
D<sub>10</sub>= 0.0028      C<sub>u</sub>= 87.00      C<sub>c</sub>= 1.19

**Classification**

USCS= SM      AASHTO= A-4(0)

**Remarks**

\* (no specification provided)

Source of Sample: Boring E330 - B-03      Depth: 39'-40'      Date: 2/1/13  
Sample Number: HMA 7494i/Golder S16

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450 <b>Figure</b>
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Tested By: Tara Pfaff      Checked By: JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

2/4/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330 - B-03

**Depth:** 39'-40'

**Sample Number:** HMA 7494i/Golder S16

**Material Description:** Silty Sand with Gravel

**Date:** 2/1/13

**PL:** NP

**LL:** NP

**PI:** NP

**USCS Classification:** SM

**AASHTO Classification:** A-4(0)

**Tested by:** Tara Pfaff

**Checked by:** JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 551.30  
 Tare Wt. = 193.10  
 Minus #200 from wash = 42.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
819.90	193.10	1"	0.00	0.00	100.0
		3/4"	1524.60	1505.10	96.9
		3/8"	1537.50	1484.00	88.4
		#4	1384.60	1357.60	84.0
		#10	1195.60	1173.60	80.5
		#20	1090.00	1068.30	77.1
		#40	989.10	945.60	70.1
		#60	940.30	878.80	60.3
		#100	896.10	843.70	52.0
		#200	1073.00	1020.50	43.6

**Hydrometer Test Data**

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 80.5

Weight of hydrometer sample = 68.7

Hygroscopic moisture correction:

Moist weight and tare = 26.30

Dry weight and tare = 26.20

Tare weight = 11.10

Hygroscopic moisture = 0.7%

Table of composite correction values:

Temp., deg. C:	15.0	17.8	25.5
Comp. corr.:	-5.8	-5.0	-2.9

Meniscus correction only = -1.0

Specific gravity of solids = 2.7

Hydrometer type = 152H

Hydrometer effective depth equation:  $L = 16.298 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	19.5	33.5	29.0	0.0135	32.5	21.6	0.0445	33.8
5.00	19.5	30.0	25.5	0.0135	29.0	21.1	0.0278	29.7
15.00	19.5	24.5	20.0	0.0135	23.5	20.2	0.0157	23.3
30.00	19.5	21.9	17.4	0.0135	20.9	19.7	0.0110	20.3
60.00	19.5	18.0	13.5	0.0135	17.0	19.1	0.0076	15.7
250.00	19.3	14.0	9.4	0.0136	13.0	18.4	0.0037	11.0
1440.00	18.6	11.5	6.7	0.0137	10.5	18.0	0.0015	7.8

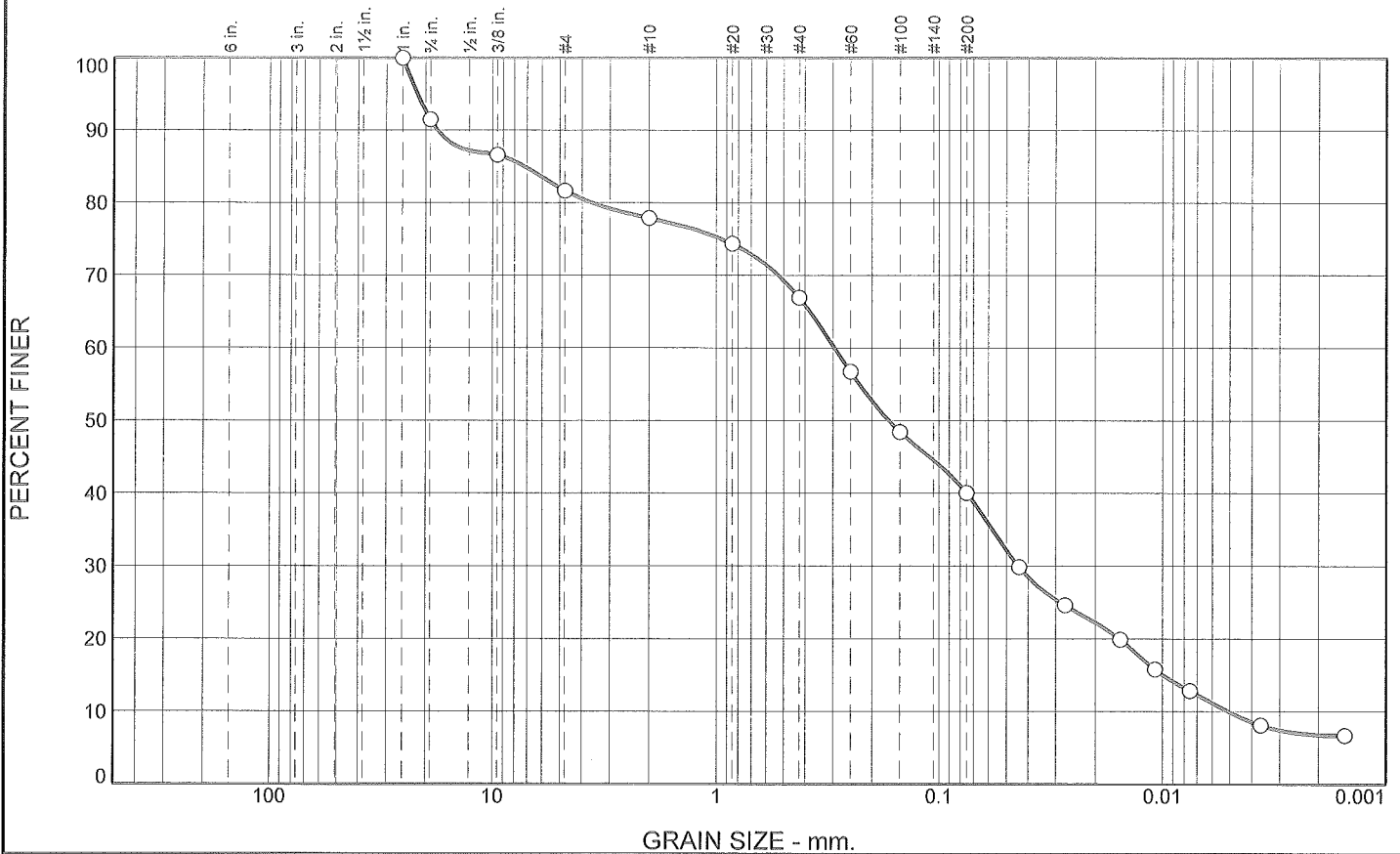
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	3.1	12.9	16.0	3.5	10.4	26.5	40.4	31.3	12.3	43.6

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.0028	0.0072	0.0107	0.0287	0.1264	0.2458	1.7083	5.8652	11.0786	16.3613

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.81	87.00	1.19

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.5	9.8	3.8	11.0	26.8	30.2	9.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	91.5		
3/8"	86.6		
#4	81.7		
#10	77.9		
#20	74.3		
#40	66.9		
#60	56.7		
#100	48.4		
#200	40.1		

**Material Description**

Silty Sand with Gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>90</sub>= 17.6381      D<sub>85</sub>= 7.1962      D<sub>60</sub>= 0.2948  
D<sub>50</sub>= 0.1683      D<sub>30</sub>= 0.0442      D<sub>15</sub>= 0.0099  
D<sub>10</sub>= 0.0051      C<sub>u</sub>= 58.10      C<sub>c</sub>= 1.30

**Classification**

USCS= SM      AASHTO= A-4(0)

**Remarks**

\* (no specification provided)

**Source of Sample:** Boring E330 - B-03  
**Sample Number:** HMA 7494j/Golder S21

**Depth:** 52'-52.5'

**Date:** 2/1/13

**Hayre McElroy & Associates, LLC**

**Client:** Golder Associates  
**Project:** Sound Transit East Link

**Redmond, WA**

**Project No:** 12-450

**Figure**

**Tested By:** Tara Pfaff

**Checked By:** JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

2/1/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330 - B-03

**Depth:** 52'-52.5'

**Sample Number:** HMA 7494j/Golder S21

**Material Description:** Silty Sand with Gravel

**Date:** 2/1/13

**PL:** NP

**LL:** NP

**PI:** NP

**USCS Classification:** SM

**AASHTO Classification:** A-4(0)

**Tested by:** Tara Pfaff

**Checked by:** JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 434.90  
 Tare Wt. = 162.20  
 Minus #200 from wash = 39.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
612.60	162.20	1"	0.00	0.00	100.0
		3/4"	1543.40	1505.10	91.5
		3/8"	1506.10	1484.00	86.6
		#4	1379.90	1357.70	81.7
		#10	1190.70	1173.60	77.9
		#20	1084.20	1068.30	74.3
		#40	979.00	945.60	66.9
		#60	924.80	878.90	56.7
		#100	881.00	843.70	48.4
		#200	1058.20	1020.40	40.1

**Hydrometer Test Data**

Hydrometer test uses material passing #10  
 Percent passing #10 based upon complete sample = 77.9  
 Weight of hydrometer sample = 66.5  
 Hygroscopic moisture correction:  
 Moist weight and tare = 35.60  
 Dry weight and tare = 35.30  
 Tare weight = 13.60  
 Hygroscopic moisture = 1.4%  
 Table of composite correction values:  
 Temp., deg. C: 15.0 17.8 25.5  
 Comp. corr.: -5.8 -5.0 -2.9  
 Meniscus correction only = -1.0  
 Specific gravity of solids = 2.7  
 Hydrometer type = 152H  
 Hydrometer effective depth equation:  $L = 16.298 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	19.5	30.0	25.5	0.0135	29.0	21.1	0.0439	29.9
5.00	19.5	25.5	21.0	0.0135	24.5	20.3	0.0273	24.6
15.00	19.5	21.5	17.0	0.0135	20.5	19.7	0.0155	19.9
30.00	19.5	18.0	13.5	0.0135	17.0	19.1	0.0108	15.8
60.00	19.5	15.5	11.0	0.0135	14.5	18.7	0.0075	12.9
250.00	19.3	11.5	6.9	0.0136	10.5	18.0	0.0036	8.1
1440.00	18.6	10.5	5.7	0.0137	9.5	17.9	0.0015	6.7

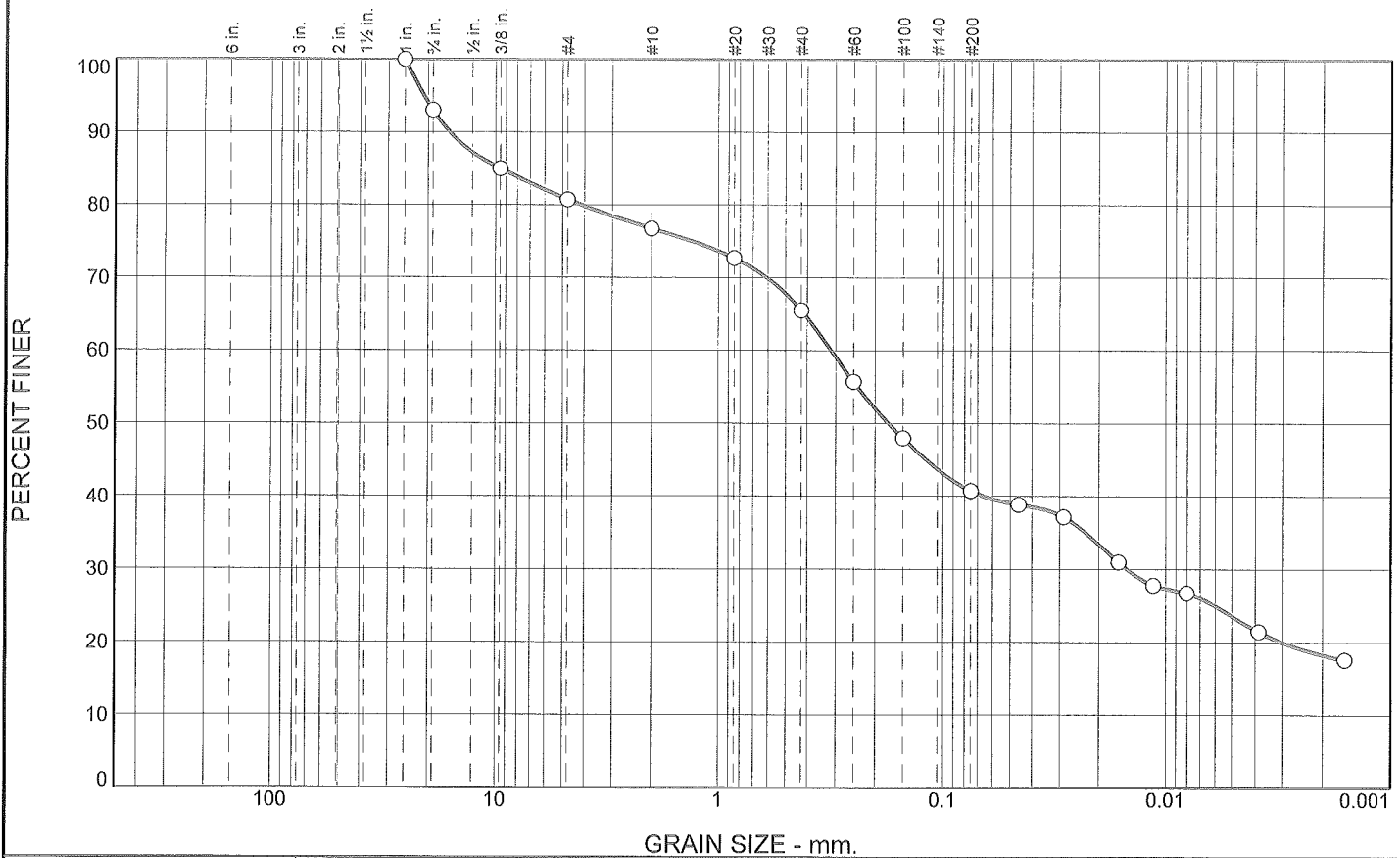
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	8.5	9.8	18.3	3.8	11.0	26.8	41.6	30.2	9.9	40.1

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.0051	0.0099	0.0156	0.0442	0.1683	0.2948	3.6077	7.1962	17.6381	21.7417

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
2.06	58.10	1.30

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.0	12.3	4.0	11.2	24.8	17.2	23.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	93.0		
3/8"	85.0		
#4	80.7		
#10	76.7		
#20	72.7		
#40	65.5		
#60	55.7		
#100	48.0		
#200	40.7		

**Material Description**

Silty Sand with Gravel

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>90</sub>= 16.0553      D<sub>85</sub>= 9.5390      D<sub>60</sub>= 0.3141  
D<sub>50</sub>= 0.1743      D<sub>30</sub>= 0.0149      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= SM                      AASHTO= A-4(0)

**Remarks**

\* (no specification provided)

Source of Sample: Boring E330 - B-03  
Sample Number: HMA 7494k/Golder S25

Depth: 62'-62.5'

Date: 2/1/13

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
---	--

Figure

Tested By: Tara Pfaff

Checked By: JAM



**GRAIN SIZE DISTRIBUTION TEST DATA**

2/1/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330 - B-03

**Depth:** 62'-62.5'

**Sample Number:** HMA 7494k/Golder S25

**Material Description:** Silty Sand with Gravel

**Date:** 2/1/13

**PL:** NP

**LL:** NP

**PI:** NP

**USCS Classification:** SM

**AASHTO Classification:** A-4(0)

**Tested by:** Tara Pfaff

**Checked by:** JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 536.40  
 Tare Wt. = 234.80  
 Minus #200 from wash = 40.3%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
739.80	234.80	1"	0.00	0.00	100.0
		3/4"	1540.30	1505.00	93.0
		3/8"	1524.40	1483.90	85.0
		#4	1379.00	1357.50	80.7
		#10	1193.80	1173.60	76.7
		#20	1088.70	1068.30	72.7
		#40	981.80	945.50	65.5
		#60	928.50	878.90	55.7
		#100	882.80	843.80	48.0
		#200	1056.90	1020.40	40.7

**Hydrometer Test Data**

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 76.7

Weight of hydrometer sample = 72.9

Hygroscopic moisture correction:

Moist weight and tare = 33.70

Dry weight and tare = 33.50

Tare weight = 13.70

Hygroscopic moisture = 1.0%

Table of composite correction values:

Temp., deg. C: 15.0 17.8 25.5

Comp. corr.: -5.8 -5.0 -2.9

Meniscus correction only = -1.0

Specific gravity of solids = 2.7

Hydrometer type = 152H

Hydrometer effective depth equation:  $L = 16.298 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	19.5	41.5	37.0	0.0135	40.5	22.9	0.0458	38.9
5.00	19.5	39.9	35.4	0.0135	38.9	22.7	0.0288	37.2
15.00	19.5	34.0	29.5	0.0135	33.0	21.7	0.0163	31.0
30.00	19.5	31.0	26.5	0.0135	30.0	21.2	0.0114	27.8
60.00	19.3	30.0	25.4	0.0136	29.0	21.1	0.0080	26.7
250.00	19.3	25.0	20.4	0.0136	24.0	20.2	0.0039	21.5
1440.00	18.6	21.5	16.7	0.0137	20.5	19.7	0.0016	17.6

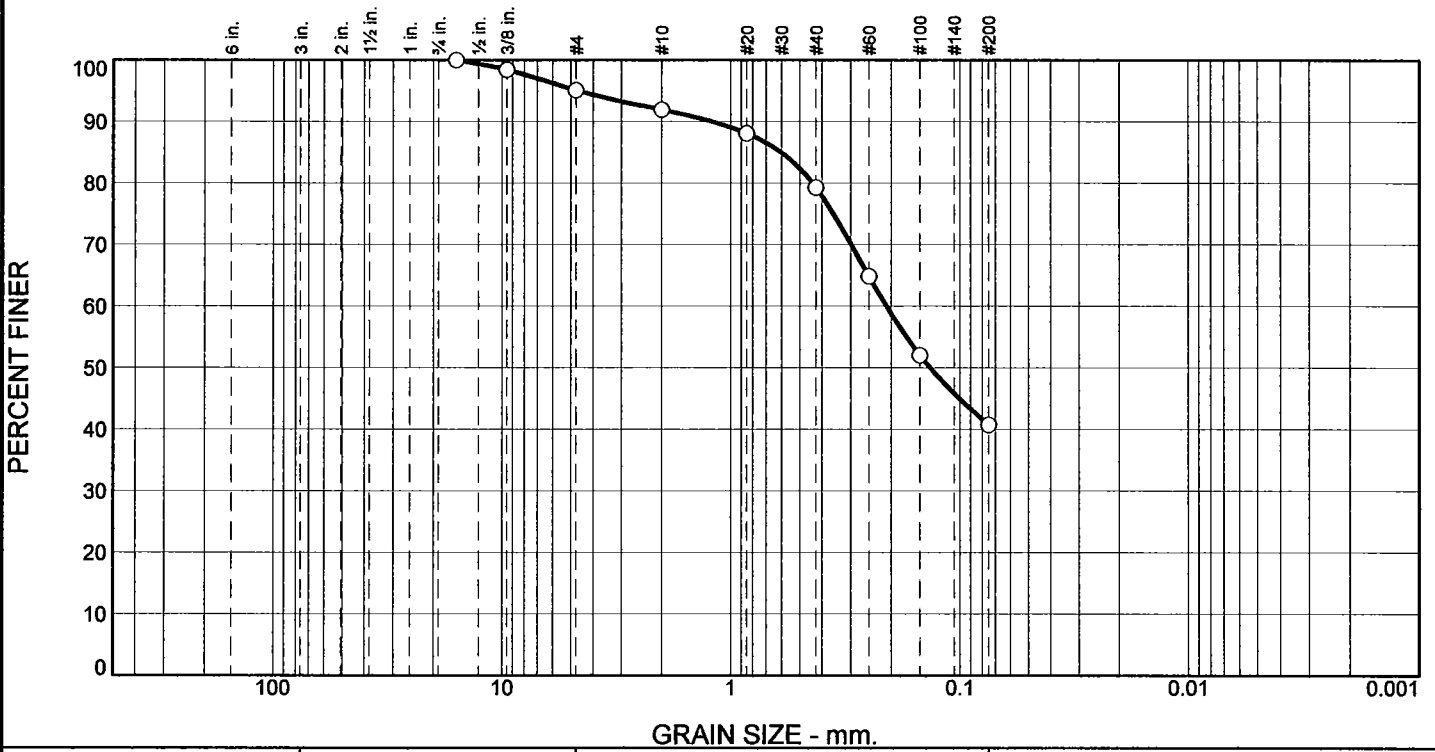
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	7.0	12.3	19.3	4.0	11.2	24.8	40.0	17.2	23.5	40.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
		0.0030	0.0149	0.1743	0.3141	4.1313	9.5390	16.0553	20.8397

<b>Fineness Modulus</b>
2.12

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.9	3.2	12.6	38.5	40.8	

Test Results (ASTM C 136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
5/8"	100.0		
3/8"	98.4		
#4	95.1		
#10	91.9		
#20	88.1		
#40	79.3		
#60	64.9		
#100	52.1		
#200	40.8		

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 1.1972      D<sub>85</sub>= 0.6015      D<sub>60</sub>= 0.2095  
D<sub>50</sub>= 0.1351      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

Date Received: 05/03/13      Date Tested: 05/07/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-003A  
Sample Number: HMA#7510-7/S-3

Depth: 7.5'-9.0'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-003A

**Depth:** 7.5'-9.0'

**Sample Number:** HMA#7510-7/S-3

**Material Description:** Olive Gray Silty Sand

**Date Received:** 05/03/13

**AASHTO Classification:** A-4(0)

**USCS Classification:** SM

**Grain Size Test Method:** ASTM C 136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/07/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 439.30  
 Tare Wt. = 114.20  
 Minus #200 from wash = 39.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
654.20	114.20	5/8"	0.00	0.00	100.0
		3/8"	1492.50	1484.10	98.4
		#4	1375.40	1357.40	95.1
		#10	1531.90	1514.80	91.9
		#20	1088.70	1067.80	88.1
		#40	992.50	945.10	79.3
		#60	956.60	878.60	64.9
		#100	912.50	843.50	52.1
		#200	1081.00	1019.90	40.8

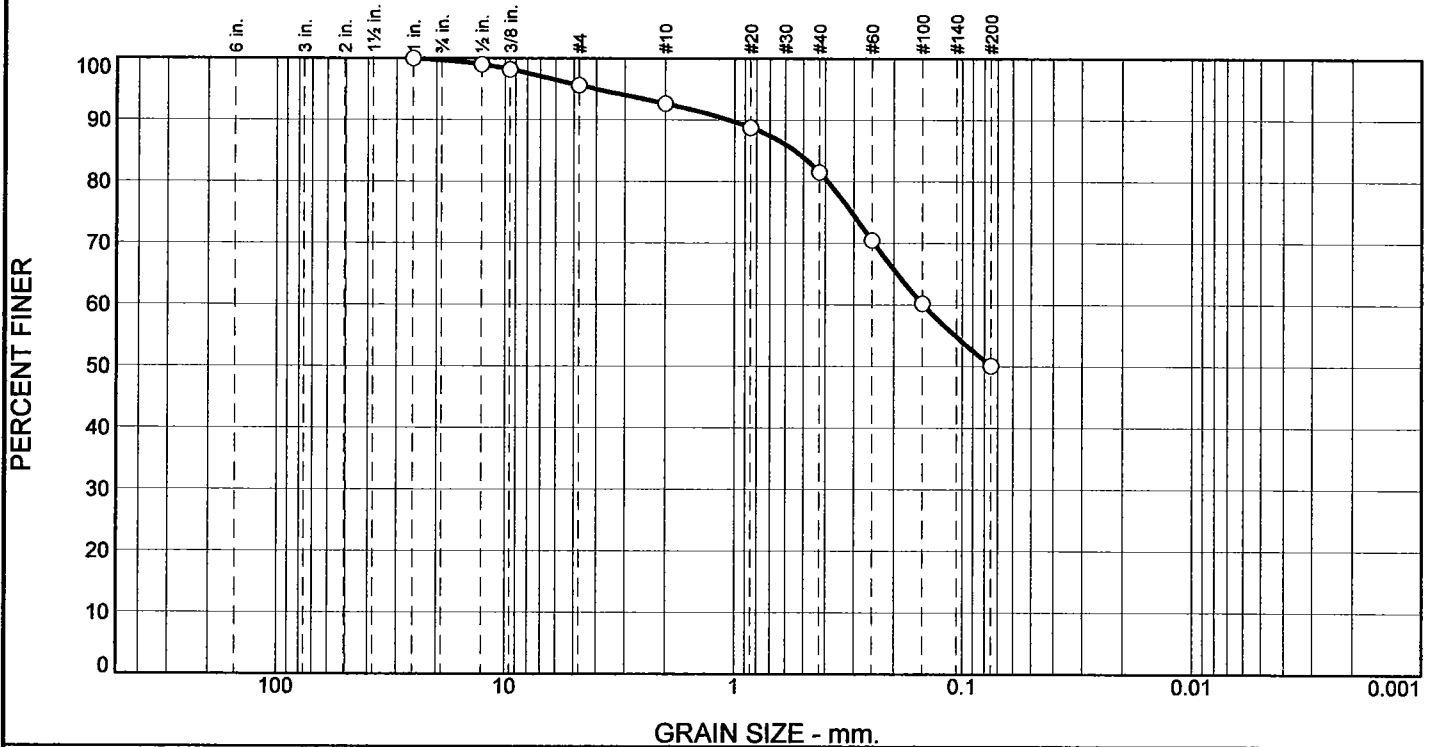
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	4.9	4.9	3.2	12.6	38.5	54.3			40.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1351	0.2095	0.4393	0.6015	1.1972	4.6356

<b>Fineness Modulus</b>
1.17

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.3	4.1	2.9	11.2	31.4	50.1	

Test Results (ASTM C 136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
1/2"	99.0		
3/8"	98.2		
#4	95.6		
#10	92.7		
#20	88.8		
#40	81.5		
#60	70.5		
#100	60.2		
#200	50.1		

**Material Description**

Olive Gray Sandy Silt

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 1.0536                      D<sub>85</sub>= 0.5431                      D<sub>60</sub>= 0.1479  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks


---

Date Received: 05/03/13                      Date Tested: 05/07/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-003A  
Sample Number: HMA#7510-8/S-5

Depth: 12.5'-13.3'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-003A

**Depth:** 12.5'-13.3'

**Sample Number:** HMA#7510-8/S-5

**Material Description:** Olive Gray Sandy Silt

**Date Received:** 05/03/13

**AASHTO Classification:** A-4(0)

**USCS Classification:** ML

**Grain Size Test Method:** ASTM C 136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/07/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 358.30  
 Tare Wt. = 115.30  
 Minus #200 from wash = 49.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
595.50	115.30	1"	0.00	0.00	100.0
		1/2"	1424.40	1419.70	99.0
		3/8"	1487.50	1483.60	98.2
		#4	1369.70	1357.30	95.6
		#10	1528.90	1514.70	92.7
		#20	1086.50	1067.80	88.8
		#40	979.80	945.10	81.5
		#60	931.60	878.50	70.5
		#100	892.50	843.30	60.2
		#200	1068.40	1019.90	50.1

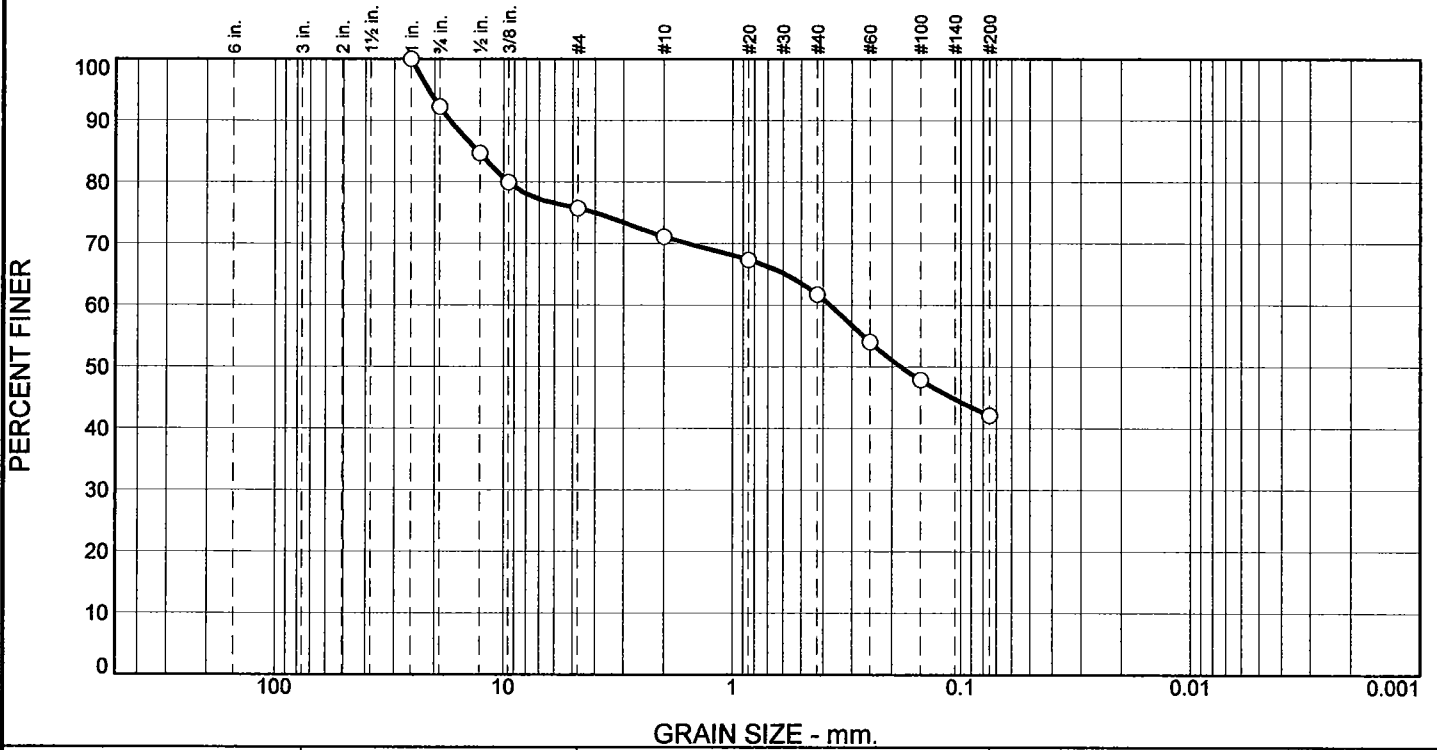
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.3	4.1	4.4	2.9	11.2	31.4	45.5			50.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
					0.1479	0.3898	0.5431	1.0536	3.9866

<b>Fineness Modulus</b>
1.02

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.7	16.5	4.7	9.3	19.7	42.1	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	92.3		
1/2"	84.7		
3/8"	80.0		
#4	75.8		
#10	71.1		
#20	67.4		
#40	61.8		
#60	54.0		
#100	47.9		
#200	42.1		

**Material Description**

Gray Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 17.1488      D<sub>85</sub>= 12.9206      D<sub>60</sub>= 0.3729  
D<sub>50</sub>= 0.1831      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 05/03/13      Date Tested: 05/07/13  
Tested By: JF  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-003A  
Sample Number: HMA#7510-9/S-10

Depth: 30'-30.4'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-003A

**Depth:** 30'-30.4'

**Sample Number:** HMA#7510-9/S-10

**Material Description:** Gray Silty Sand W/Gravel

**Date Received:** 05/03/13

**AASHTO Classification:** A-4(0)

**USCS Classification:** SM

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/07/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 287.70  
 Tare Wt. = 114.70  
 Minus #200 from wash = 41.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
408.90	114.70	1"	0.00	0.00	100.0
		3/4"	1527.70	1504.90	92.3
		1/2"	1441.90	1419.70	84.7
		3/8"	1497.60	1483.70	80.0
		#4	1369.70	1357.30	75.8
		#10	1528.50	1514.80	71.1
		#20	1078.70	1067.70	67.4
		#40	961.70	945.20	61.8
		#60	901.30	878.50	54.0
		#100	861.60	843.50	47.9
		#200	1037.00	1020.00	42.1

**Fractional Components**

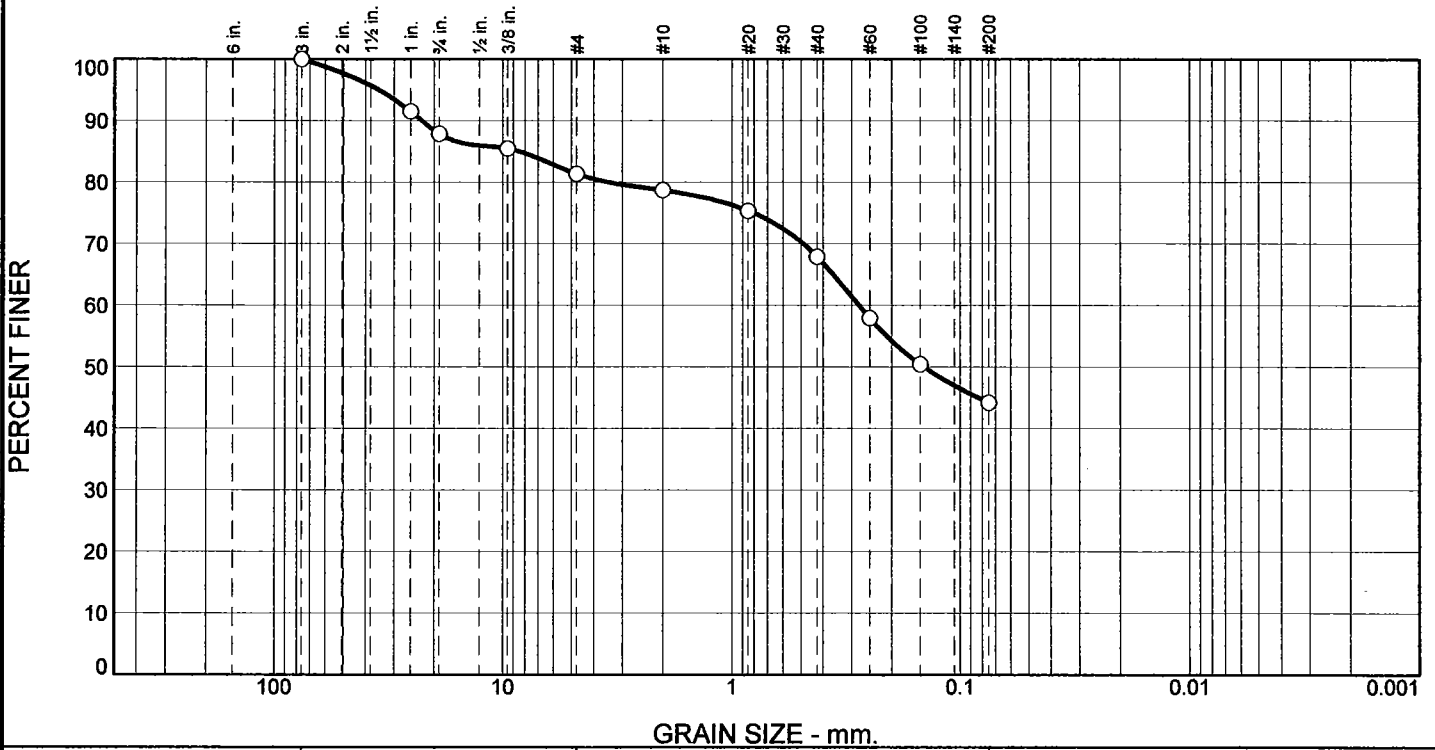
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	7.7	16.5	24.2	4.7	9.3	19.7	33.7			42.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1831	0.3729	9.5394	12.9206	17.1488	21.2578

<b>Fineness Modulus</b>
2.41



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.1	6.5	2.7	10.8	23.7	44.2	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1"	91.5		
3/4"	87.9		
3/8"	85.5		
#4	81.4		
#10	78.7		
#20	75.4		
#40	67.9		
#60	57.9		
#100	50.4		
#200	44.2		

**Material Description**

Gray Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 22.7104      D<sub>85</sub>= 8.4626      D<sub>60</sub>= 0.2792  
D<sub>50</sub>= 0.1445      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


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Date Received: 05/03/13      Date Tested: 05/07/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-003A  
Sample Number: HMA#7510-10/S-16

Depth: 60'-60.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-003A

**Depth:** 60'-60.5'

**Sample Number:** HMA#7510-10/S-16

**Material Description:** Gray Silty Sand W/Gravel

**Date Received:** 05/03/13

**AASHTO Classification:** A-4(0)

**USCS Classification:** SM

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/07/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 332.70  
 Tare Wt. = 114.00  
 Minus #200 from wash = 43.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
500.30	114.00	3"	0.00	0.00	100.0
		1"	1502.30	1469.50	91.5
		3/4"	1519.10	1505.00	87.9
		3/8"	1493.00	1483.80	85.5
		#4	1373.20	1357.30	81.4
		#10	1525.20	1514.90	78.7
		#20	1080.80	1067.90	75.4
		#40	974.00	945.20	67.9
		#60	917.00	878.50	57.9
		#100	872.40	843.40	50.4
		#200	1044.10	1020.00	44.2

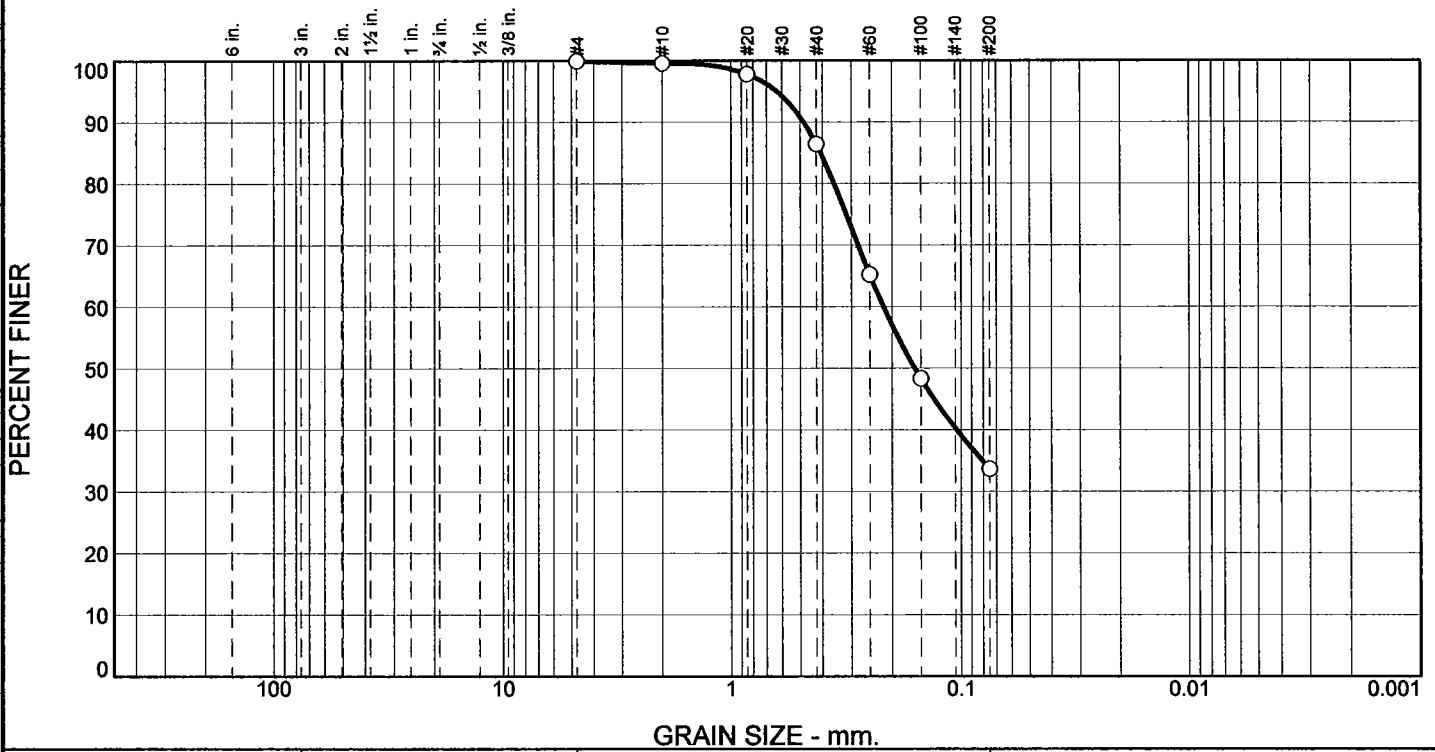
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	12.1	6.5	18.6	2.7	10.8	23.7	37.2			44.2

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
				0.1445	0.2792	3.4621	8.4626	22.7104	34.9339

<b>Fineness Modulus</b>
2.09

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			0.4	13.2	52.8	33.6	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.6		
#20	97.8		
#40	86.4		
#60	65.2		
#100	48.3		
#200	33.6		

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.4823                      D<sub>85</sub>= 0.4072                      D<sub>60</sub>= 0.2178

D<sub>50</sub>= 0.1594                      D<sub>30</sub>=                                      D<sub>15</sub>=

D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

Remarks

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Date Received: 05/03/13                      Date Tested: 05/08/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-003A  
 Sample Number: HMA#7510-11/S-20

Depth: 80'-81.5'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>	Client: Golder Associates Project: Sound Transit East Link Project No: 12-450
<b>Redmond, WA</b>	<b>Figure</b>

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-003A

**Depth:** 80'-81.5'

**Sample Number:** HMA#7510-11/S-20

**Material Description:** Olive Gray Silty Sand

**Date Received:** 05/03/13

**AASHTO Classification:** A-2-4(0)

**USCS Classification:** SM

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/08/13

**Checked By:** JAM

Sieve Test Data

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 412.10  
 Tare Wt. = 118.40  
 Minus #200 from wash = 32.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
552.90	118.40	#4	1357.50	1357.30	100.0
		#10	1516.40	1514.80	99.6
		#20	1075.60	1067.90	97.8
		#40	994.60	945.10	86.4
		#60	970.50	878.50	65.2
		#100	917.00	843.50	48.3
		#200	1083.80	1020.00	33.6

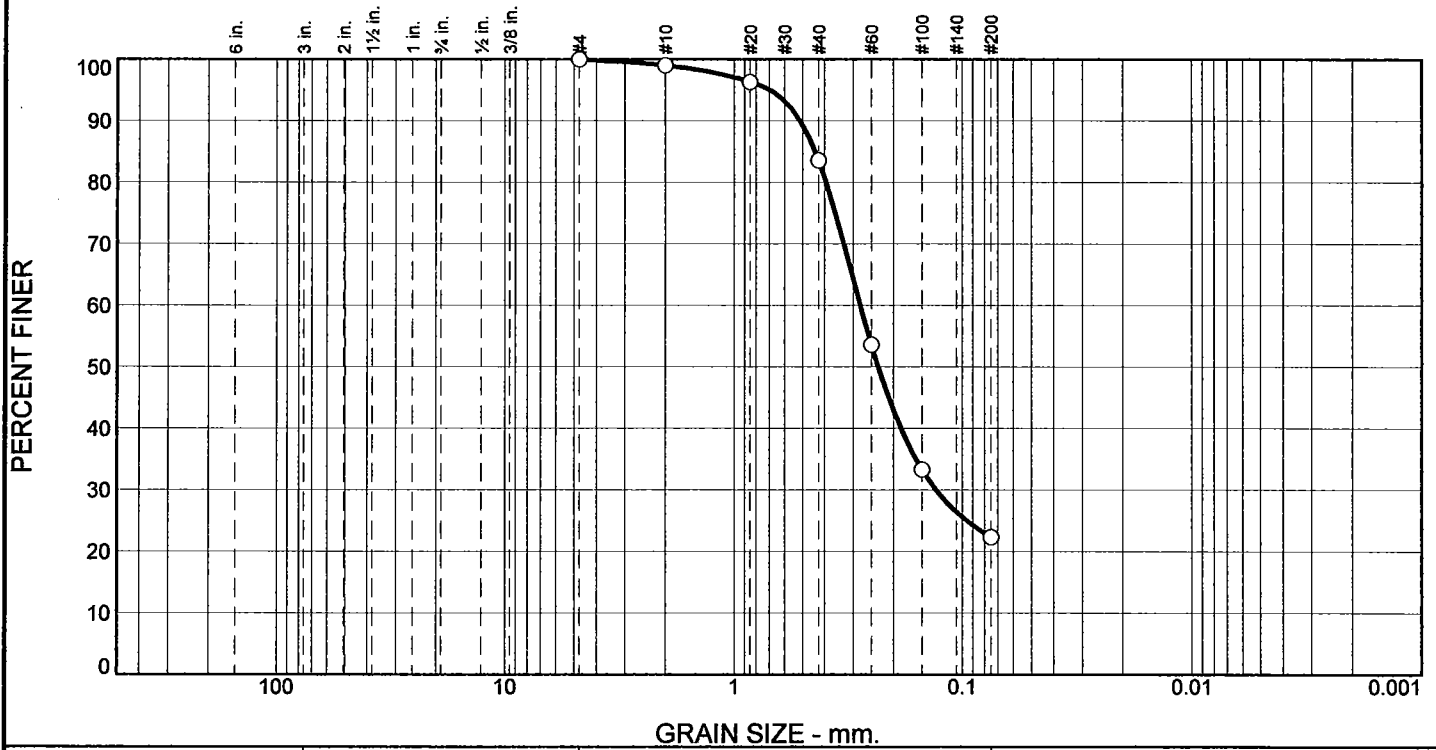
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
				0.4	13.2	52.8	66.4			33.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1594	0.2178	0.3561	0.4072	0.4823	0.6290

<b>Fineness Modulus</b>
0.86

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.0	15.5	61.2	22.3	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.0		
#20	96.3		
#40	83.5		
#60	53.6		
#100	33.3		
#200	22.3		

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.5129                      D<sub>85</sub>= 0.4401                      D<sub>60</sub>= 0.2794

D<sub>50</sub>= 0.2333                      D<sub>30</sub>= 0.1304                      D<sub>15</sub>=

D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

Remarks

---

Date Received: 05/03/13                      Date Tested: 05/08/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-003A  
 Sample Number: HMA#7510-12/S-23

Depth: 90.5'-91.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-003A

**Depth:** 90.5'-91.5'  
**Material Description:** Olive Gray Silty Sand  
**Date Received:** 05/03/13

**Sample Number:** HMA#7510-12/S-23

**USCS Classification:** SM

**AASHTO Classification:** A-2-4(0)

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/08/13

**Checked By:** JAM

Sieve Test Data

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 359.30  
 Tare Wt. = 117.00  
 Minus #200 from wash = 21.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
425.10	117.00	#4	0.00	0.00	100.0
		#10	1517.70	1514.70	99.0
		#20	1076.10	1067.80	96.3
		#40	984.50	945.10	83.5
		#60	970.60	878.40	53.6
		#100	905.90	843.30	33.3
		#200	1053.80	1019.90	22.3

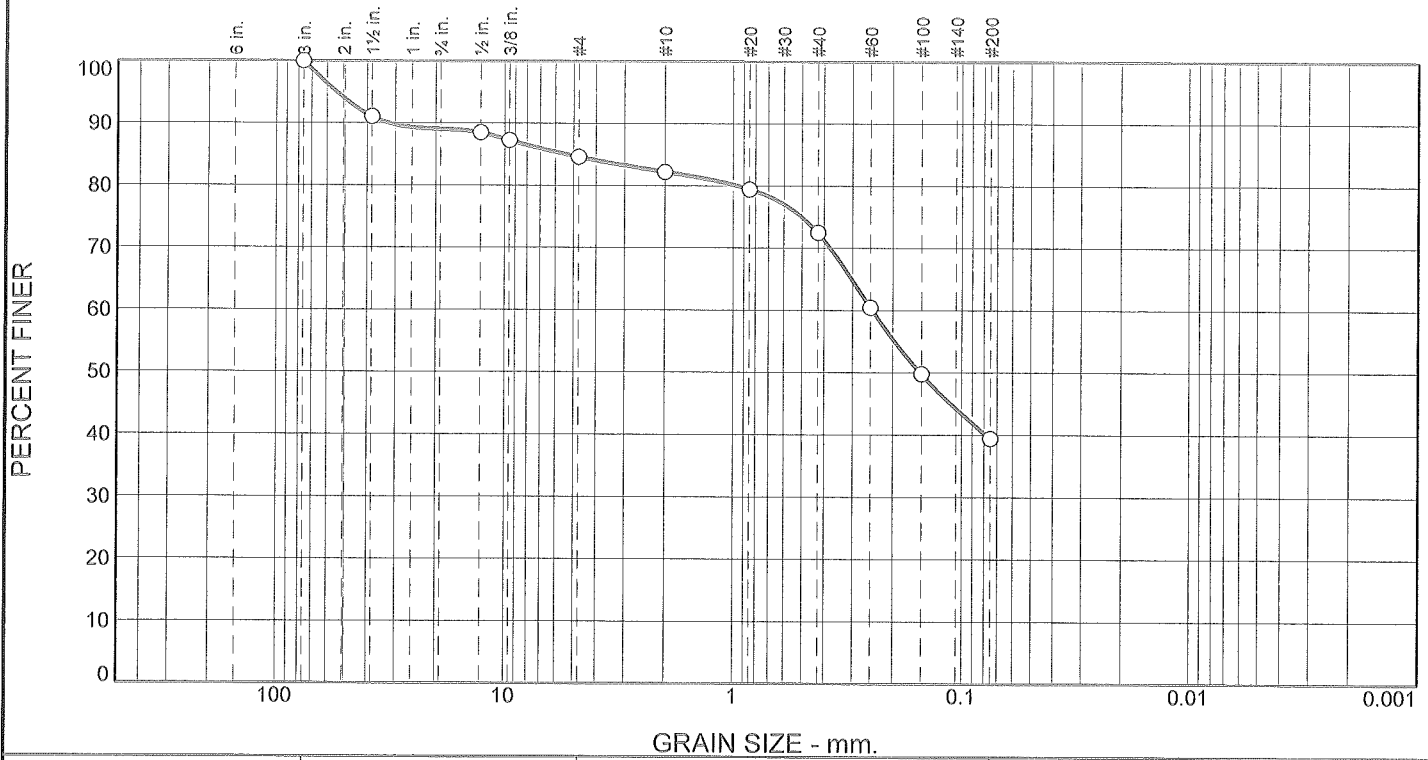
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.0	15.5	61.2	77.7			22.3

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
			0.1304	0.2333	0.2794	0.3942	0.4401	0.5129	0.6940

<b>Fineness Modulus</b>
1.12

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.0	4.4	2.4	9.7	33.1	39.4	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1 1/2"	91.1		
1/2"	88.5		
3/8"	87.3		
#4	84.6		
#10	82.2		
#20	79.4		
#40	72.5		
#60	60.4		
#100	49.8		
#200	39.4		

\* (no specification provided)

**Material Description**

Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 32.1081      D<sub>85</sub>= 5.3590      D<sub>60</sub>= 0.2453  
D<sub>50</sub>= 0.1516      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/24/2013      Date Tested: 6/3/2013  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-004  
Sample Number: HMA#7513-30/S-2

Depth: 4'-5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/4/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-004

Depth: 4'-5'

Sample Number: HMA#7513-30/S-2

Material Description: Brown Silty Sand W/Gravel

Date Received: 5/24/2013

USCS Classification: SM

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/3/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 1000.20  
 Tare Wt. = 196.10  
 Minus #200 from wash = 38.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1510.40	196.10	3"	0.00	0.00	100.0
		1 1/2"	1568.20	1450.70	91.1
		1/2"	1453.20	1419.50	88.5
		3/8"	1499.60	1483.60	87.3
		#4	1392.30	1357.10	84.6
		#10	1545.80	1514.40	82.2
		#20	1103.70	1067.30	79.4
		#40	1036.50	944.70	72.5
		#60	1036.20	878.30	60.4
		#100	982.90	843.20	49.8
		#200	1156.20	1019.70	39.4

**Fractional Components**

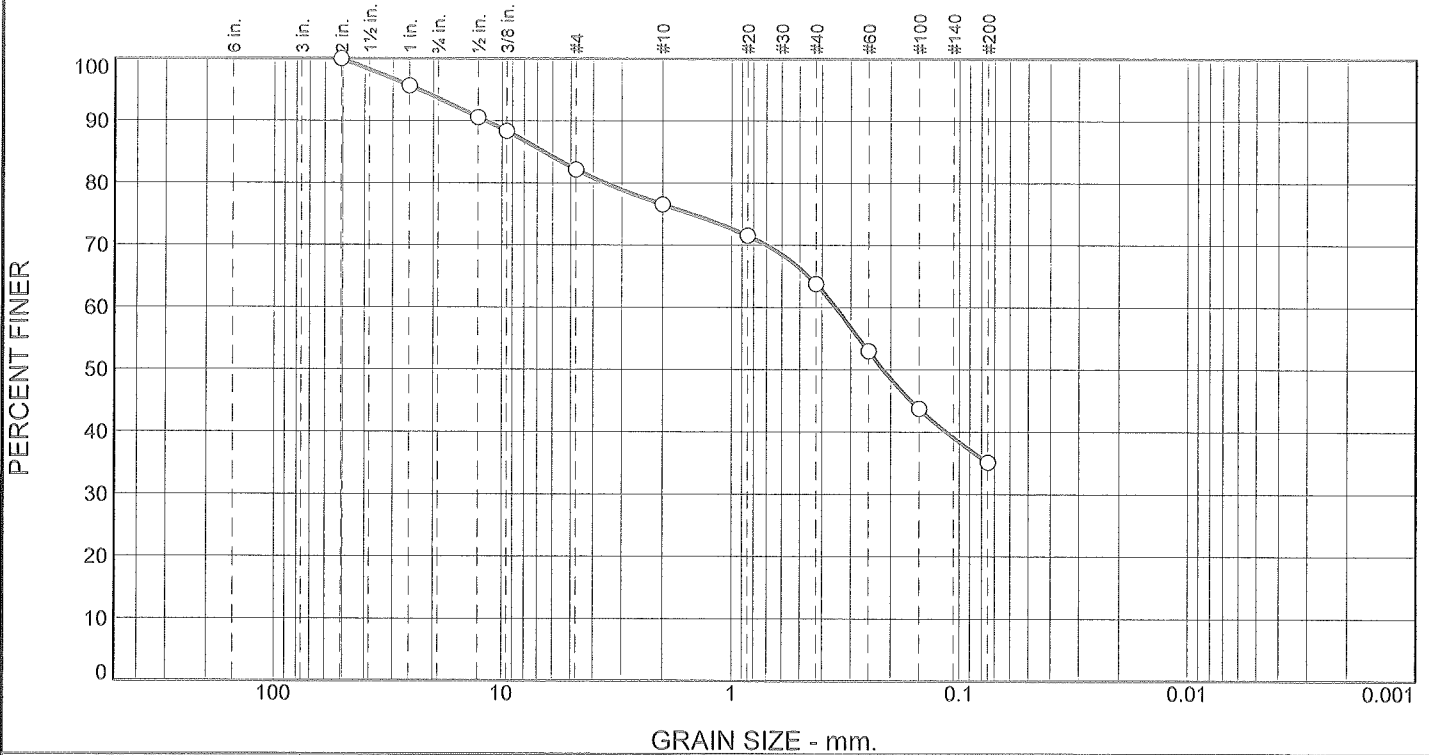
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	11.0	4.4	15.4	2.4	9.7	33.1	45.2			39.4

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1516	0.2453	0.9589	5.3590	32.1081	54.3619

<b>Fineness Modulus</b>
1.93



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	11.4	5.7	12.7	28.7	35.1	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2"	100.0		
1"	95.7		
1/2"	90.6		
3/8"	88.3		
#4	82.2		
#10	76.5		
#20	71.5		
#40	63.8		
#60	53.0		
#100	43.8		
#200	35.1		

**Material Description**

Gray Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 11.7749      D<sub>85</sub>= 6.5520      D<sub>60</sub>= 0.3480  
D<sub>50</sub>= 0.2153      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/24/2013      Date Tested: 6/3/2013  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-004  
Sample Number: HMA#7513-31/S-7

Depth: 17.5'-18.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/4/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004

Sample Number: HMA#7513-31/S-7

Material Description: Gray Brown Silty Sand W/Gravel

Date Received: 5/24/2013

AASHTO Classification: A-2-4(0)

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/3/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 868.50  
 Tare Wt. = 113.40  
 Minus #200 from wash = 34.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1267.30	113.40	2"	0.00	0.00	100.0
		1"	1519.80	1469.70	95.7
		1/2"	1478.10	1419.40	90.6
		3/8"	1509.50	1483.70	88.3
		#4	1428.40	1357.10	82.2
		#10	1579.10	1514.40	76.5
		#20	1125.00	1067.20	71.5
		#40	1034.10	944.90	63.8
		#60	1003.10	878.20	53.0
		#100	949.60	843.30	43.8
		#200	1119.30	1019.70	35.1

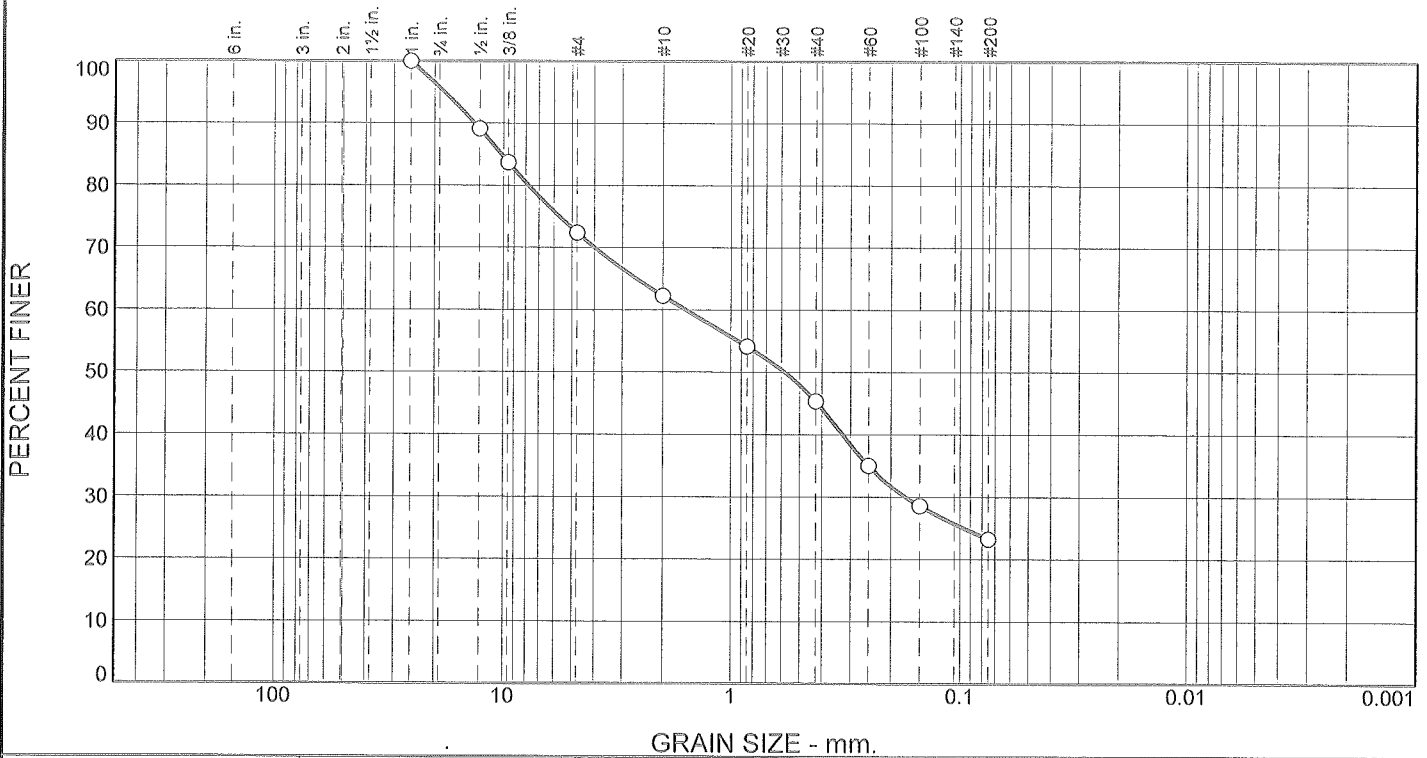
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	6.4	11.4	17.8	5.7	12.7	28.7	47.1			35.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.2153	0.3480	3.5634	6.5520	11.7749	23.0980

<b>Fineness Modulus</b>
2.17

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.2	23.4	10.1	17.0	22.0	23.3	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
1/2"	89.1		
3/8"	83.7		
#4	72.4		
#10	62.3		
#20	54.1		
#40	45.3		
#60	35.0		
#100	28.6		
#200	23.3		

**Material Description**

Gray Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 13.3365      D<sub>85</sub>= 10.2154      D<sub>60</sub>= 1.5836  
D<sub>50</sub>= 0.5800      D<sub>30</sub>= 0.1725      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/24/2013      Date Tested: 6/3/2013

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-004  
Sample Number: HMA#7513-32/S-9

Depth: 26'-27'

Date Sampled:

**Hayre McElroy & Associates, LLC**

**Client:** Golder Associates  
**Project:** Sound Transit East Link

Redmond, WA

**Project No:** 12-450

**Figure**

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/4/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004  
 Depth: 26'-27'

Sample Number: HMA#7513-32/S-9

Material Description: Gray Brown Silty Sand W/Gravel

Date Received: 5/24/2013

USCS Classification: SM

AASHTO Classification: A-1-b

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/3/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 818.60  
 Tare Wt. = 193.10  
 Minus #200 from wash = 22.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1002.90	193.10	1"	0.00	0.00	100.0
		1/2"	1507.60	1419.50	89.1
		3/8"	1527.80	1483.70	83.7
		#4	1448.40	1357.00	72.4
		#10	1596.40	1514.40	62.3
		#20	1133.00	1067.30	54.1
		#40	1016.10	944.70	45.3
		#60	962.00	878.40	35.0
		#100	895.00	843.20	28.6
		#200	1063.00	1019.60	23.3

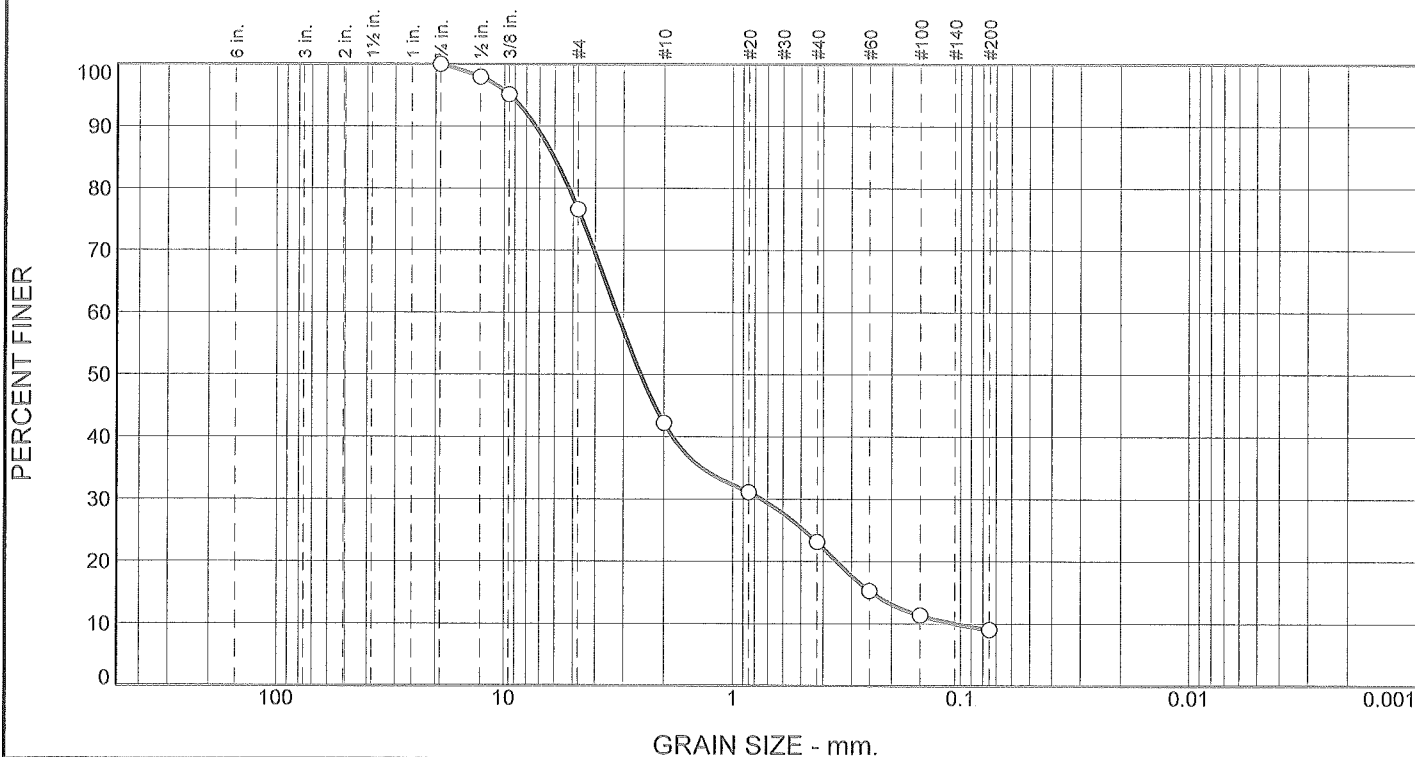
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	4.2	23.4	27.6	10.1	17.0	22.0	49.1			23.3

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1725	0.5800	1.5836	7.7614	10.2154	13.3365	18.0880

<b>Fineness Modulus</b>
3.09

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.4	34.4	19.1	14.1	9.0	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	98.0		
3/8"	95.2		
#4	76.6		
#10	42.2		
#20	31.1		
#40	23.1		
#60	15.3		
#100	11.4		
#200	9.0		

\* (no specification provided)

**Material Description**

Gray Brown Well-graded Sand W/Silt & Gravel

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SW-SM    AASHTO (M 145)= A-1-a

**Coefficients**

D<sub>90</sub>= 7.2716              D<sub>85</sub>= 6.0552              D<sub>60</sub>= 3.2120  
D<sub>50</sub>= 2.5235              D<sub>30</sub>= 0.7468              D<sub>15</sub>= 0.2438  
D<sub>10</sub>= 0.1059              C<sub>u</sub>= 30.34              C<sub>c</sub>= 1.64

Remarks

---

Date Received: 5/24/2013      Date Tested: 6/3/2013

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

Source of Sample: Boring E330-B-004  
Sample Number: HMA#7513-33/S-12

Depth: 33'-34'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/5/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-004

Depth: 33'-34'

Sample Number: HMA#7513-33/S-12

Material Description: Gray Brown Well-graded Sand W/Silt & Gravel

Date Received: 5/24/2013

USCS Classification: SW-SM

AASHTO Classification: A-1-a

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/3/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 1062.30  
 Tare Wt. = 198.10  
 Minus #200 from wash = 9.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1147.70	198.10	3/4"	0.00	0.00	100.0
		1/2"	1439.00	1419.70	98.0
		3/8"	1510.60	1483.90	95.2
		#4	1533.50	1357.20	76.6
		#10	1841.30	1514.60	42.2
		#20	1172.80	1067.60	31.1
		#40	1020.80	945.10	23.1
		#60	953.10	878.60	15.3
		#100	880.90	843.50	11.4
		#200	1041.80	1019.90	9.0

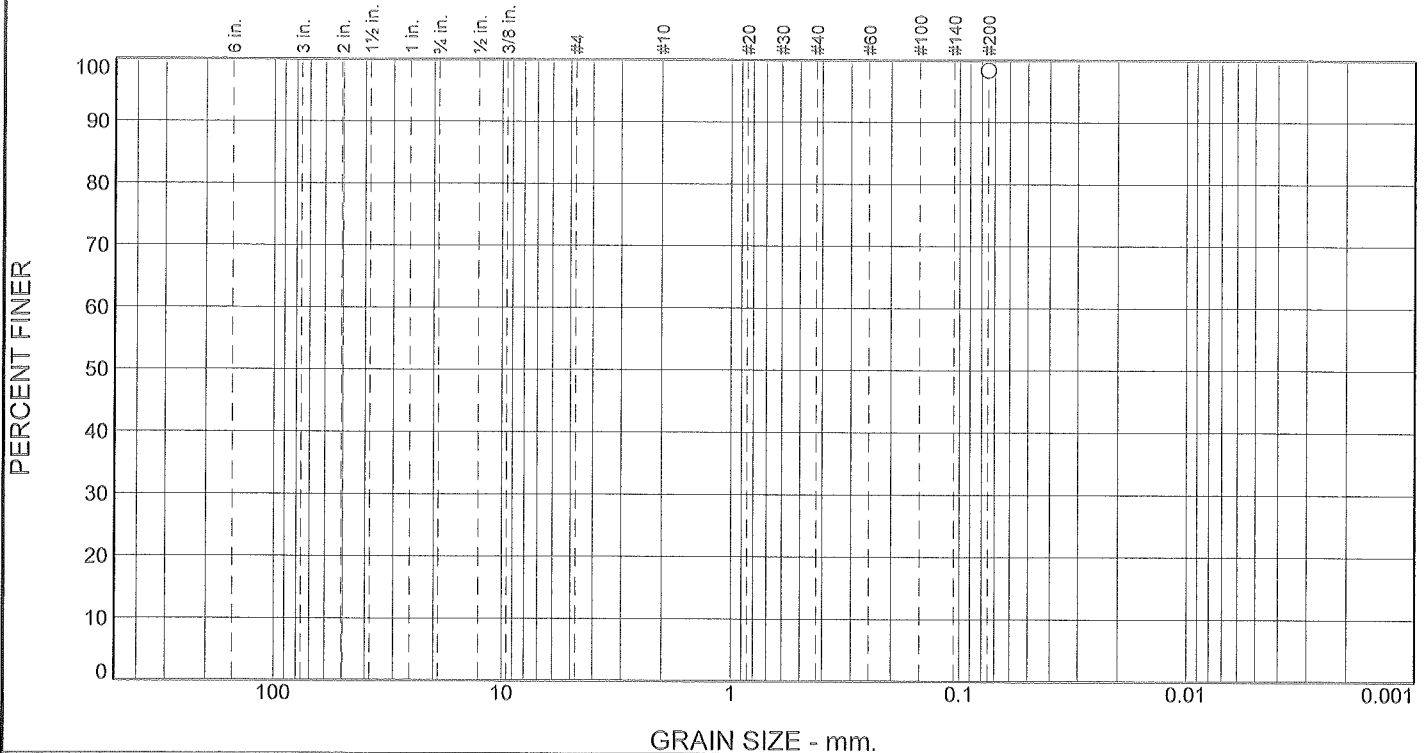
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	23.4	23.4	34.4	19.1	14.1	67.6			9.0

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1059	0.2438	0.3474	0.7468	2.5235	3.2120	5.2063	6.0552	7.2716	9.4214

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
3.90	30.34	1.64

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						98.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	98.4		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**  
 PL= 23                      LL= 34                      PI= 11

**Classification**  
 USCS (D 2487)= CL or OL    AASHTO (M 145)=

**Coefficients**

D <sub>90</sub> =	D <sub>85</sub> =	D <sub>60</sub> =
D <sub>50</sub> =	D <sub>30</sub> =	D <sub>15</sub> =
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =

Remarks

---

Date Received: 5/24/2013                      Date Tested: 5/31/2013  
 Tested By: JF/TP  
 Checked By: JAM  
 Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-004 <b>Sample Number:</b> HMA#7513-34/S-16	<b>Depth:</b> 42'-43'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	<b>Figure</b>

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/5/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004  
 Depth: 42'-43'

Sample Number: HMA#7513-34/S-16

Material Description: Gray Clay

Date Received: 5/24/2013      PL: 23

LL: 34

PI: 11

USCS Classification: CL or OL

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 5/31/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 206.50  
 Tare Wt. = 194.10  
 Minus #200 from wash = 98.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
990.90	194.10	#200			98.4

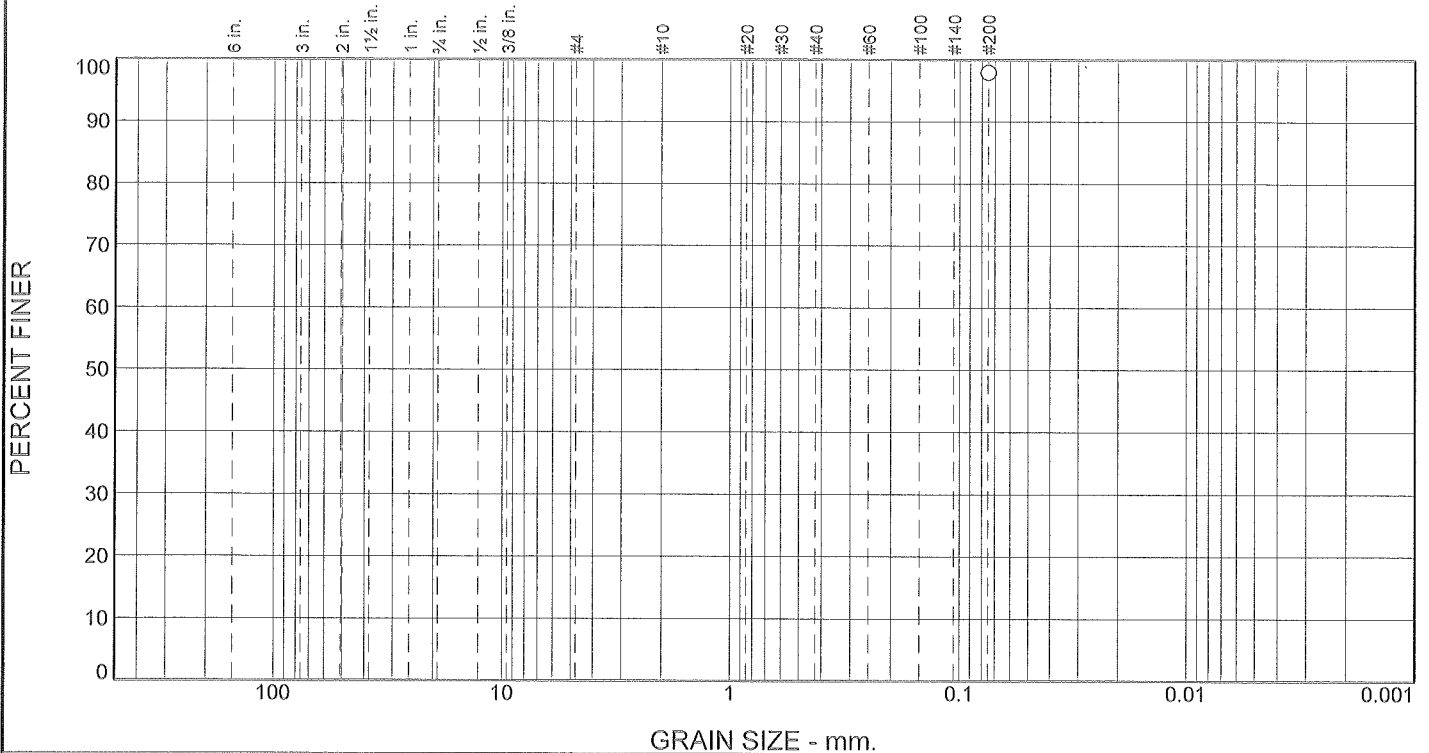
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										98.4

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						98.0	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	98.0		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 22                      LL= 36                      PI= 14

**Classification**

USCS (D 2487)=    CL or OL    AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/24/2013                      Date Tested: 5/31/2013

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-004  
Sample Number: HMA#7513-35/S-21

Depth: 68'-69'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/5/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004  
 Depth: 68'-69'

Sample Number: HMA#7513-35/S-21

Material Description: Gray Clay

Date Received: 5/24/2013      PL: 22

LL: 36

PI: 14

USCS Classification: CL or OL

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 5/31/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 255.20  
 Tare Wt. = 231.00  
 Minus #200 from wash = 98.0%

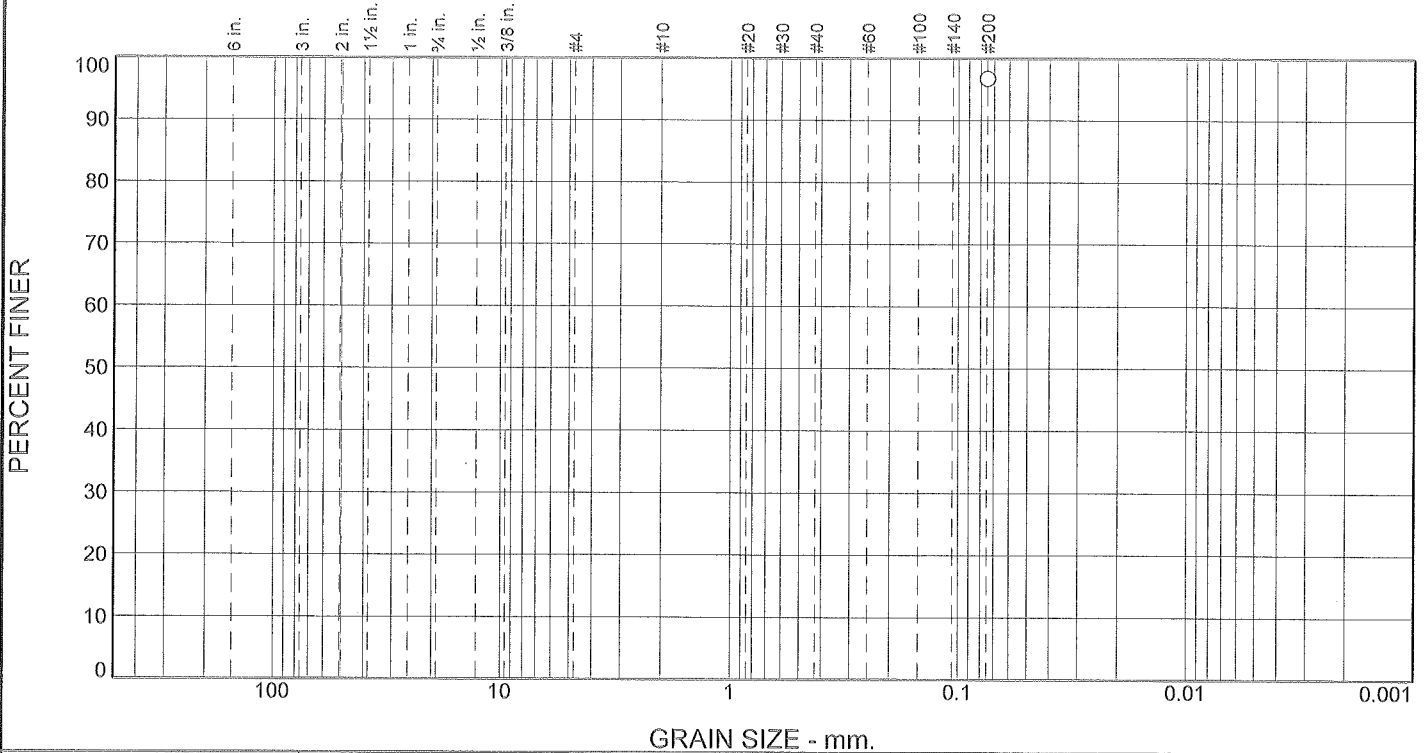
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1428.90	231.00	#200			98.0

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										98.0

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						96.8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	96.8		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL= 25                      LL= 34                      PI= 9

**Classification**

USCS (D 2487)= ML or OL AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/24/2013                      Date Tested: 6/3/2013

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-004                      Depth: 81'-83'                      Date Sampled:

Sample Number: HMA#7513-36/S-24

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	Client: Golder Associates Project: Sound Transit East Link  Project No: 12-450
---	---

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/5/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004  
 Depth: 81'-83'

Sample Number: HMA#7513-36/S-24

Material Description: Gray Silt  
 Date Received: 5/24/2013      PL: 25

LL: 34                                      PI: 9

USCS Classification: ML or OL  
 #200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/3/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 265.10  
 Tare Wt. = 234.90  
 Minus #200 from wash = 96.8%

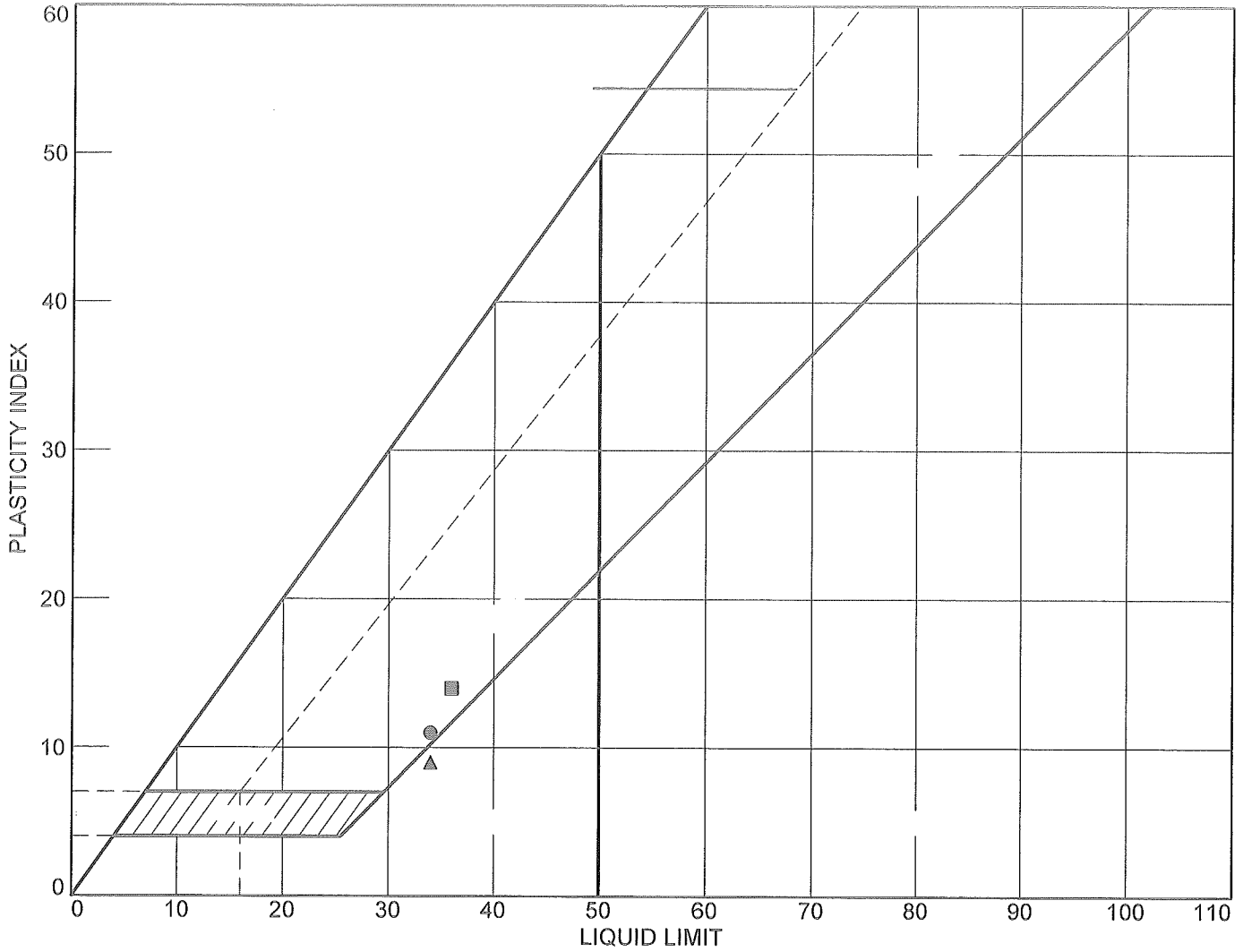
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1175.70	234.90	#200			96.8

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										96.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-004	HMA#7513-34/S-16	42'-43'	27.2	23	34	11	CL or OL
■	Boring E330-B-004	HMA#7513-35/S-21	68'-69'	24.9	22	36	14	CL or OL
▲	Boring E330-	HMA#7513-	81'-83'	21.8	25	34	9	ML or OL

**Hayre McElroy & Associates, LLC**

Redmond, WA

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/5/2013

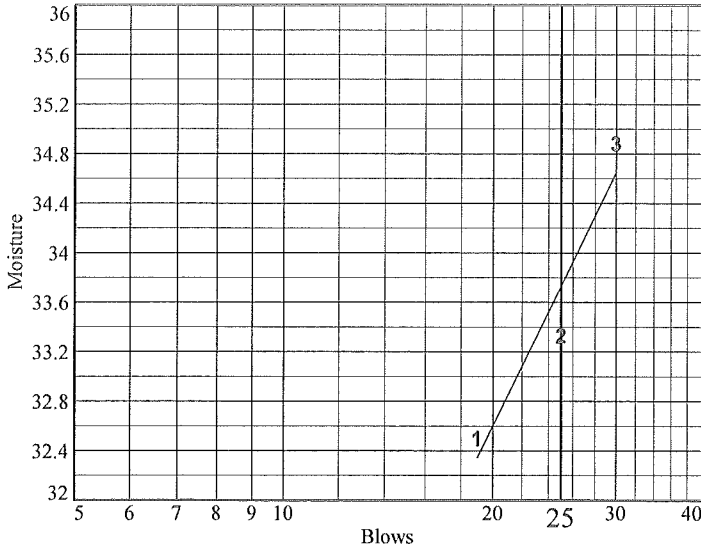
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004  
 Depth: 42'-43'  
 Material Description: Gray Clay  
 USCS: CL or OL  
 Tested by: JF/TP

Sample Number: HMA#7513-34/S-16

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	29.4	30.8	25.3			
Dry+Tare	25.5	26.5	22.3			
Tare	13.5	13.6	13.7			
# Blows	19	25	30			
Moisture	32.5	33.3	34.9			



Liquid Limit= 34  
 Plastic Limit= 23  
 Plasticity Index= 11  
 Natural Moisture= 27.2  
 Liquidity Index= 0.4

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	25.9	31.6	23.6	
Dry+Tare	23.5	28.3	21.7	
Tare	13.6	13.5	13.6	
Moisture	24.2	22.3	23.5	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
1208	990.9	194.1	27.2

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/5/2013

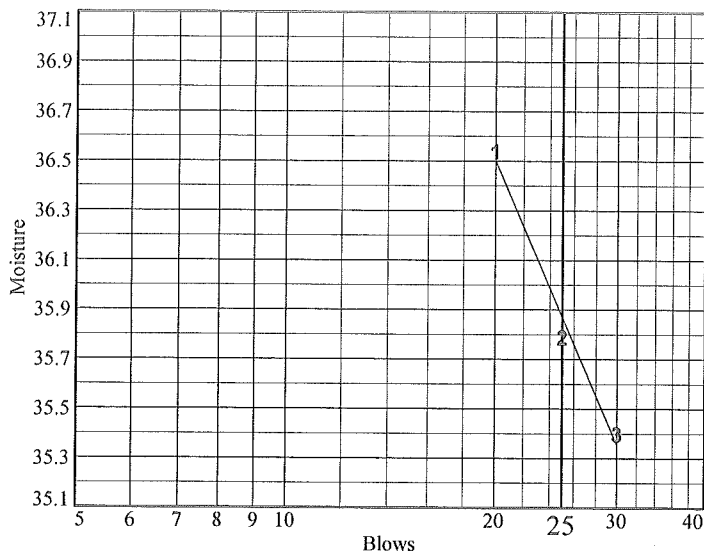
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004  
 Depth: 68'-69'  
 Material Description: Gray Clay  
 USCS: CL or OL  
 Tested by: JF/TP

Sample Number: HMA#7513-35/S-21

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	27.9	26.5	28.9			
Dry+Tare	24.1	23.1	24.9			
Tare	13.7	13.6	13.6			
# Blows	20	25	30			
Moisture	36.5	35.8	35.4			



Liquid Limit= 36  
 Plastic Limit= 22  
 Plasticity Index= 14  
 Natural Moisture= 24.9  
 Liquidity Index= 0.2

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	23.5	24.3	24.8	
Dry+Tare	21.7	22.3	22.8	
Tare	13.6	13.6	13.6	
Moisture	22.2	23.0	21.7	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
1726.6	1428.9	231	24.9

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/5/2013

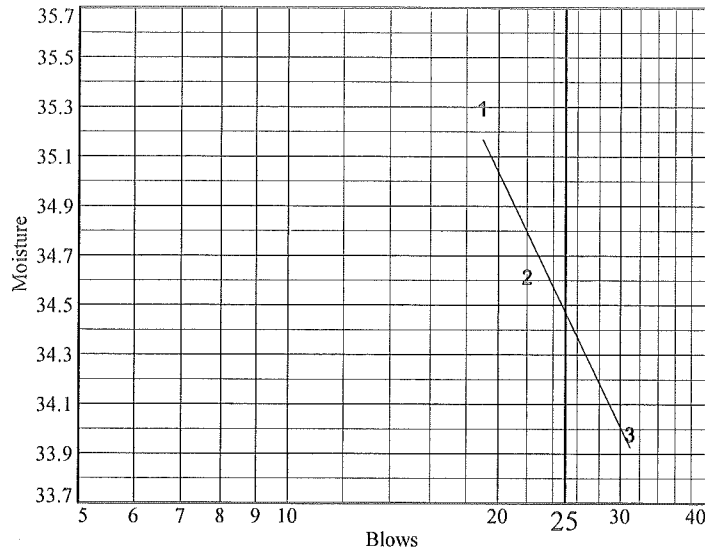
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-004  
 Depth: 81'-83'  
 Material Description: Gray Silt  
 USCS: ML or OL  
 Tested by: JF/TP

Sample Number: HMA#7513-36/S-24

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	29.8	27.6	27.5			
Dry+Tare	25.6	24	24			
Tare	13.7	13.6	13.7			
# Blows	19	22	31			
Moisture	35.3	34.6	34.0			



Liquid Limit= 34  
 Plastic Limit= 25  
 Plasticity Index= 9  
 Natural Moisture= 21.8  
 Liquidity Index= -0.4

**Plastic Limit Data**

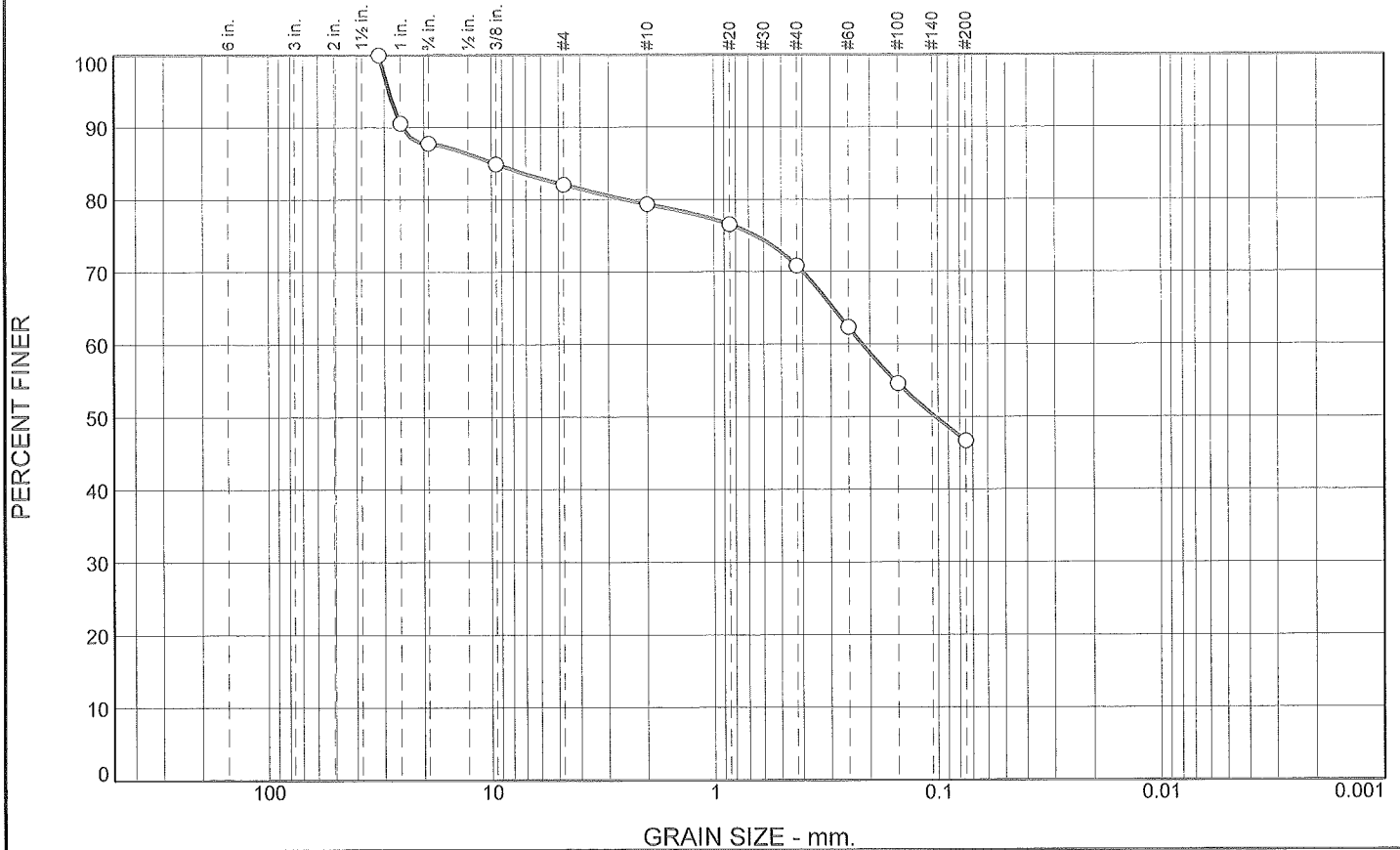
Run No.	1	2	3	4
Wet+Tare	24.8	30.4	29.6	
Dry+Tare	22.5	27	26.4	
Tare	13.6	13.5	13.6	
Moisture	25.8	25.2	25.0	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
1380.4	1175.7	234.9	21.8



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.3	5.6	2.8	8.5	24.1	46.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/4"	100.0		
1"	90.6		
3/4"	87.7		
3/8"	84.9		
#4	82.1		
#10	79.3		
#20	76.5		
#40	70.8		
#60	62.4		
#100	54.6		
#200	46.7		

**Material Description**

Silty Sand with Gravel

**Atterberg Limits**

PL= NP      LL= NP      PI=

**Coefficients**

D<sub>90</sub>= 24.8619      D<sub>85</sub>= 9.7166      D<sub>60</sub>= 0.2164  
D<sub>50</sub>= 0.1026      D<sub>30</sub>=      D<sub>15</sub>=  
D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= SM      AASHTO= A-4(0)

**Remarks**

\* (no specification provided)

Source of Sample: Boring E-330-B-05  
Sample Number: 1/HMA #7499-32

Depth: 6.5

Date: 3/29/13

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

Tested By: Tara Pfaff

Checked By: JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

4/1/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E-330-B-05

**Depth:** 6.5

**Sample Number:** 1/HMA #7499-32

**Material Description:** Silty Sand with Gravel

**Date:** 3/29/13

**Tested by:** Tara Pfaff

**Checked by:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 839.80  
 Tare Wt. = 313.20  
 Minus #200 from wash = 46.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1290.20	313.20	1 1/4"	0.00	0.00	100.0
		1"	1562.00	1469.70	90.6
		3/4"	1532.40	1505.00	87.7
		3/8"	1511.70	1483.90	84.9
		#4	1385.20	1357.50	82.1
		#10	1541.60	1515.00	79.3
		#20	1095.80	1068.40	76.5
		#40	1228.90	1173.10	70.8
		#60	961.50	878.80	62.4
		#100	920.00	844.00	54.6
		#200	1097.80	1020.40	46.7

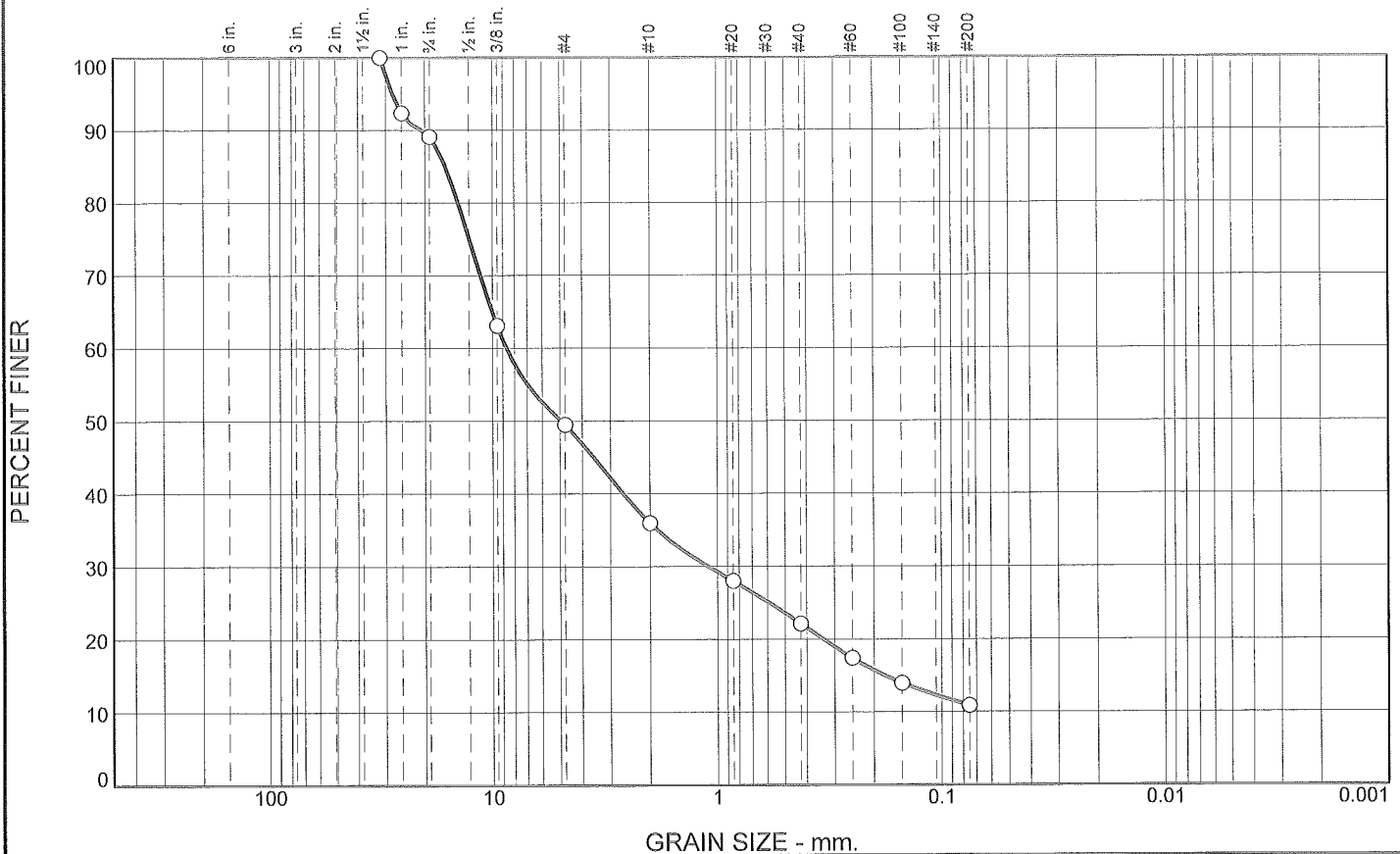
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	12.3	5.6	17.9	2.8	8.5	24.1	35.4			46.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1026	0.2164	2.5169	9.7166	24.8619	28.6095

<b>Fineness Modulus</b>
1.93

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.9	39.6	13.5	13.8	11.3	10.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/4"	100.0		
1"	92.3		
3/4"	89.1		
3/8"	63.1		
#4	49.5		
#10	36.0		
#20	28.0		
#40	22.2		
#60	17.4		
#100	14.0		
#200	10.9		

**Material Description**

Poorly graded gravel with silt and sand

**Atterberg Limits**

PL= NP      LL= NP      PI=

**Coefficients**

D<sub>90</sub>= 20.6193      D<sub>85</sub>= 16.1938      D<sub>60</sub>= 8.6510  
D<sub>50</sub>= 4.9440      D<sub>30</sub>= 1.0986      D<sub>15</sub>= 0.1785  
D<sub>10</sub>=              C<sub>u</sub>=              C<sub>c</sub>=

**Classification**

USCS= GP-GM      AASHTO= A-1-a

**Remarks**

\* (no specification provided)

Source of Sample: Boring E-330-B-05  
Sample Number: 12/HMA #7499-33

Depth: 34.0-35.0

Date: 4/1/2013

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

Tested By: Tara Pfaff

Checked By: JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

4/1/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E-330-B-05

Depth: 34.0-35.0

Sample Number: 12/HMA #7499-33

Material Description: Poorly graded gravel with silt and sand

Date: 4/1/2013

Tested by: Tara Pfaff

Checked by: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 1057.60  
 Tare Wt. = 363.80  
 Minus #200 from wash = 10.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
1138.50	363.80	1 1/4"	0.00	0.00	100.0
		1"	1528.90	1469.60	92.3
		3/4"	1530.30	1505.00	89.1
		3/8"	1685.30	1483.90	63.1
		#4	1463.10	1357.50	49.5
		#10	1619.30	1515.00	36.0
		#20	1130.20	1068.40	28.0
		#40	1218.40	1173.00	22.2
		#60	915.50	878.80	17.4
		#100	870.30	843.70	14.0
		#200	1044.30	1020.40	10.9

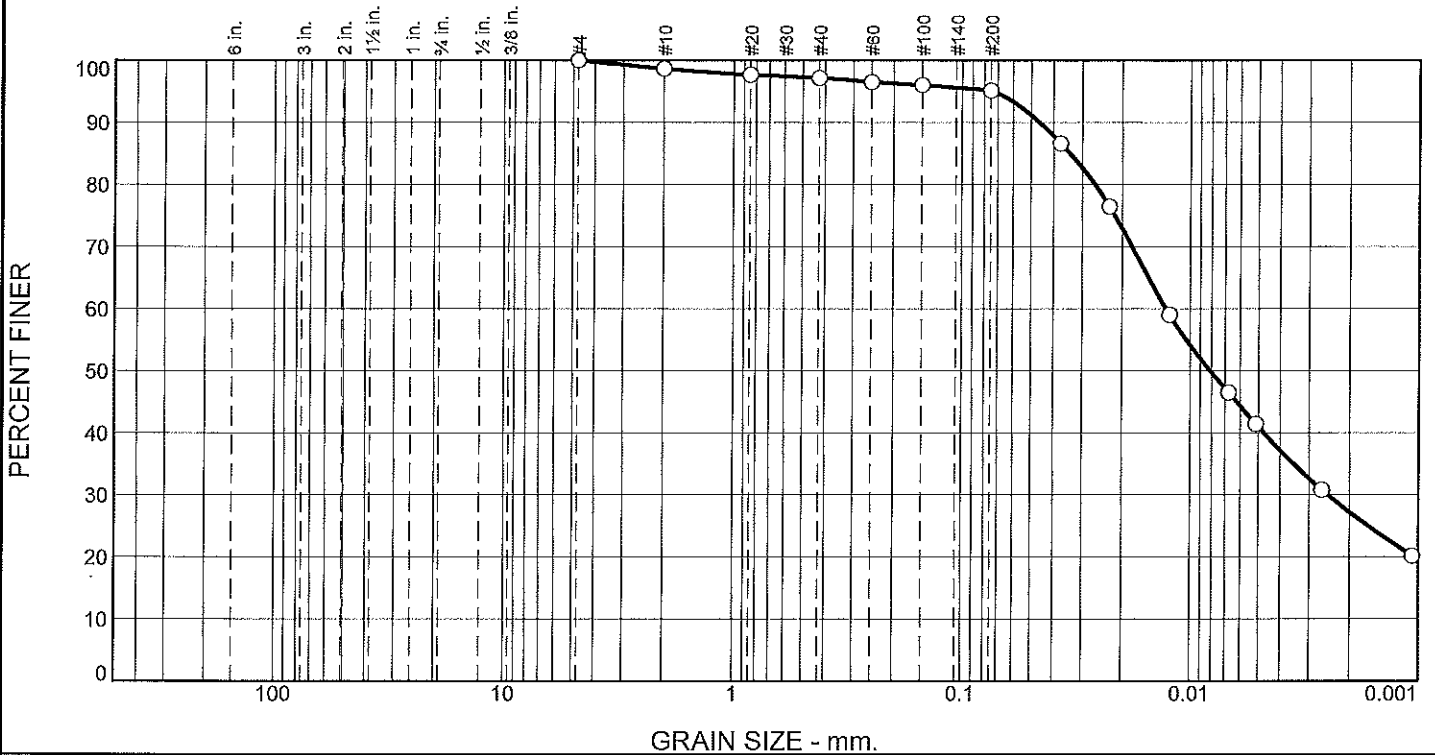
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	10.9	39.6	50.5	13.5	13.8	11.3	38.6			10.9

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
	0.1785	0.3364	1.0986	4.9440	8.6510	14.1885	16.1938	20.6193	27.8863

<b>Fineness Modulus</b>
4.71

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.3	1.5	2.0	54.2	41.0

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	98.7		
#20	97.7		
#40	97.2		
#60	96.5		
#100	96.0		
#200	95.2		
0.0372 mm.	86.6		
0.0227 mm.	76.4		
0.0123 mm.	59.0		
0.0068 mm.	46.5		
0.0051 mm.	41.4		
0.0026 mm.	30.8		
0.0011 mm.	20.2		

**Material Description**

Lean Clay

**Atterberg Limits (ASTM D 4318)**

PL= 24                      LL= 35                      PI= 11

**Classification**

USCS (D 2487)= CL                      AASHTO (M 145)= A-6(11)

**Coefficients**

D<sub>90</sub>= 0.0461                      D<sub>85</sub>= 0.0339                      D<sub>60</sub>= 0.0128

D<sub>50</sub>= 0.0082                      D<sub>30</sub>= 0.0025                      D<sub>15</sub>=

D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: \_\_\_\_\_ Date Tested: \_\_\_\_\_

Tested By: Tara Pfaff

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E-330-B-005                      Depth: 48.0-49.0                      Date Sampled: 4/1/2013  
 Sample Number: 19/HMA #7499-34

<b>Hayre McElroy &amp; Associates, LLC</b>	Client: Golder Associates Project: Sound Transit East Link	
Redmond, WA	Project No: 12-450	Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

2/13/2014

Client: Golder Associates

Project: Sound Transit East Link

Project Number: I2-450

Location: Boring E-330-B-005

Depth: 48.0-49.0

Sample Number: 19/HMA #7499-34

Material Description: Lean Clay

Sample Date: 4/1/2013

PL: 24

LL: 35

PI: 11

USCS Classification: CL

AASHTO Classification: A-6(11)

Tested By: Tara Pfaff

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 197.50

Tare Wt. = 196.00

Minus #200 from wash = 97.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
60.10	0.00	#4	0.00	0.00	100.0
		#10	1515.90	1515.10	98.7
		#20	1173.50	1172.90	97.7
		#40	1068.30	1068.00	97.2
		#60	879.20	878.80	96.5
		#100	844.10	843.80	96.0
		#200	1020.90	1020.40	95.2

**Hydrometer Test Data**

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 98.7

Weight of hydrometer sample = 60.1

Hygroscopic moisture correction:

Moist weight and tare = 33.30

Dry weight and tare = 32.70

Tare weight = 11.10

Hygroscopic moisture = 2.8%

Table of composite correction values:

Temp., deg. C: 15.0 25.5 17.8

Comp. corr.: -5.9 -3.6 -5.4

Meniscus correction only = -1.0

Specific gravity of solids = 2.7

Hydrometer type = 152H

Hydrometer effective depth equation:  $L = 5.795 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	19.1	57.0	51.9	0.0136	56.0	15.0	0.0372	86.6
5.00	19.1	50.9	45.8	0.0136	49.9	14.0	0.0227	76.4
15.00	18.9	40.5	35.4	0.0136	39.5	12.3	0.0123	59.0
45.00	18.9	33.0	27.9	0.0136	32.0	11.0	0.0068	46.5
75.00	18.7	30.0	24.8	0.0137	29.0	10.6	0.0051	41.4
250.00	19.3	23.5	18.5	0.0136	22.5	9.5	0.0026	30.8
1440.00	17.7	17.5	12.1	0.0138	16.5	8.5	0.0011	20.2

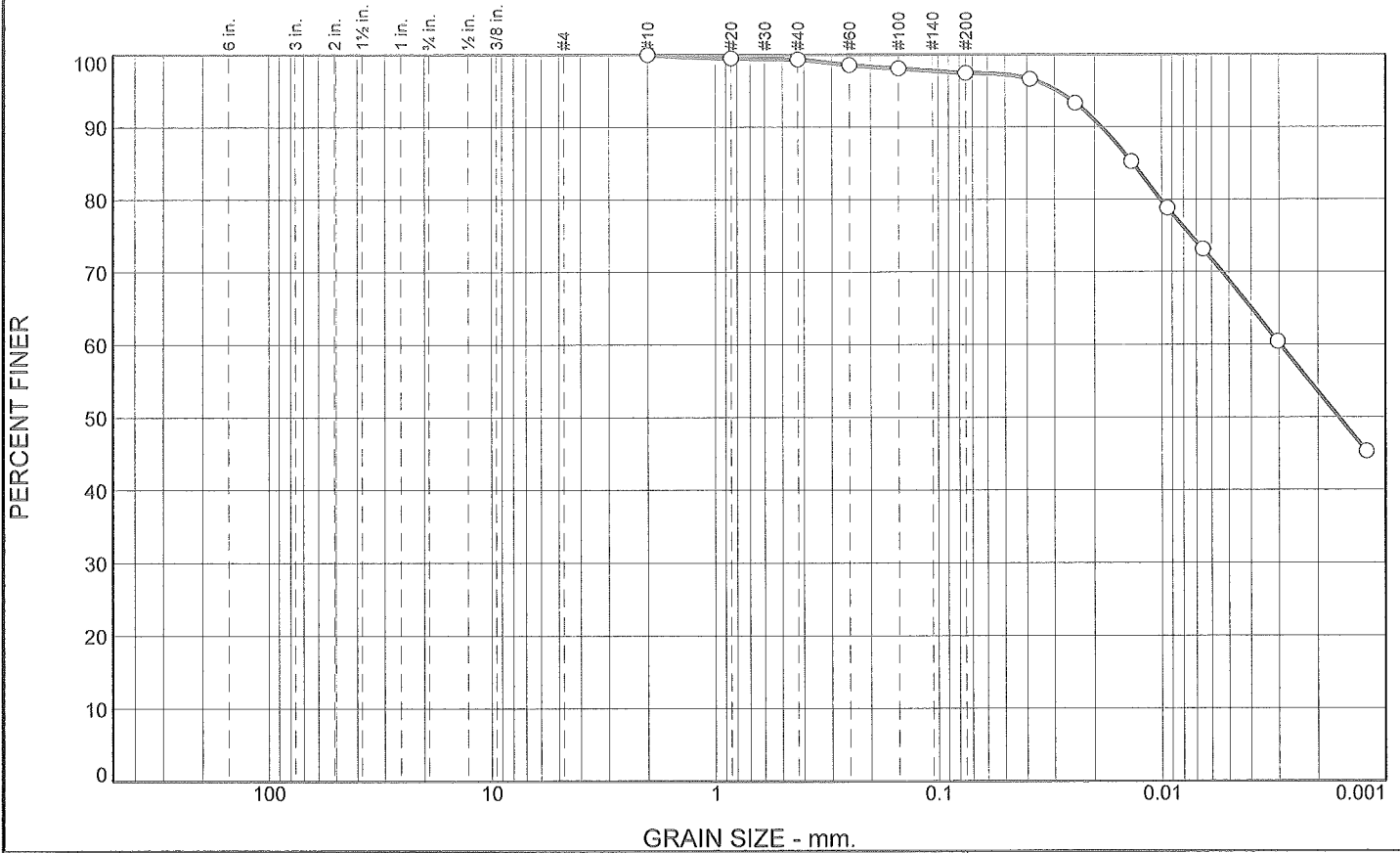
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.3	1.5	2.0	4.8	54.2	41.0	95.2

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
			0.0025	0.0082	0.0128	0.0264	0.0339	0.0461	0.0729

<b>Fineness Modulus</b>
0.13

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.6	1.9	28.7	68.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.5		
#40	99.4		
#60	98.6		
#100	98.1		
#200	97.5		

**Material Description**

Fat Clay

**Atterberg Limits**  
 PL= 28      LL= 58      PI= 30

**Coefficients**  
 D<sub>90</sub>= 0.0186      D<sub>85</sub>= 0.0135      D<sub>60</sub>= 0.0030  
 D<sub>50</sub>= 0.0016      D<sub>30</sub>=              D<sub>15</sub>=  
 D<sub>10</sub>=              C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= CH      AASHTO= A-7-6(35)

**Remarks**

\* (no specification provided)

Source of Sample: Boring E-330-B-05  
 Sample Number: 23/HMA #7499-35

Depth: 61.0-62.0

Date: 4/1/2013

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	Client: Golder Associates Project: Sound Transit East Link  Project No: 12-450
Figure	

Tested By: Tara Pfaff

Checked By: JAM



**GRAIN SIZE DISTRIBUTION TEST DATA**

4/1/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E-330-B-05

Depth: 61.0-62.0

Sample Number: 23/HMA #7499-35

Material Description: Fat Clay

Date: 4/1/2013

PL: 28

LL: 58

PI: 30

USCS Classification: CH

AASHTO Classification: A-7-6(35)

Tested by: Tara Pfaff

Checked by: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 198.90  
 Tare Wt. = 198.10  
 Minus #200 from wash = 98.7%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
63.30	0.00	#10	0.00	0.00	100.0
		#20	1173.10	1172.80	99.5
		#40	1068.30	1068.20	99.4
		#60	879.20	878.70	98.6
		#100	844.10	843.80	98.1
		#200	1020.80	1020.40	97.5

**Hydrometer Test Data**

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 100.0

Weight of hydrometer sample = 63.3

Hygroscopic moisture correction:

Moist weight and tare = 27.50

Dry weight and tare = 27.00

Tare weight = 11.20

Hygroscopic moisture = 3.2%

Table of composite correction values:

Temp., deg. C:	15.0	25.5	17.8
Comp. corr.:	-5.9	-3.6	-5.4

Meniscus correction only = -1.0

Specific gravity of solids = 2.7

Hydrometer type = 152H

Hydrometer effective depth equation:  $L = 5.795 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	19.3	65.0	60.0	0.0136	64.0	16.3	0.0387	96.6
5.00	19.1	63.0	57.9	0.0136	62.0	16.0	0.0243	93.3
15.00	19.0	58.0	52.9	0.0136	57.0	15.1	0.0137	85.2
30.00	19.1	54.0	48.9	0.0136	53.0	14.5	0.0094	78.8
60.00	19.0	50.5	45.4	0.0136	49.5	13.9	0.0066	73.1
250.00	19.5	42.5	37.5	0.0135	41.5	12.6	0.0030	60.4
1440.00	17.9	33.5	28.1	0.0138	32.5	11.1	0.0012	45.3

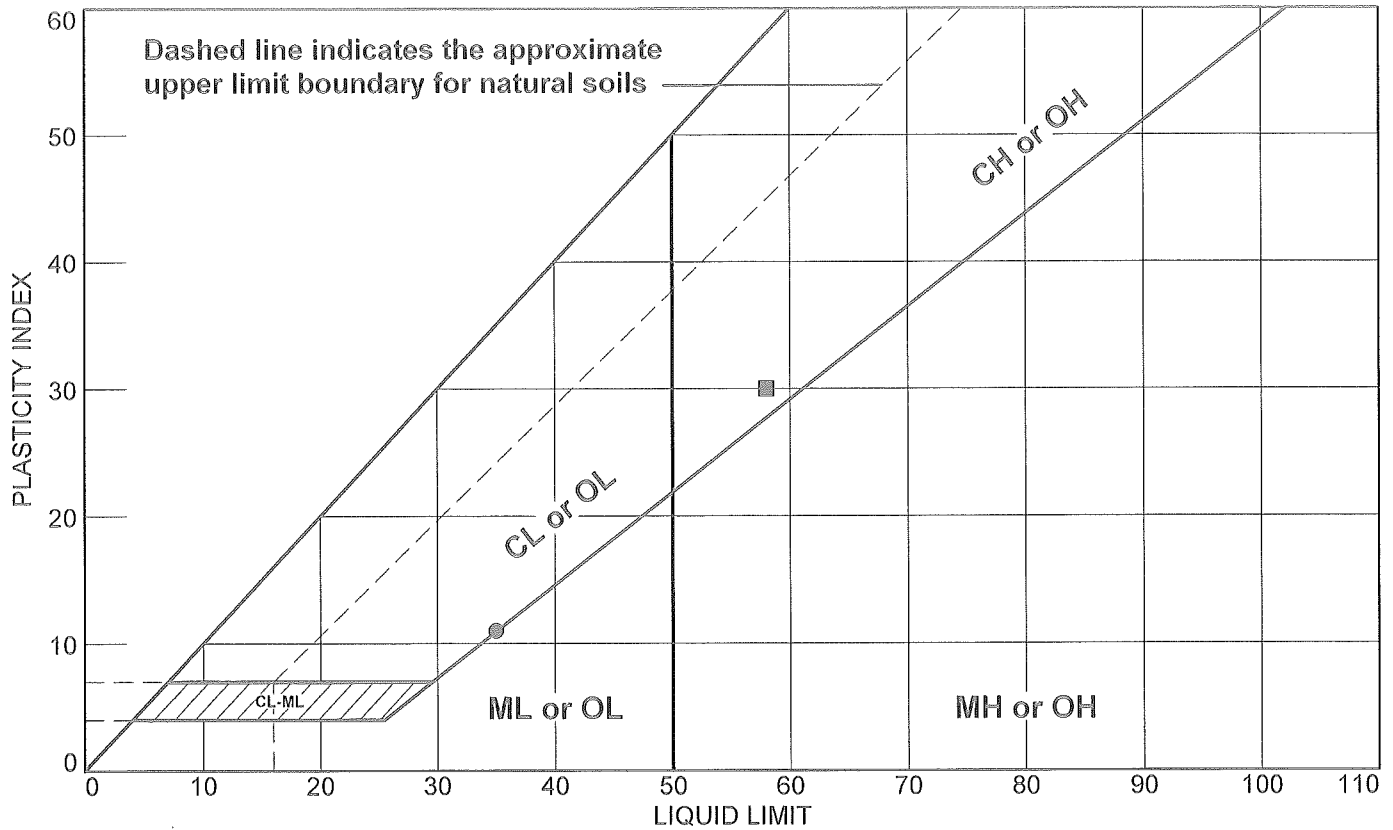
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.6	1.9	2.5	28.7	68.8	97.5

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.0016	0.0030	0.0101	0.0135	0.0186	0.0292

Fineness Modulus
0.04

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E-330-B-05	19/HMA #7499-34	48.0-49.0	20.7	24	35	11	CL
■	Boring E-330-B-05	23/HMA #7499-35	61.0-62.0	28.9	28	58	30	CH

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: Tara Pfaff

Checked By: JAM

LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E-330-B-05  
 Depth: 48.0-49.0  
 Material Description: Lean Clay  
 USCS: CL  
 Tested by: Tara Pfaff

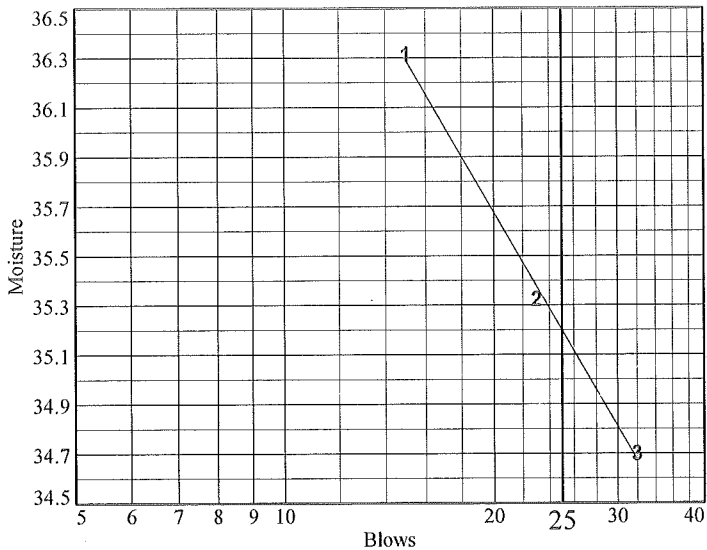
Sample Number: 19/HMA #7499-34

AASHTO: A-6(11)

Checked by: JAM

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.6	38.5	43.2			
Dry+Tare	32.7	32.0	35.6			
Tare	13.7	13.6	13.7			
# Blows	15	23	32			
Moisture	36.3	35.3	34.7			



Liquid Limit= 35  
 Plastic Limit= 24  
 Plasticity Index= 11  
 Natural Moisture= 20.7  
 Liquidity Index= -0.3

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	22.0	23.2	24.0	
Dry+Tare	20.3	21.4	21.9	
Tare	13.6	13.6	13.5	
Moisture	25.4	23.1	25.0	

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
109.4	97.0	37.2	20.7

LIQUID AND PLASTIC LIMIT TEST DATA

4/3/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E-330-B-05  
 Depth: 61.0-62.0  
 Material Description: Fat Clay  
 USCS: CH  
 Tested by: Tara Pfaff

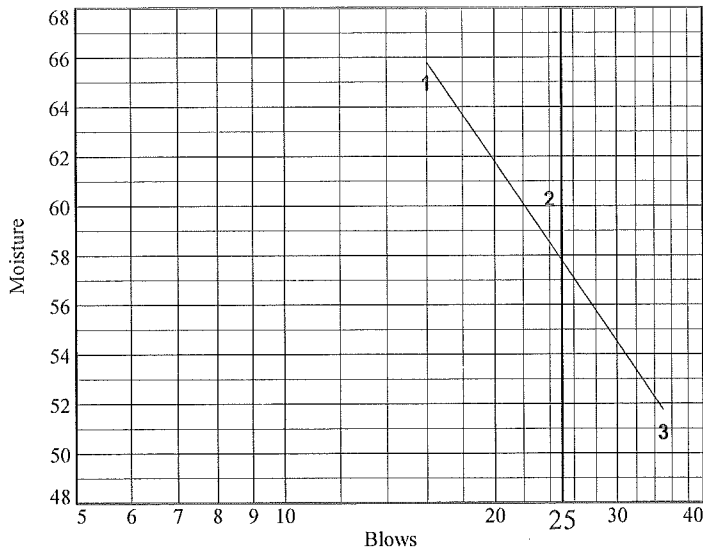
Sample Number: 23/HMA #7499-35

AASHTO: A-7-6(35)

Checked by: JAM

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.9	37.0	37.8			
Dry+Tare	25.0	28.2	28.8			
Tare	11.3	13.6	11.1			
# Blows	16	24	35			
Moisture	65.0	60.3	50.8			



Liquid Limit= 58  
 Plastic Limit= 28  
 Plasticity Index= 30  
 Natural Moisture= 28.9  
 Liquidity Index= 0.0

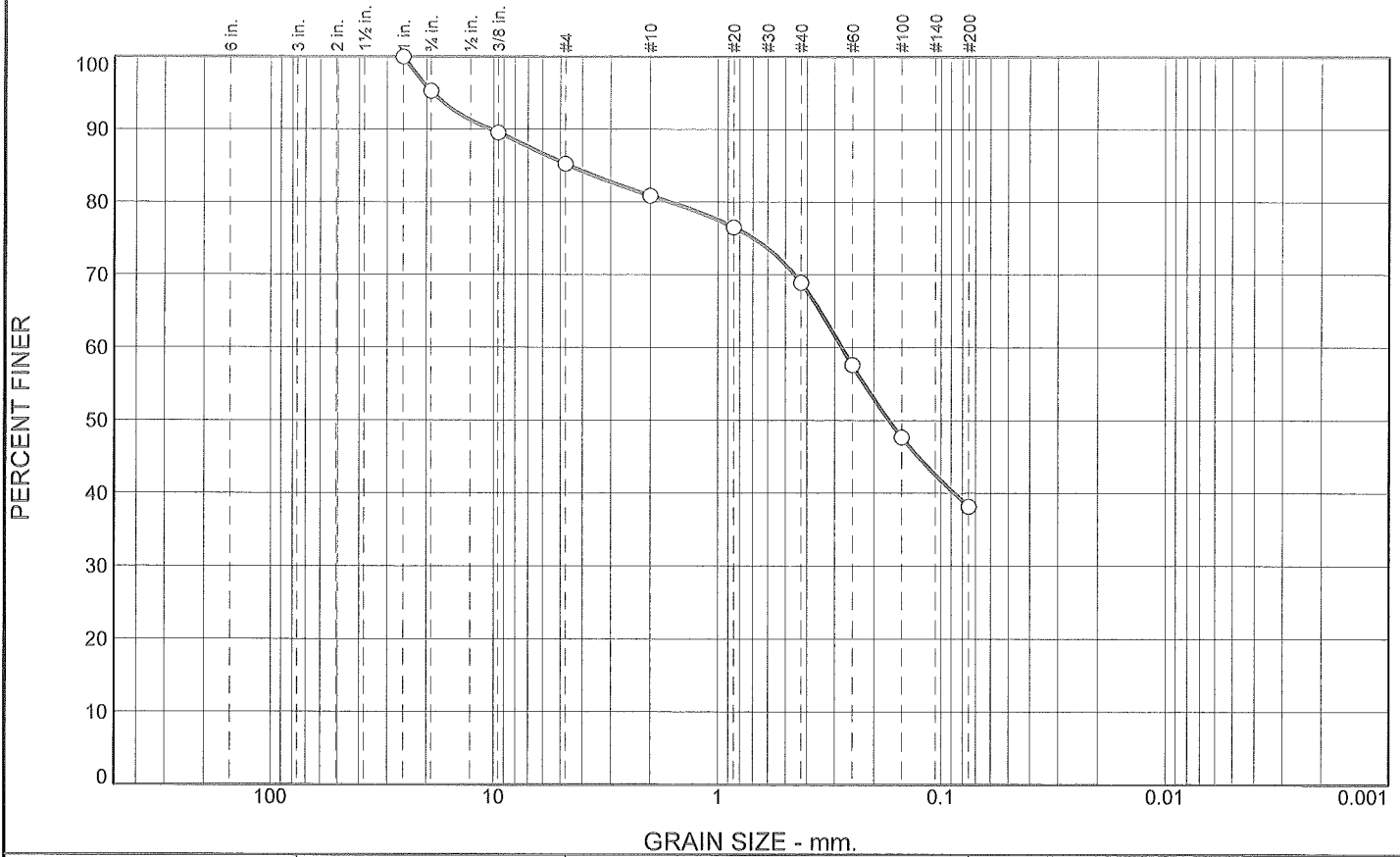
Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	20.3	22.5	26.3	
Dry+Tare	18.8	20.6	23.6	
Tare	13.6	13.6	13.6	
Moisture	28.8	27.1	27.0	

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
87.1	75.7	36.3	28.9

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.7	10.1	4.3	12.0	30.7	38.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	95.3		
3/8"	89.5		
#4	85.2		
#10	80.9		
#20	76.5		
#40	68.9		
#60	57.6		
#100	47.7		
#200	38.2		

**Material Description**

Silty Sand

**Atterberg Limits**  
 PL= NP      LL= NP      PI= NP

**Coefficients**  
 D<sub>90</sub>= 10.3076      D<sub>85</sub>= 4.5695      D<sub>60</sub>= 0.2784  
 D<sub>50</sub>= 0.1715      D<sub>30</sub>=              D<sub>15</sub>=  
 D<sub>10</sub>=              C<sub>u</sub>=              C<sub>c</sub>=

**Classification**  
 USCS= SM      AASHTO= A-4(0)

**Remarks**

\* (no specification provided)

**Source of Sample:** Boring E-330-B-06  
**Sample Number:** Run 2/HMA #7499-7

**Depth:** 15.5-16.0

**Date:** 3/28/13

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
<b>Figure</b>	

Tested By: Tara Pfaff

Checked By: JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

3/29/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E-330-B-06  
 Depth: 15.5-16.0  
 Material Description: Silty Sand  
 Date: 3/28/13  
 Tested by: Tara Pfaff

Sample Number: Run 2/HMA #7499-7

Checked by: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 1952.90  
 Tare Wt. = 775.50  
 Minus #200 from wash = 37.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
2649.20	775.50	1"	0.00	0.00	100.0
		3/4"	1593.50	1505.00	95.3
		3/8"	1591.70	1484.20	89.5
		#4	1438.20	1357.40	85.2
		#10	1596.90	1515.00	80.9
		#20	1149.50	1068.30	76.5
		#40	1316.10	1173.00	68.9
		#60	1090.90	879.50	57.6
		#100	1030.00	844.00	47.7
		#200	1198.40	1020.50	38.2

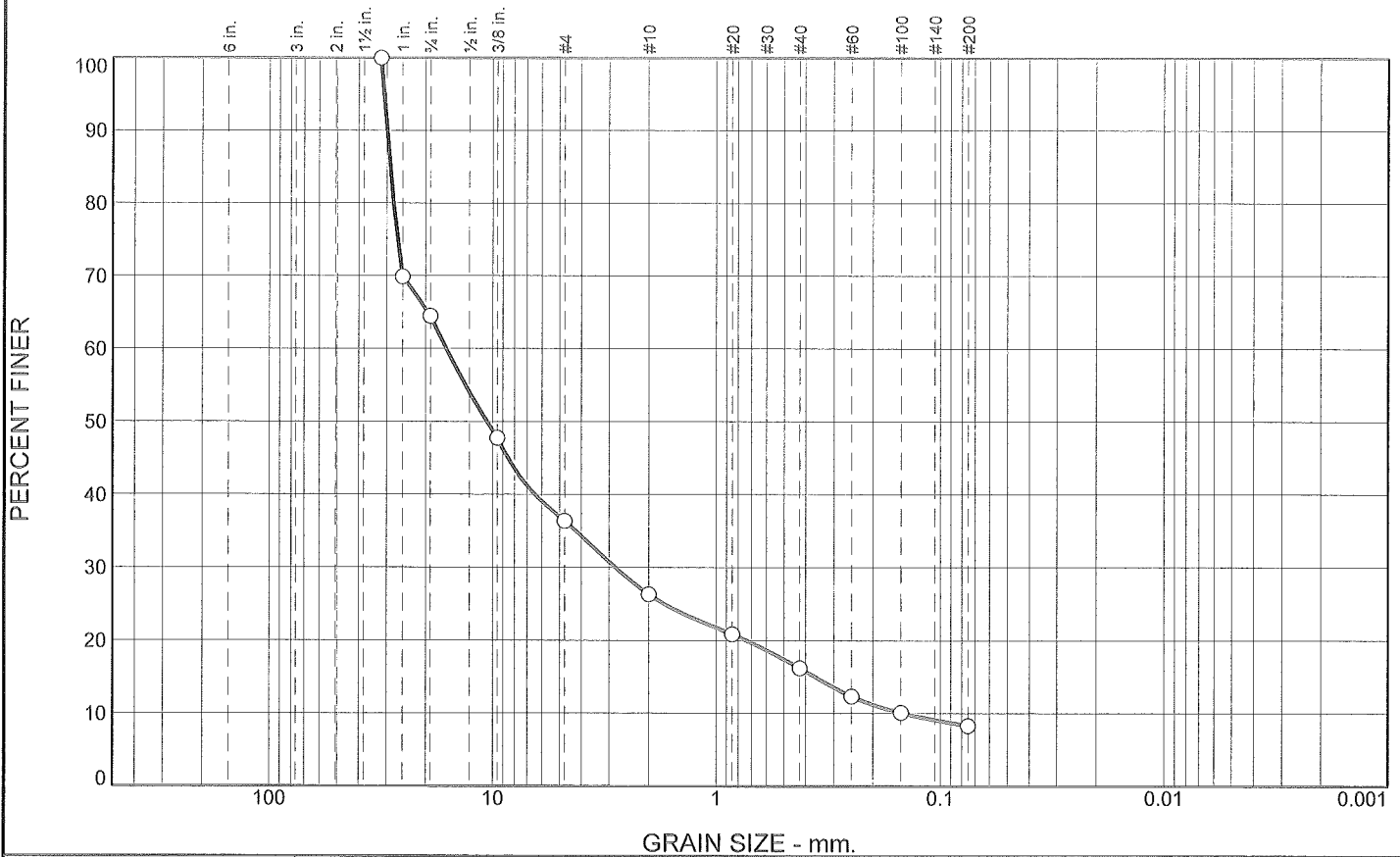
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	4.7	10.1	14.8	4.3	12.0	30.7	47.0			38.2

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
				0.1715	0.2784	1.6468	4.5695	10.3076	18.6687

<b>Fineness Modulus</b>
1.87

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	35.5	28.1	10.1	10.1	7.9	8.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/4"	100.0		
1"	69.9		
3/4"	64.5		
3/8"	47.7		
#4	36.4		
#10	26.3		
#20	20.8		
#40	16.2		
#60	12.4		
#100	10.1		
#200	8.3		

**Material Description**

Poorly Graded Gravel with Silt and Sand

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D <sub>90</sub> = 29.8217	D <sub>85</sub> = 28.8531	D <sub>60</sub> = 16.1462
D <sub>50</sub> = 10.6113	D <sub>30</sub> = 2.8163	D <sub>15</sub> = 0.3635
D <sub>10</sub> = 0.1459	C <sub>u</sub> = 110.69	C <sub>c</sub> = 3.37

**Classification**

USCS= GP-GM      AASHTO= A-1-a

**Remarks**

\* (no specification provided)

**Source of Sample:** Boring E-330-B-06  
**Sample Number:** Run 7/HMA #7499-8

**Depth:** 52.0-52.5

**Date:** 3/29/13

**Hayre McElroy & Associates, LLC**

**Client:** Golder Associates  
**Project:** Sound Transit East Link

**Redmond, WA**

**Project No:** 12-450

**Figure**

**Tested By:** Tara Pfaff

**Checked By:** JAM



**GRAIN SIZE DISTRIBUTION TEST DATA**

3/29/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E-330-B-06

Depth: 52.0-52.5

Sample Number: Run 7/HMA #7499-8

Material Description: Poorly Graded Gravel with Silt and Sand

Date: 3/29/13

Tested by: Tara Pfaff

Checked by: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 2370.20  
 Tare Wt. = 595.90  
 Minus #200 from wash = 8.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
2526.50	595.90	1 1/4"	0.00	0.00	100.0
		1"	2050.90	1469.80	69.9
		3/4"	1609.60	1505.00	64.5
		3/8"	1807.10	1484.00	47.7
		#4	1577.30	1357.60	36.4
		#10	1709.00	1515.10	26.3
		#20	1174.20	1068.50	20.8
		#40	1263.00	1173.20	16.2
		#60	953.50	879.30	12.4
		#100	887.70	844.00	10.1
		#200	1055.40	1020.60	8.3

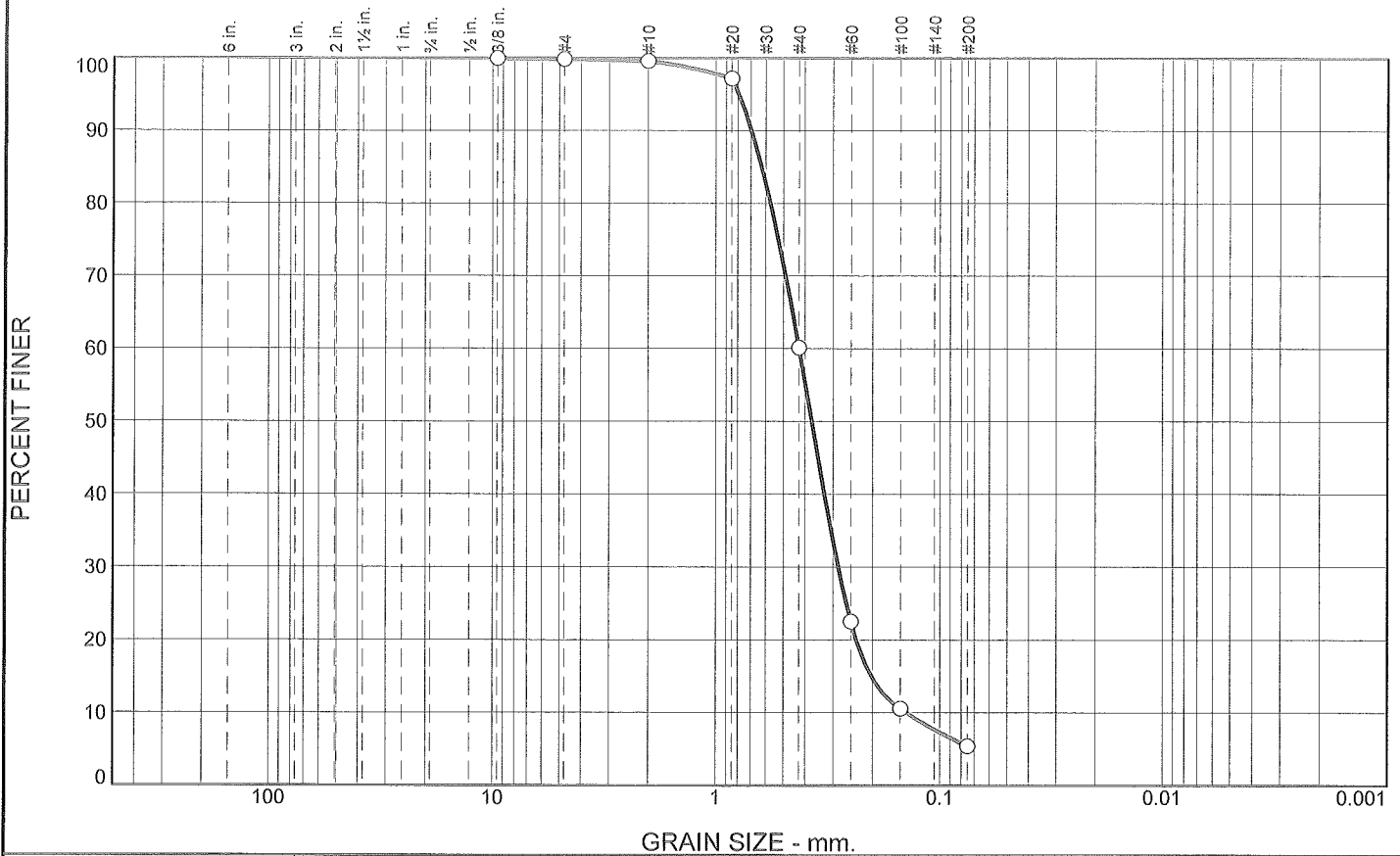
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	35.5	28.1	63.6	10.1	10.1	7.9	28.1			8.3

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1459	0.3635	0.7368	2.8163	10.6113	16.1462	27.8461	28.8531	29.8217	30.7803

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
5.58	110.69	3.37

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.3	39.5	54.7	5.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.9		
#10	99.6		
#20	97.2		
#40	60.1		
#60	22.5		
#100	10.6		
#200	5.4		

**Material Description**

Poorly Graded Sand with Silt

**Atterberg Limits**

PL= NP      LL= NP      PI= NP

**Coefficients**

D<sub>90</sub>= 0.6934      D<sub>85</sub>= 0.6249      D<sub>60</sub>= 0.4243  
D<sub>50</sub>= 0.3729      D<sub>30</sub>= 0.2847      D<sub>15</sub>= 0.2026  
D<sub>10</sub>= 0.1410      C<sub>u</sub>= 3.01      C<sub>c</sub>= 1.35

**Classification**

USCS= SP-SM      AASHTO= A-3

**Remarks**

\* (no specification provided)

Source of Sample: Boring E-330-B-06      Depth: 72.0-72.5      Date: 3/29/13  
Sample Number: Run 10/HMA #7499-9

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450 <b>Figure</b>
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Tested By: Tara Pfaff      Checked By: JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

3/29/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E-330-B-06

Depth: 72.0-72.5

Sample Number: Run 10/HMA #7499-9

Material Description: Poorly Graded Sand with Silt

Date: 3/29/13

Tested by: Tara Pfaff

Checked by: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 516.00  
 Tare Wt. = 114.30  
 Minus #200 from wash = 4.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
536.40	114.30	3/8"	0.00	0.00	100.0
		#4	1357.90	1357.50	99.9
		#10	1516.10	1515.00	99.6
		#20	1078.60	1068.40	97.2
		#40	1329.70	1173.10	60.1
		#60	1038.10	879.30	22.5
		#100	894.30	843.90	10.6
		#200	1042.20	1020.40	5.4

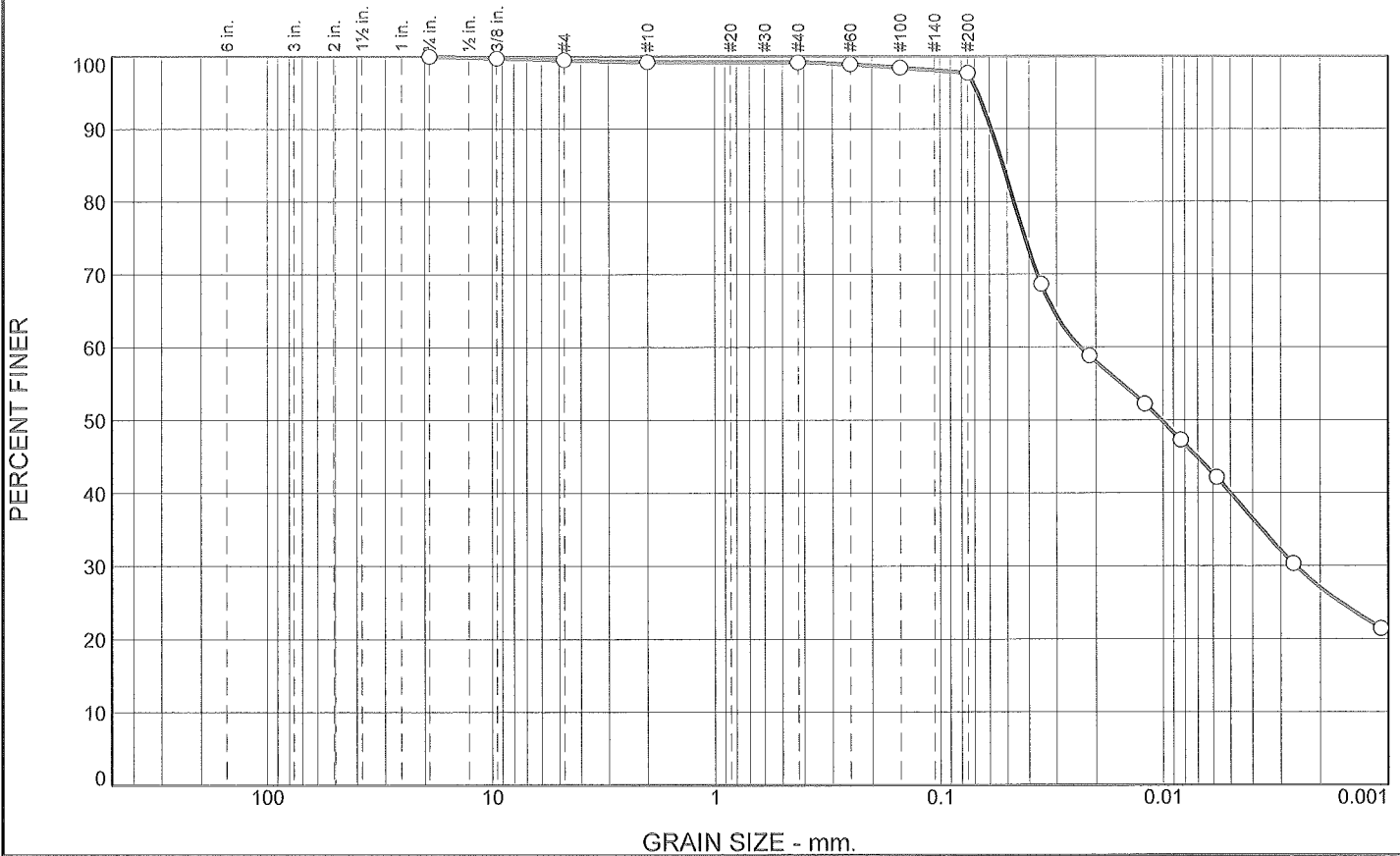
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.1	0.1	0.3	39.5	54.7	94.5			5.4

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1410	0.2026	0.2365	0.2847	0.3729	0.4243	0.5709	0.6249	0.6934	0.7889

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.75	3.01	1.35

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.3	0.0	1.5	57.7	40.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
3/8"	99.8		
#4	99.5		
#10	99.2		
#40	99.2		
#60	98.9		
#100	98.5		
#200	97.7		

**Material Description**

Lean Clay

**Atterberg Limits**

PL= 20      LL= 33      PI= 13

**Coefficients**

D<sub>90</sub>= 0.0588      D<sub>85</sub>= 0.0522      D<sub>60</sub>= 0.0234  
D<sub>50</sub>= 0.0102      D<sub>30</sub>= 0.0026      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

**Classification**

USCS= CL                      AASHTO= A-6(13)

**Remarks**

\* (no specification provided)

**Source of Sample:** Boring E-330-B-06  
**Sample Number:** Run 11/HMA #7499-10

**Depth:** 76.7-77.0

**Date:** 3/29/13

**Hayre McElroy & Associates, LLC**

**Client:** Golder Associates  
**Project:** Sound Transit East Link

**Redmond, WA**

**Project No:** 12-450

**Figure**

**Tested By:** Tara Pfaff

**Checked By:** JAM

**GRAIN SIZE DISTRIBUTION TEST DATA**

4/3/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E-330-B-06  
 Depth: 76.7-77.0  
 Material Description: Lean Clay  
 Date: 3/29/13                      PL: 20  
 USCS Classification: CL  
 Tested by: Tara Pfaff

Sample Number: Run 11/HMA #7499-10  
 LL: 33                                      PI: 13  
 AASHTO Classification: A-6(13)  
 Checked by: JAM

**Sieve Test Data**

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
797.00	0.00	3/4"	0.00	0.00	100.0
		3/8"	1485.60	1483.80	99.8
		#4	1359.50	1357.50	99.5
		#10	1517.30	1515.10	99.2
		#40	1068.70	1068.40	99.2
		#60	881.10	878.80	98.9
		#100	847.80	844.10	98.5
		#200	1026.40	1020.50	97.7

**Hydrometer Test Data**

Hydrometer test uses material passing #10  
 Percent passing #10 based upon complete sample = 99.2  
 Weight of hydrometer sample = 61.6  
 Hygroscopic moisture correction:  
 Moist weight and tare = 42.00  
 Dry weight and tare = 41.20  
 Tare weight = 13.70  
 Hygroscopic moisture = 2.9%  
 Table of composite correction values:  
 Temp., deg. C:            15.0            25.5            17.8  
 Comp. corr.:              -5.9            -3.6            -5.4  
 Meniscus correction only = -1.0  
 Specific gravity of solids = 2.7  
 Hydrometer type = 152H

Hydrometer effective depth equation:  $L = 5.795 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	19.0	47.0	41.9	0.0136	46.0	13.3	0.0352	68.7
5.00	19.0	41.0	35.9	0.0136	40.0	12.4	0.0214	58.8
15.00	18.9	37.0	31.9	0.0136	36.0	11.7	0.0120	52.2
30.00	18.8	34.0	28.8	0.0136	33.0	11.2	0.0083	47.3
60.00	18.7	30.9	25.7	0.0137	29.9	10.7	0.0058	42.2
250.00	19.5	23.5	18.5	0.0135	22.5	9.5	0.0026	30.3
1440.00	17.7	18.5	13.1	0.0138	17.5	8.7	0.0011	21.4

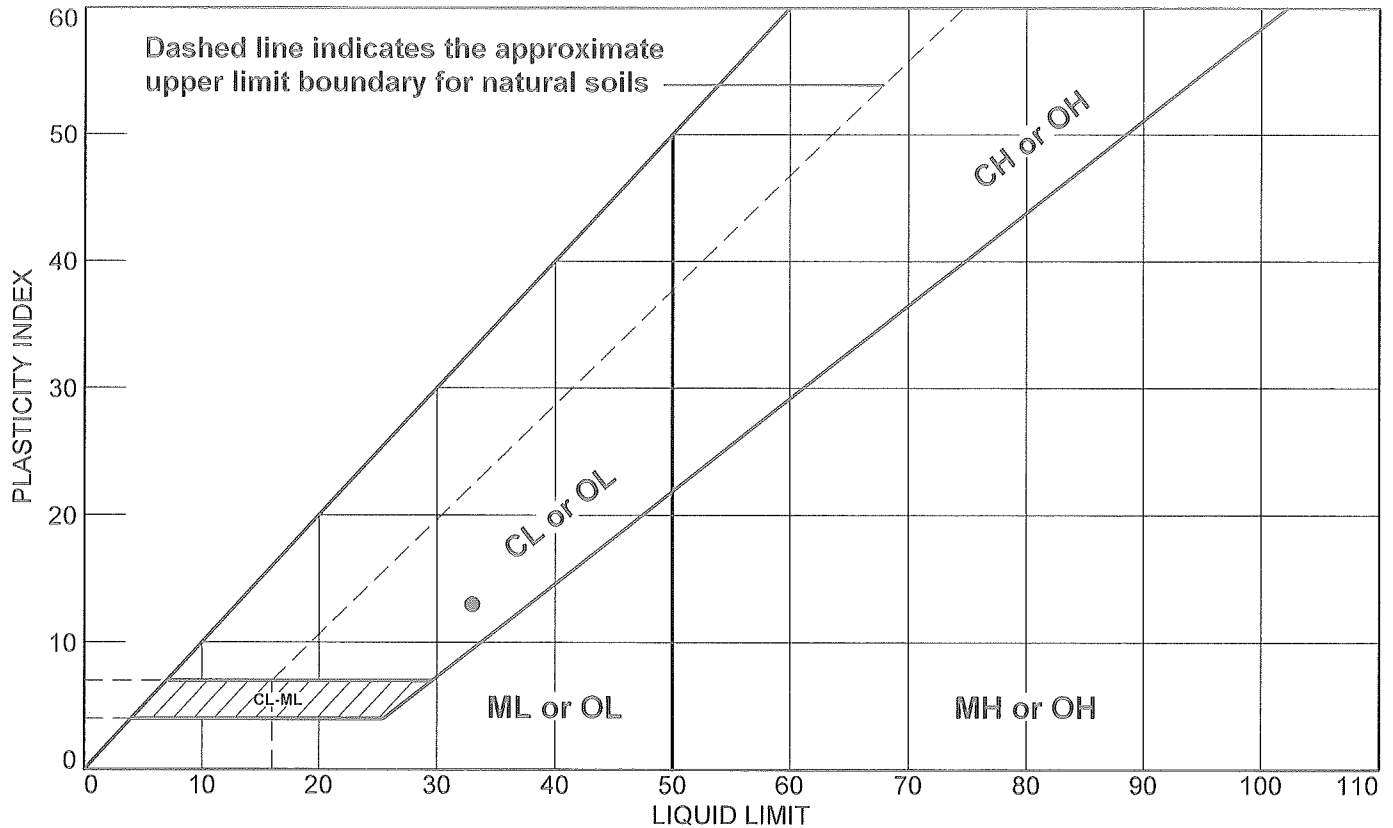
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.5	0.5	0.3	0.0	1.5	1.8	57.7	40.0	97.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.0026	0.0102	0.0234	0.0466	0.0522	0.0588	0.0677

Fineness Modulus
0.05

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
● Boring E-330-B-06	Run 11/HMA #7499-10	76.7-77.0	14.1	20	33	13	CL

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates  
**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: Tara Praff

Checked By: JAM

LIQUID AND PLASTIC LIMIT TEST DATA

4/3/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E-330-B-06  
 Depth: 76.7-77.0  
 Material Description: Lean Clay  
 USCS: CL  
 Tested by: Tara Pfaff

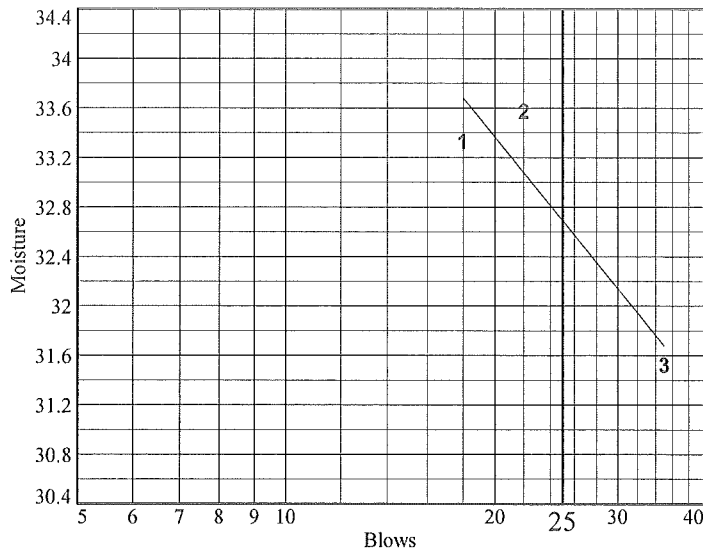
Sample Number: Run 11/HMA #7499-10

AASHTO: A-6(13)

Checked by: JAM

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	41.7	32.0	40.2			
Dry+Tare	34.7	27.4	33.8			
Tare	13.7	13.7	13.5			
# Blows	18	22	35			
Moisture	33.3	33.6	31.5			



Liquid Limit= 33  
 Plastic Limit= 20  
 Plasticity Index= 13  
 Natural Moisture= 14.1  
 Liquidity Index= -0.5

Plastic Limit Data

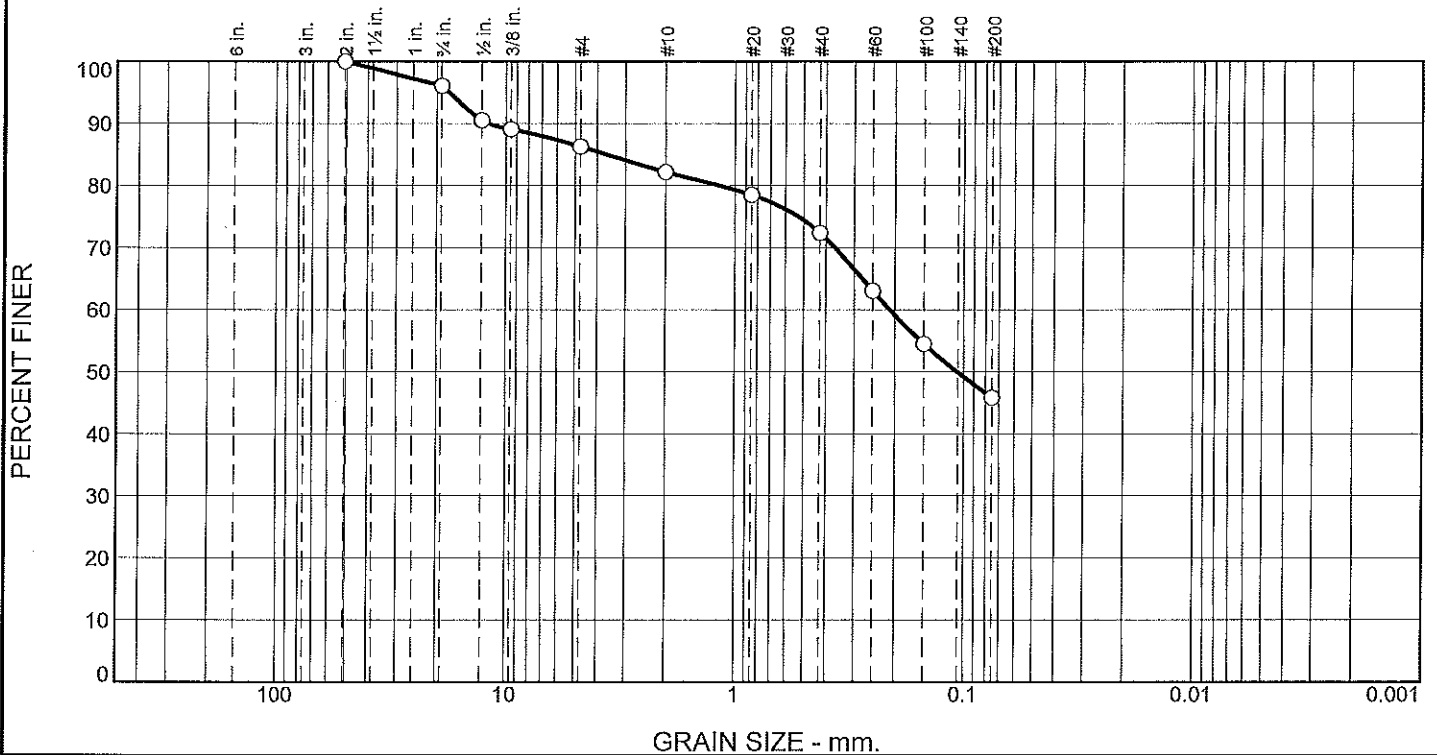
Run No.	1	2	3	4
Wet+Tare	20.9	24.0	23.7	
Dry+Tare	19.3	21.9	22.0	
Tare	11.2	11.2	13.7	
Moisture	19.8	19.6	20.5	

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
84.5	77.9	31.0	14.1



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.9	9.8	4.1	9.8	26.6	45.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2"	100.0		
3/4"	96.1		
1/2"	90.5		
3/8"	89.1		
#4	86.3		
#10	82.2		
#20	78.5		
#40	72.4		
#60	63.0		
#100	54.5		
#200	45.8		

\* (no specification provided)

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 11.9347                      D<sub>85</sub>= 3.6446                      D<sub>60</sub>= 0.2111

D<sub>50</sub>= 0.1073                      D<sub>30</sub>=                      D<sub>15</sub>=

D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks


---

Date Received: 5/3/13                      Date Tested: 5/8/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

Source of Sample: Boring E330-B-006A  
 Sample Number: HMA#7510-13/S-2

Depth: 10'-10.9'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

2/13/2014

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-006A

Depth: 10'-10.9'

Sample Number: HMA#7510-13/S-2

Material Description: Olive Gray Silty Sand

Date Received: 5/3/13

AASHTO Classification: A-4(0)

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF

Test Date: 5/8/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 321.90  
 Tare Wt. = 120.20  
 Minus #200 from wash = 45.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
489.50	120.20	2"	0.00	0.00	100.0
		3/4"	1519.30	1504.80	96.1
		1/2"	1440.30	1419.70	90.5
		3/8"	1489.10	1483.80	89.1
		#4	1367.70	1357.40	86.3
		#10	1529.80	1514.70	82.2
		#20	1081.40	1067.70	78.5
		#40	967.60	945.00	72.4
		#60	912.70	878.30	63.0
		#100	874.90	843.30	54.5
		#200	1052.00	1019.90	45.8

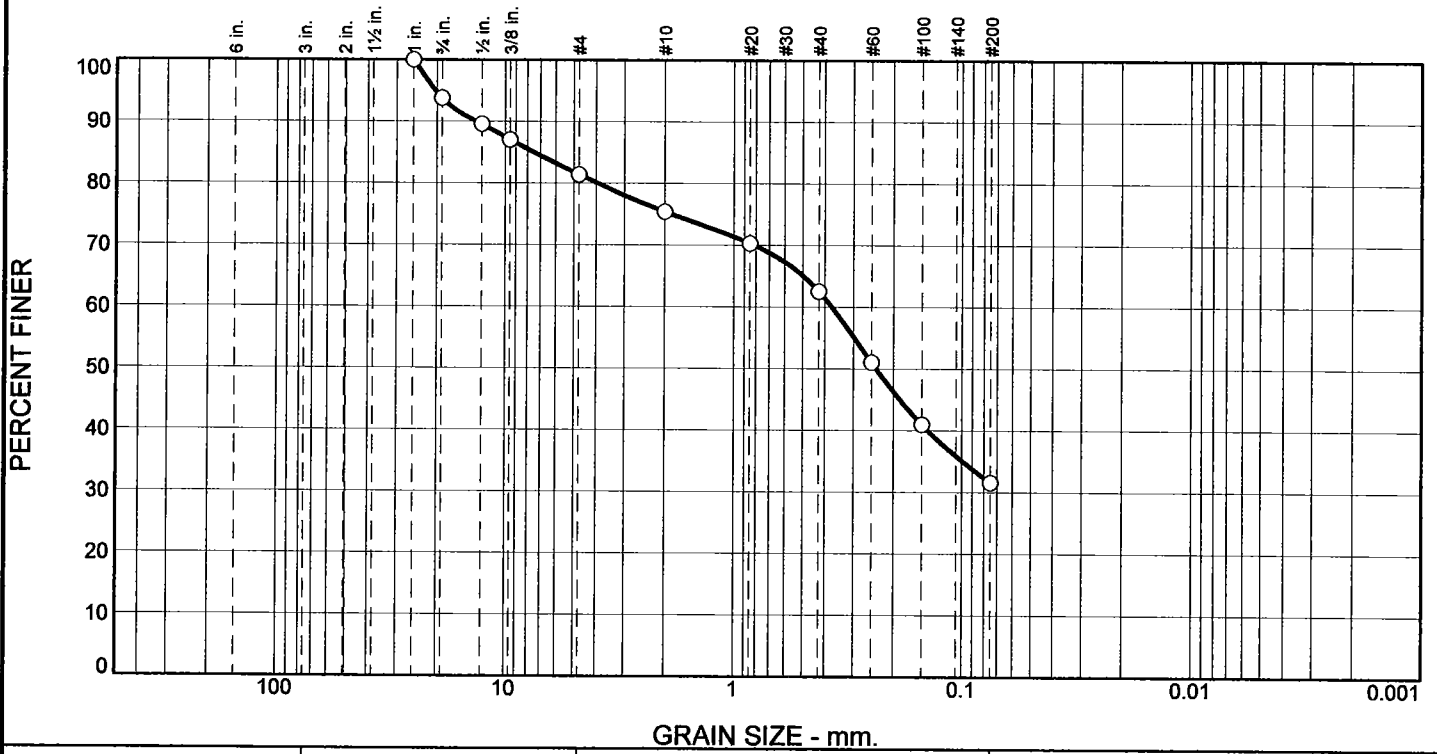
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	3.9	9.8	13.7	4.1	9.8	26.6	40.5			45.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1073	0.2111	1.1740	3.6446	11.9347	17.6469

<b>Fineness Modulus</b>
1.70

# Particle Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.2	12.4	6.0	12.8	31.0	31.6	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	93.8		
1/2"	89.6		
3/8"	87.1		
#4	81.4		
#10	75.4		
#20	70.3		
#40	62.6		
#60	51.1		
#100	41.0		
#200	31.6		

\* (no specification provided)

**Material Description**

Olive Gray Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 13.3908      D<sub>85</sub>= 7.4933      D<sub>60</sub>= 0.3722  
 D<sub>50</sub>= 0.2383      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
 D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

Date Received: 05/03/13      Date Tested: 05/08/13  
 Tested By: JF  
 Checked By: JAM  
 Title: \_\_\_\_\_

Source of Sample: Boring E330-B-006A  
 Sample Number: 7510-15/S-4

Depth: 20'-20.8'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-006A

**Depth:** 20'-20.8'

**Sample Number:** 7510-15/S-4

**Material Description:** Olive Gray Silty Sand W/Gravel

**Date Received:** 05/03/13

**AASHTO Classification:** A-2-4(0)

**USCS Classification:** SM

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/08/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 427.30  
 Tare Wt. = 118.00  
 Minus #200 from wash = 27.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
542.00	118.00	1"	0.00	0.00	100.0
		3/4"	1531.20	1505.00	93.8
		1/2"	1437.60	1419.60	89.6
		3/8"	1494.70	1484.00	87.1
		#4	1381.40	1357.50	81.4
		#10	1540.40	1515.00	75.4
		#20	1089.70	1068.10	70.3
		#40	978.30	945.40	62.6
		#60	927.30	878.50	51.1
		#100	886.30	843.60	41.0
		#200	1060.00	1020.10	31.6

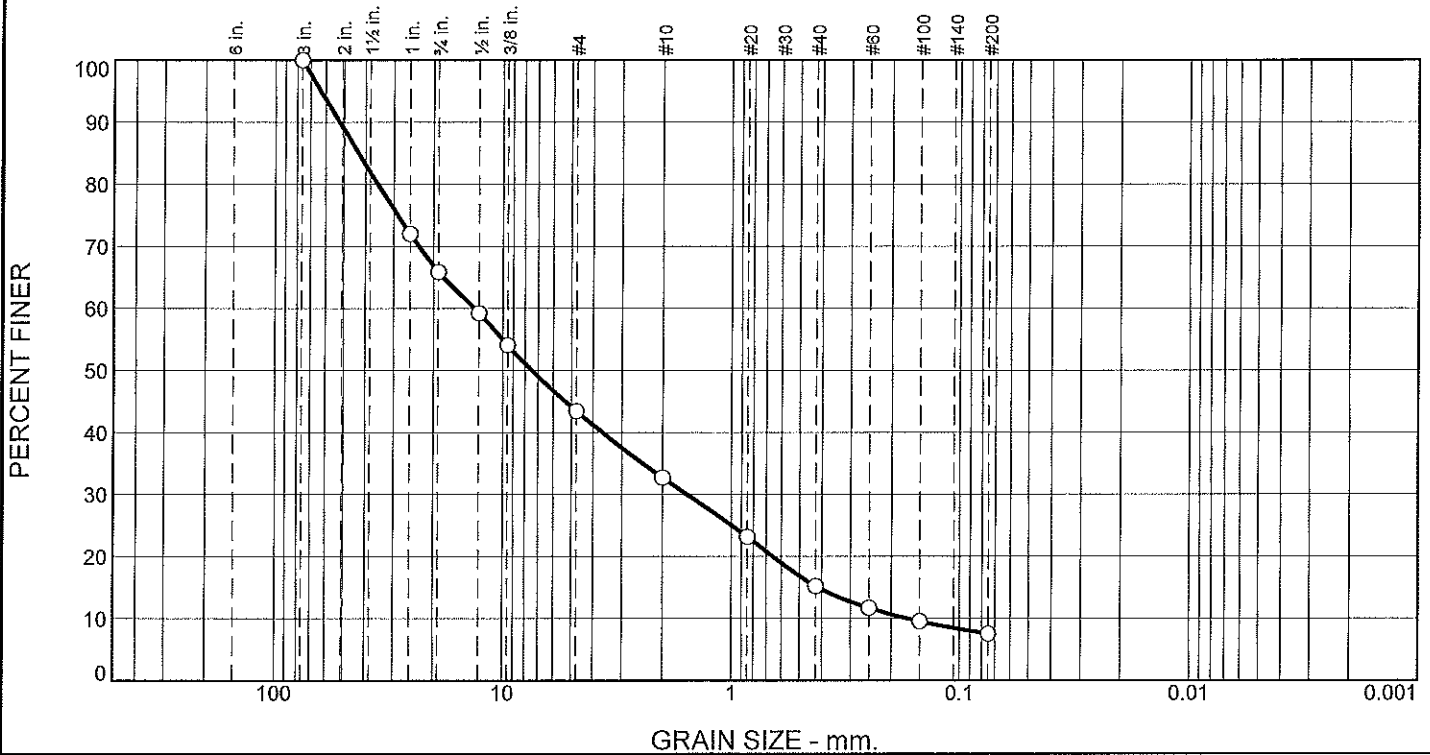
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	6.2	12.4	18.6	6.0	12.8	31.0	49.8			31.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.2383	0.3722	3.9305	7.4933	13.3908	20.3261

<b>Fineness Modulus</b>
2.25

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	34.1	22.5	10.7	17.5	7.7	7.5	

Test Results (ASTM D 136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1"	72.0		
3/4"	65.9		
1/2"	59.2		
3/8"	54.0		
#4	43.4		
#10	32.7		
#20	23.2		
#40	15.2		
#60	11.7		
#100	9.5		
#200	7.5		

**Material Description**

Olive Gray Silty Gravel W/Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= GW-GM AASHTO (M 145)= A-1-a

**Coefficients**

D <sub>90</sub> = 52.2107	D <sub>85</sub> = 43.0605	D <sub>60</sub> = 13.3127
D <sub>50</sub> = 7.4771	D <sub>30</sub> = 1.5691	D <sub>15</sub> = 0.4142
D <sub>10</sub> = 0.1702	C <sub>u</sub> = 78.23	C <sub>c</sub> = 1.09

Remarks

Date Received: 05/03/13      Date Tested: 05/08/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-006A  
 Sample Number: 7510-14/S-6

Depth: 30'-30.3'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
 Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

2/13/2014

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-006A

Depth: 30'-30.3'

Sample Number: 7510-14/S-6

Material Description: Olive Gray Silty Gravel W/Sand

Date Received: 05/03/13

USCS Classification: GW-GM

AASHTO Classification: A-1-a

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D 1140

Tested By: JF

Test Date: 05/08/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 471.20  
 Tare Wt. = 116.10  
 Minus #200 from wash = 7.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
498.90	116.10	3"	0.00	0.00	100.0
		1"	1576.80	1469.70	72.0
		3/4"	1528.50	1504.90	65.9
		1/2"	1445.10	1419.70	59.2
		3/8"	1503.60	1483.80	54.0
		#4	1397.90	1357.30	43.4
		#10	1556.20	1515.00	32.7
		#20	1104.40	1068.00	23.2
		#40	975.60	945.20	15.2
		#60	892.00	878.50	11.7
		#100	852.00	843.70	9.5
		#200	1027.70	1020.10	7.5

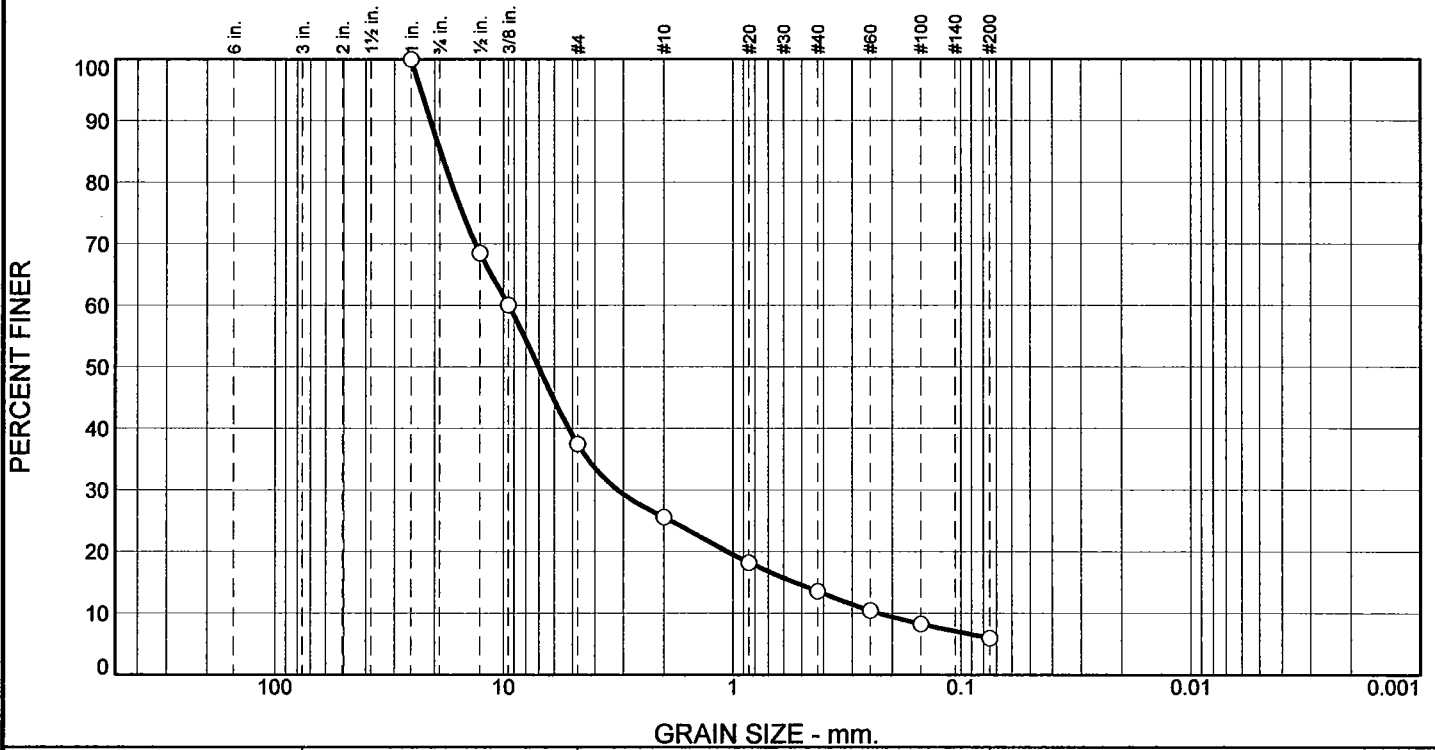
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	34.1	22.5	56.6	10.7	17.5	7.7	35.9			7.5

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.1702	0.4142	0.6553	1.5691	7.4771	13.3127	35.3471	43.0605	52.2107	63.1196

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
5.52	78.23	1.09

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.5	48.1	11.8	12.1	7.5	6.0	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
1/2"	68.5		
3/8"	60.1		
#4	37.4		
#10	25.6		
#20	18.2		
#40	13.5		
#60	10.4		
#100	8.3		
#200	6.0		

**Material Description**

Olive Gray Poorly Graded Gravel W/Silt & Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= GP-GM    AASHTO (M 145)= A-1-a

**Coefficients**

D <sub>90</sub> = 20.8886	D <sub>85</sub> = 18.8719	D <sub>60</sub> = 9.5078
D <sub>50</sub> = 7.0423	D <sub>30</sub> = 3.1839	D <sub>15</sub> = 0.5361
D <sub>10</sub> = 0.2292	C <sub>u</sub> = 41.47	C <sub>c</sub> = 4.65

Remarks

---

Date Received: 05/03/13                      Date Tested: 05/08/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-006A  
 Sample Number: 7510-16/S-8

Depth: 40'-40.7'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-006A

**Depth:** 40'-40.7'

**Sample Number:** 7510-16/S-8

**Material Description:** Olive Gray Poorly Graded Gravel W/Silt & Sand

**Date Received:** 05/03/13

**USCS Classification:** GP-GM

**AASHTO Classification:** A-1-a

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/08/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 262.20  
 Tare Wt. = 123.50  
 Minus #200 from wash = 6.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
271.20	123.50	1"	0.00	0.00	100.0
		1/2"	1466.10	1419.60	68.5
		3/8"	1496.20	1483.70	60.1
		#4	1390.70	1357.30	37.4
		#10	1532.30	1514.80	25.6
		#20	1078.60	1067.70	18.2
		#40	952.00	945.10	13.5
		#60	883.00	878.40	10.4
		#100	846.50	843.30	8.3
		#200	1023.10	1019.70	6.0

**Fractional Components**

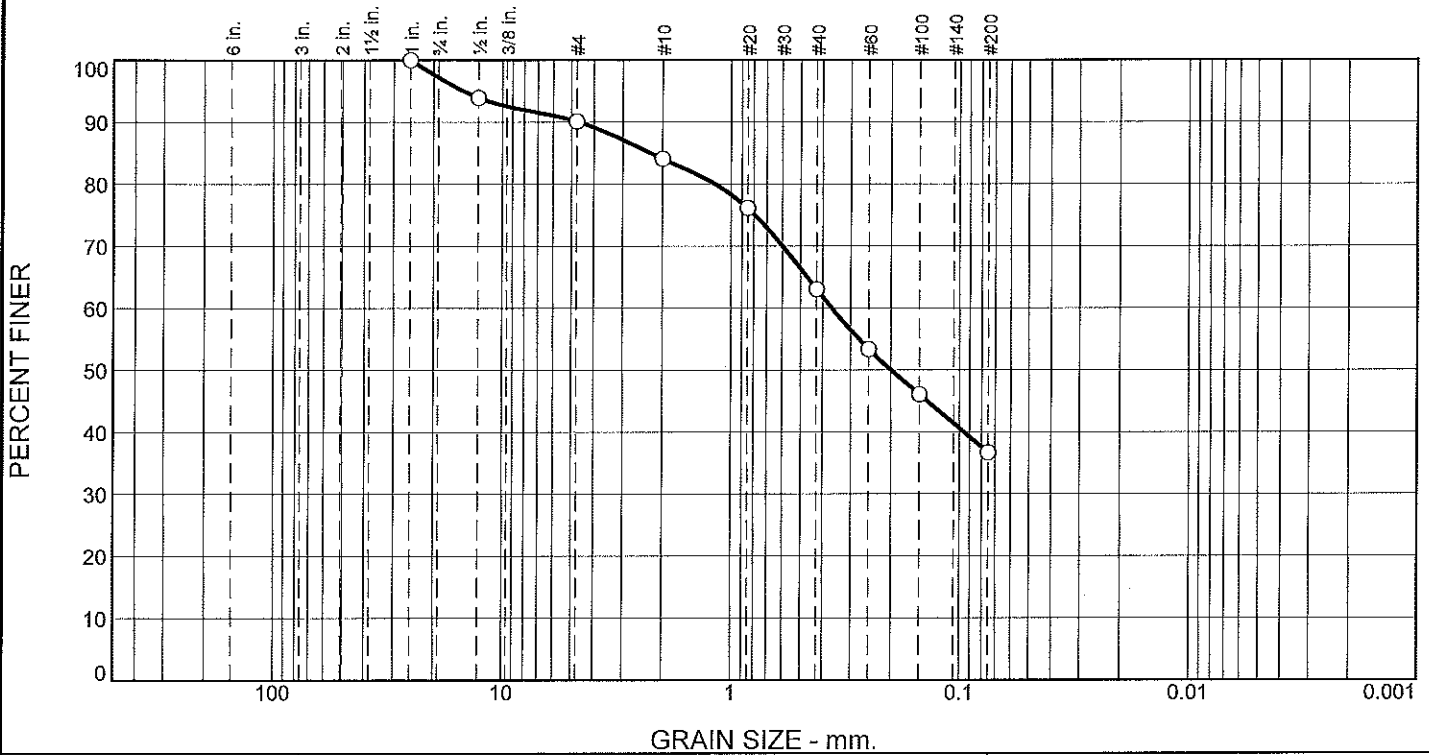
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	14.5	48.1	62.6	11.8	12.1	7.5	31.4			6.0

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.2292	0.5361	1.0563	3.1839	7.0423	9.5078	16.9608	18.8719	20.8886	23.0504

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
5.34	41.47	4.65



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.8	7.1	6.1	21.0	26.3	36.7	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
1/2"	93.9		
#4	90.1		
#10	84.0		
#20	76.1		
#40	63.0		
#60	53.4		
#100	46.0		
#200	36.7		

**Material Description**

Gray W/Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= 22                      LL= 27                      PI= 5

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 4.6776                      D<sub>85</sub>= 2.2749                      D<sub>60</sub>= 0.3643  
D<sub>50</sub>= 0.2001                      D<sub>30</sub>=                                      D<sub>15</sub>=  
D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

Remarks


---

Date Received: 05/03/13                      Date Tested: 05/09/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-006A  
Sample Number: 7510-18/S-17

Depth: 85'-86.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

2/18/2014

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-006A

Depth: 85'-86.5'

Sample Number: 7510-18/S-17

Material Description: Gray W/Olive Gray Silty Sand

Date Received: 05/03/13

PL: 22

LL: 27

PI: 5

USCS Classification: SM

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D 1140

Tested By: JF

Test Date: 05/09/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 244.80  
 Tare Wt. = 118.40  
 Minus #200 from wash = 35.3%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
313.90	118.40	1"	0.00	0.00	100.0
		1/2"	1432.00	1420.10	93.9
		#4	1365.20	1357.70	90.1
		#10	1527.00	1515.20	84.0
		#20	1083.30	1067.80	76.1
		#40	970.70	945.10	63.0
		#60	897.30	878.40	53.4
		#100	857.60	843.30	46.0
		#200	1038.30	1020.00	36.7

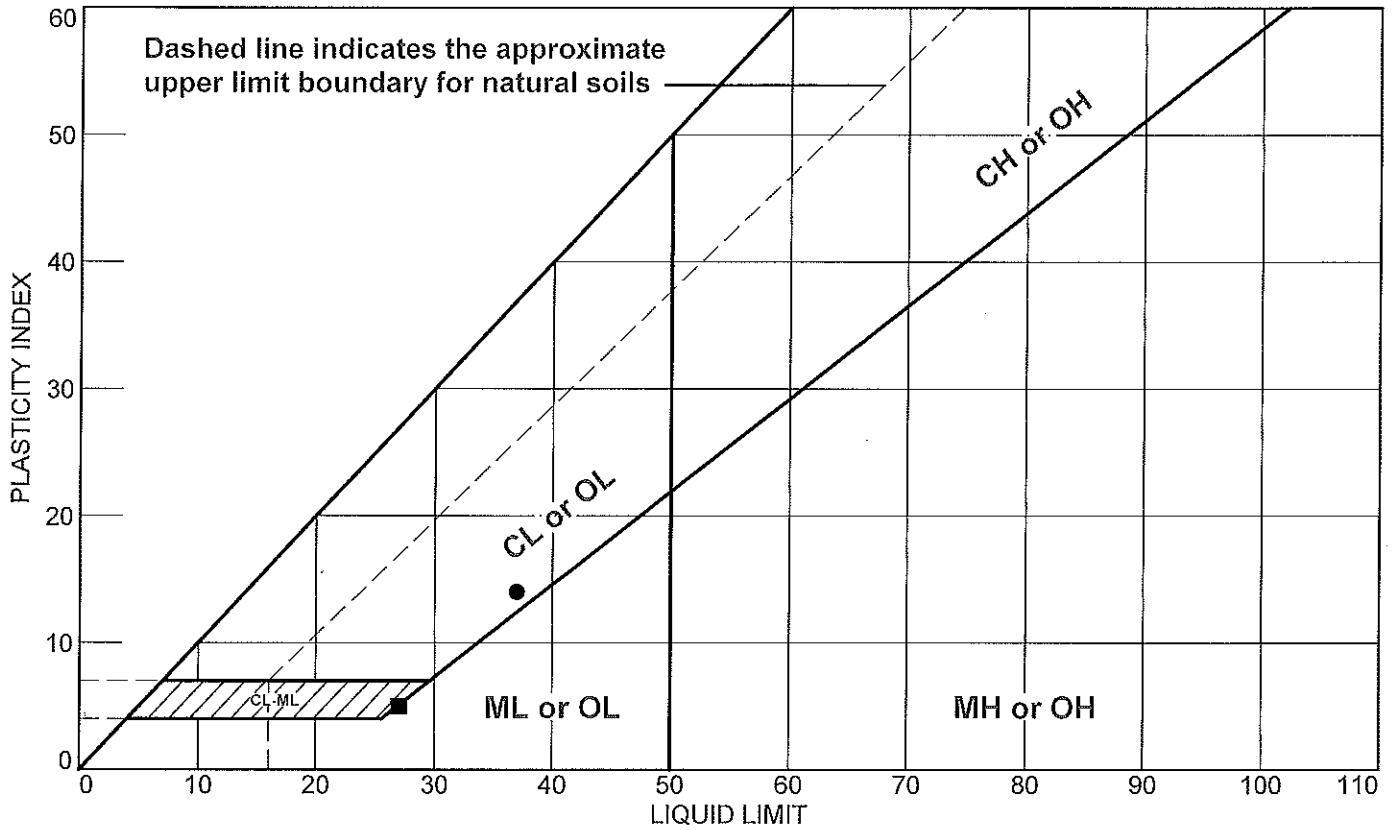
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	2.8	7.1	9.9	6.1	21.0	26.3	53.4			36.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.2001	0.3643	1.1817	2.2749	4.6776	14.8392

<b>Fineness Modulus</b>
1.83

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-006A	7510-17/S-14	70'-70.8'	32.8	23	37	14	CL or OL
■	Boring E330-B-006A	7510-18/S-17	85'-86.5'	13.7	22	27	5	SM

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

Client: Golder Associates  
Project: Sound Transit East Link

Project No.: 12-450

Figure

Tested By: JF

Checked By: JAM

## LIQUID AND PLASTIC LIMIT TEST DATA

5/15/2013

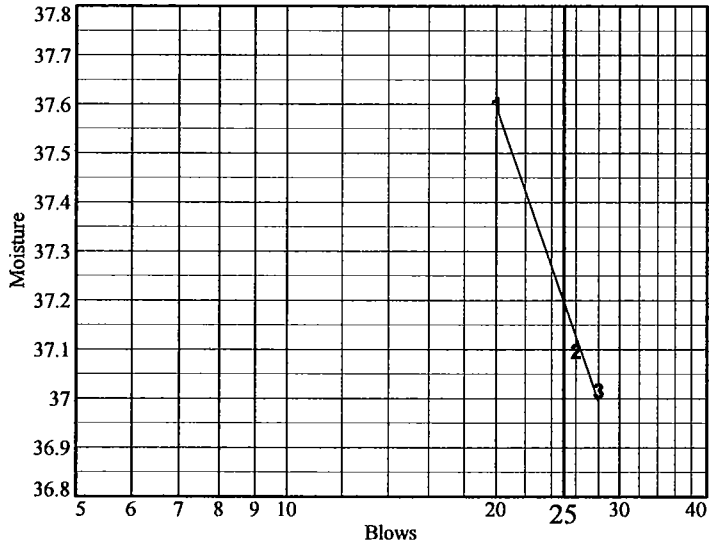
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-006A  
**Depth:** 70'-70.8'  
**Material Description:** Gray Clay  
**USCS:** CL or OL  
**Tested by:** JF

**Sample Number:** 7510-17/S-14

**Checked by:** JAM

### Liquid Limit Data

Run No.	1	2	3	4	5	6
<b>Wet+Tare</b>	30.7	30.6	38.4			
<b>Dry+Tare</b>	26	26	31.7			
<b>Tare</b>	13.5	13.6	13.6			
<b># Blows</b>	20	26	28			
<b>Moisture</b>	37.6	37.1	37.0			



**Liquid Limit=** 37  
**Plastic Limit=** 23  
**Plasticity Index=** 14  
**Natural Moisture=** 32.8  
**Liquidity Index=** 0.7

### Plastic Limit Data

Run No.	1	2	3	4
<b>Wet+Tare</b>	18.2	21.1	19.4	
<b>Dry+Tare</b>	17	19.2	17.8	
<b>Tare</b>	11.3	11.3	11.1	
<b>Moisture</b>	21.1	24.1	23.9	

### Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
77.6	61.8	13.7	32.8

**LIQUID AND PLASTIC LIMIT TEST DATA**

2/18/2014

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-006A

Depth: 85'-86.5'

Sample Number: 7510-18/S-17

Material Description: Gray W/Olive Gray Silty Sand

USCS: SM

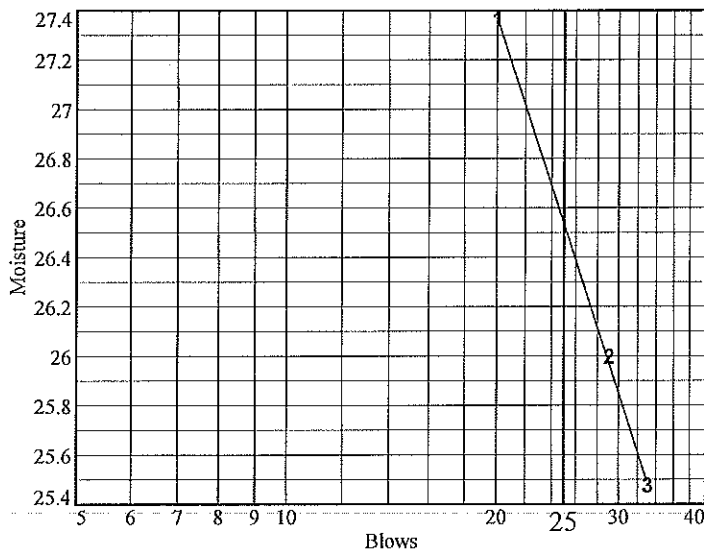
AASHTO: A-4(0)

Tested by: JF

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	37.8	32.5	33.3			
Dry+Tare	32.6	28.6	29.3			
Tare	13.6	13.6	13.6			
# Blows	20	29	33			
Moisture	27.4	26.0	25.5			



Liquid Limit= 27  
 Plastic Limit= 22  
 Plasticity Index= 5  
 Natural Moisture= 13.7  
 Liquidity Index= -1.7

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18.7	19	19.5	
Dry+Tare	17.4	17.6	17.9	
Tare	11	11.1	11	
Moisture	20.3	21.5	23.2	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
340.6	313.9	118.4	13.7



**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-006B

**Depth:** 65'-65.9'

**Sample Number:** 7510-19/S-2

**Material Description:** Olive Gray W/Black Sandy Silt

**Date Received:** 05/03/13

**AASHTO Classification:** A-4(0)

**USCS Classification:** ML

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/09/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 310.20  
 Tare Wt. = 118.50  
 Minus #200 from wash = 58.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
577.10	118.50	1/2"	0.00	0.00	100.0
		#4	1359.50	1357.30	99.5
		#10	1523.60	1514.70	97.6
		#20	1083.10	1067.90	94.3
		#40	960.40	945.10	90.9
		#60	902.90	878.50	85.6
		#100	887.50	843.30	76.0
		#200	1089.90	1020.00	60.7

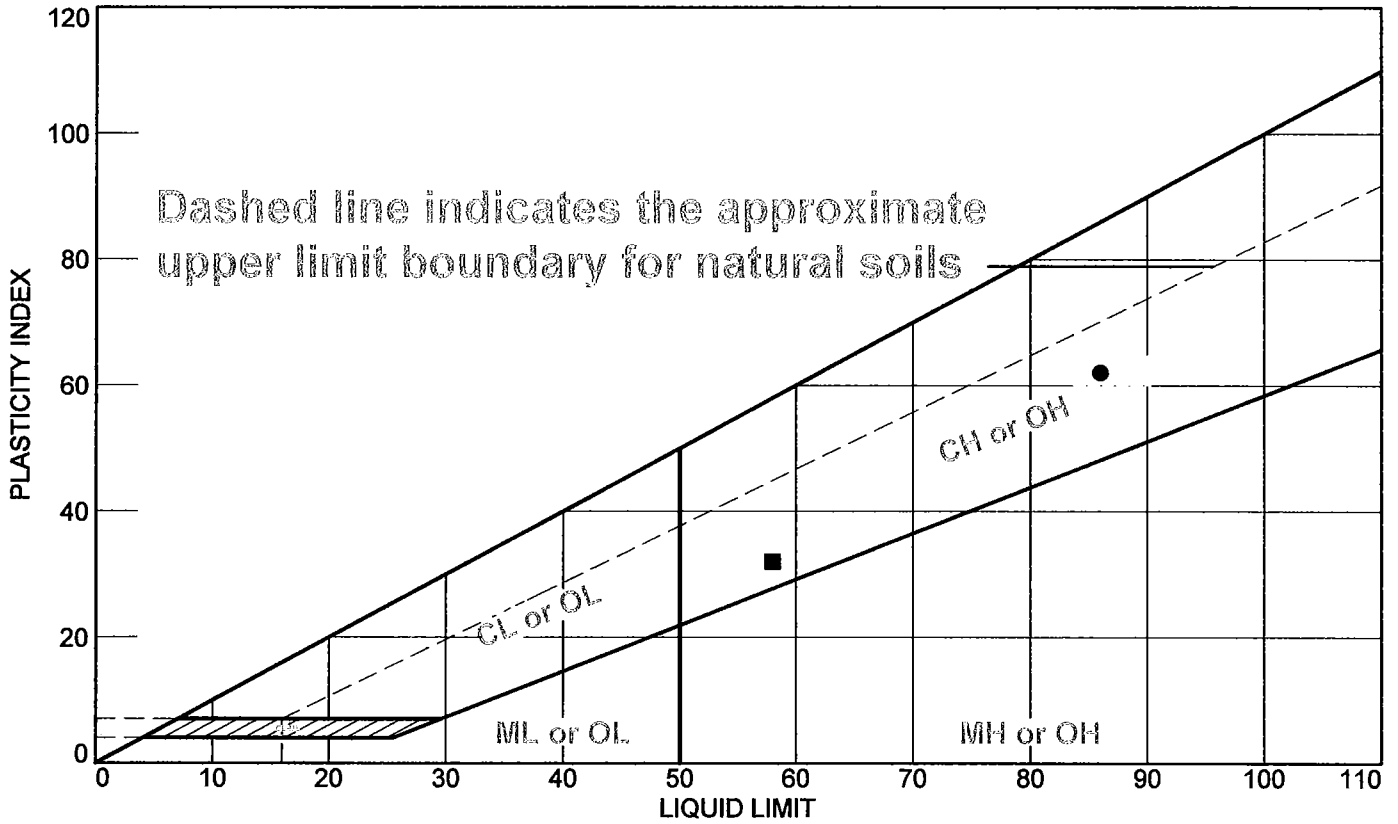
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.5	0.5	1.9	6.7	30.2	38.8			60.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
						0.1821	0.2402	0.3735	1.0180

<b>Fineness Modulus</b>
0.50

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-006B	HMA#7510-20/S-4	75'-76.5'	35.4	24	86	62	CH or OH
■	Boring E330-B-006B	HMA#7510-21/S-6	85'-86.5'	32.0	26	58	32	CH or OH

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF

Checked By: JAM



**LIQUID AND PLASTIC LIMIT TEST DATA**

5/15/2013

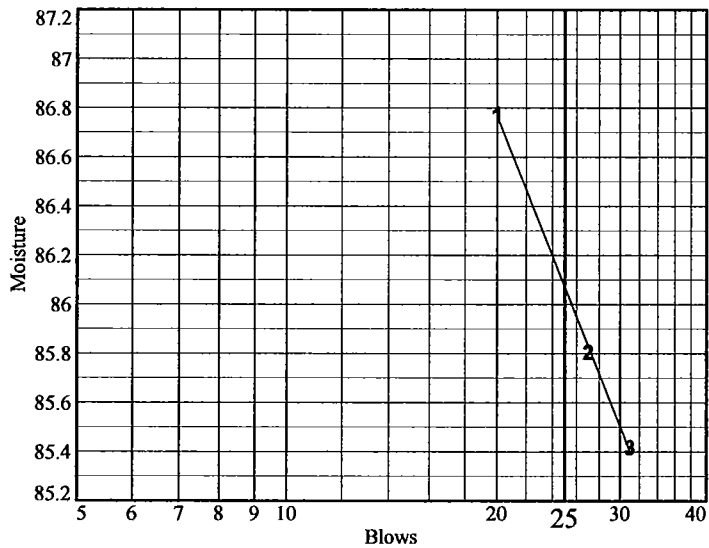
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-006B  
**Depth:** 75'-76.5'  
**Material Description:** Gray Clay  
**USCS:** CH or OH  
**Tested by:** JF

**Sample Number:** HMA#7510-20/S-4

**Checked by:** JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
<b>Wet+Tare</b>	30.82	28.32	29.97			
<b>Dry+Tare</b>	21.7	20.4	21.3			
<b>Tare</b>	11.19	11.17	11.15			
<b># Blows</b>	20	27	31			
<b>Moisture</b>	86.8	85.8	85.4			



**Liquid Limit=** 86  
**Plastic Limit=** 24  
**Plasticity Index=** 62  
**Natural Moisture=** 35.4  
**Liquidity Index=** 0.2

**Plastic Limit Data**

Run No.	1	2	3	4
<b>Wet+Tare</b>	17.9	18.2	22	
<b>Dry+Tare</b>	16.6	16.9	19.8	
<b>Tare</b>	11.2	11.2	11.2	
<b>Moisture</b>	24.1	22.8	25.6	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
78.7	61.7	13.7	35.4

## LIQUID AND PLASTIC LIMIT TEST DATA

5/15/2013

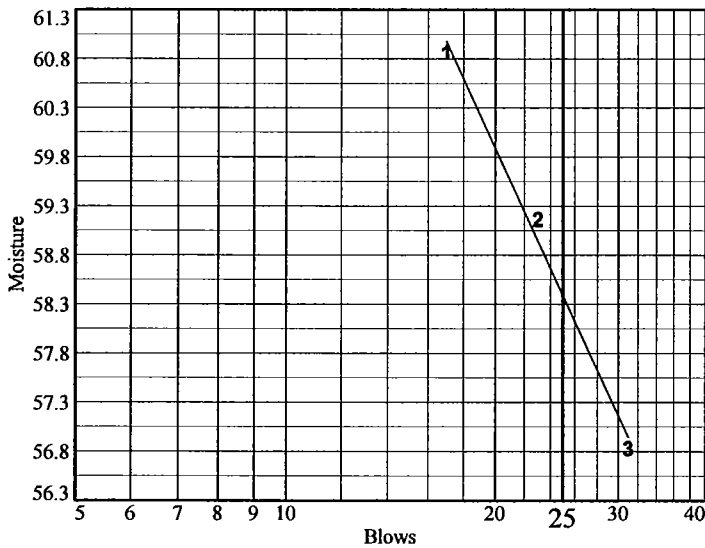
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-006B  
**Depth:** 85'-86.5'  
**Material Description:** Gray Clay  
**USCS:** CH or OH  
**Tested by:** JF

**Sample Number:** HMA#7510-21/S-6

**Checked by:** JAM

### Liquid Limit Data

Run No.	1	2	3	4	5	6
<b>Wet+Tare</b>	35.8	32.7	35.4			
<b>Dry+Tare</b>	27.4	25.6	27.5			
<b>Tare</b>	13.6	13.6	13.6			
<b># Blows</b>	17	23	31			
<b>Moisture</b>	60.9	59.2	56.8			



**Liquid Limit=** 58  
**Plastic Limit=** 26  
**Plasticity Index=** 32  
**Natural Moisture=** 32.0  
**Liquidity Index=** 0.2

### Plastic Limit Data

Run No.	1	2	3	4
<b>Wet+Tare</b>	21.9	21.3	19.5	
<b>Dry+Tare</b>	19.8	19.2	17.8	
<b>Tare</b>	11.4	11.3	11.3	
<b>Moisture</b>	25.0	26.6	26.2	

### Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
71	57.1	13.7	32.0

7499-25	S-11	E320-B-160, 35'	3/21/2013	3/26/2013	S7	116.2	474.9	451.4	7.0
7499-26	S-3	E320-B-161, 5'	3/21/2013	3/26/2013	9A	162	766.7	699.4	12.5
7499-27	S-8	E320-B-161, 20'	3/21/2013	3/26/2013	3A	213.8	463.4	447.8	6.7
7499-28	S-16	E320-B-161, 35.5'	3/21/2013	3/26/2013	X7	193	639.3	577.6	16.0
7499-7	Run 2	E330-B-006, 15'	3/21/2013	3/26/2013	C	775.5	2731.1	2649.2	4.4
7499-8	Run 7	E330-B-006, 52'	3/21/2013	3/26/2013	X2	595.9	2604.7	2526.5	4.1
7499-9	Run 10	E330-B-006, 72'	3/21/2013	3/26/2013	5A	114.3	589.4	536.4	12.6
7499-10	Run 11	E330-B-006, 76.7'	3/21/2013	3/26/2013	SR	31	84.5	77.9	14.1
7510-13	S-2	E330-B-006A, 10'	5/3/2013	5/7/2013	M5	120.2	547.8	489.5	15.8
7510-15	S-4	E330-B-006A, 20'	5/3/2013	5/7/2013	S6	118	593.6	542	12.2
7510-14	S-6	E330-B-006A, 30'	5/3/2013	5/7/2013	S7	116.1	529.5	498.9	8.0
7510-16	S-8	E330-B-006A, 40'	5/3/2013	5/7/2013	M7	123.5	279.3	271.2	5.5
7510-17	S-14	E330-B-006A, 70'	5/3/2013	5/8/2013	Z1	13.7	77.6	61.8	32.8
7510-18	S-17	E330-B-006A, 80'	5/3/2013	5/8/2013	S10	118.4	340.6	313.9	13.7
7510-19	S-2	E330-B-006B, 65'	5/3/2013	5/8/2013	S3	118.5	697	577.1	26.1
7510-20	S-4	E330-B-006B, 75'	5/3/2013	5/8/2013	3M	13.7	78.7	61.7	35.4
7519-1	S-3	E330-B-008, 7.5'	6/7/2013	6/17/2013	S10	114	742.9	650.5	17.2
7519-2	S-7	E330-B-008, 20'	6/7/2013	6/17/2013	3A	213.7	651.2	616.2	8.7
7519-3	S-9	E330-B-008, 30'	6/7/2013	6/17/2013	S6	117.9	725.5	610.6	23.3
7519-4	S-11	E330-B-008, 40'	6/7/2013	6/17/2013	X8	194.1	725.2	626.9	22.7
7519-5	S-15	E330-B-008, 60'	6/7/2013	6/17/2013	4A	212.2	671.3	593.3	20.5
7519-6	S-17	E330-B-008, 70'	6/7/2013	6/17/2013	2A	217.2	336.1	317.3	18.8
7519-7	S-21	E330-B-008, 80'	6/7/2013	6/17/2013	9A	162	434	397.8	15.4
7529-17	S-1	E330-B-008A, 2.5'	7/15/2013	7/22/2013	M6	117.3	601.8	557.7	10.0
7529-18	S-3	E330-B-008A, 7.5'	7/15/2013	7/23/2013	6A	114.6	588.3	545.8	9.9
7529-19	S-7	E330-B-008A, 20'	7/15/2013	7/23/2013	5A	114.1	527.8	471.9	15.6
7529-20	S-10	E330-B-008A, 35'	7/15/2013	7/23/2013	S4	118.4	259.1	236.9	18.7
7529-21	S-12	E330-B-008A, 45'	7/15/2013	7/23/2013	S8	113.3	463.2	423.8	12.7
7529-22	S-15	E330-B-008A, 60'	7/15/2013	7/23/2013	S1	118.2	536.8	466.2	20.3
7529-23	S-18	E330-B-008A, 75'	7/15/2013	7/23/2013	S3	118.4	282.2	251.2	23.3
7529-24	S-20	E330-B-008A, 85'	7/15/2013	7/23/2013	B3	115.2	211.3	196.4	18.3
7510-22	S-11	E330-B-009, 2.5'	5/3/2013	5/8/2013	9A	161.8	633.2	577	13.5
7510-23	S-4	E330-B-009, 10'	5/3/2013	5/8/2013	X8	194.3	671.8	613.4	13.9
7510-24	S-9	E330-B-009, 30'	5/3/2013	5/8/2013	X10	234.7	790.2	696.2	20.4
7510-25	S-12	E330-B-009, 45'	5/3/2013	5/8/2013	2M	13.7	83.7	66.9	31.6

7510-26	S-17	E330-B-009, 70'	5/3/2013	5/8/2013	43M	13.7	71.7	58.9	28.3
7510-27	S-21	E330-B-009, 90	5/3/2013	5/8/2013	M109	13.6	70.2	54.6	38.0
7510-28	S-26	E330-B-009, 115'	5/3/2013	5/8/2013	M108	13.7	61.9	49.8	33.5
7510-29	S-30	E330-B-009, 135'	5/3/2013	5/8/2013	34M	13.7	62.9	49.5	37.4
7511-22	2	E330-B-010, 2.5'	5/10/2013	5/13/2013	44M	13.6	67.6	56.6	25.6
7511-23	5	E330-B-010, 10'	5/10/2013	5/13/2013	S8	113.2	402.1	374.1	10.7
7511-24	7	E330-B-010, 15'	5/10/2013	5/13/2013	S1	118.2	358.8	327.5	15.0
7511-25	13	E330-B-010, 30'	5/10/2013	5/13/2013	5M	117.9	278.7	264.9	9.4
7511-26	10	E330-B-010, 45'	5/10/2013	5/13/2013	S6	13.4	61.4	50.9	28.0
7511-27	15	E330-B-010, 55'	5/10/2013	5/13/2013	38M	13.7	72.5	63.5	18.1
7511-28	18	E330-B-010, 70'	5/10/2013	5/13/2013	S1	11.2	47.9	41.2	22.3
7511-35	21	E330-B-010, 85'	5/10/2013	5/15/2013	M100	13.9	63.8	56.3	17.7
7511-36	24	E330-B-010, 100'	5/10/2013	5/15/2013	71M	13.5	45.8	42	13.3
7514-9	S-2	E330-B-011, 2.5'	5/30/2013	6/6/2013	M2	214.1	732.6	695.6	7.7
7514-10	S-5	E330-B-011, 12.5'	5/30/2013	6/6/2013	M5	120.1	371.4	331.3	19.0
7514-11	S-8	E330-B-011, 25'	5/30/2013	6/6/2013	S3	118.5	238.8	229.6	8.3
7514-12	S-13	E330-B-011, 50'	5/30/2013	6/6/2013	S1	118.1	270.4	240	24.9
7514-13	S-17	E330-B-011, 70'	5/30/2013	6/6/2013	SR	31.1	78.9	68.9	26.5
7514-14	S-20	E330-B-011, 85'	5/30/2013	6/6/2013	S6	117.9	245.8	215.1	31.6
7514-15	S-2	E330-B-012, 2.5'	5/30/2013	6/6/2013	M7	123.2	405.7	380.2	9.9
7514-16	S-5	E330-B-012, 10'	5/30/2013	6/7/2013	S5	118.7	322.2	277	28.6
7514-17	S-7	E330-B-012, 15'	5/30/2013	6/7/2013	S7	116.1	617.7	546.5	16.5
7514-18	S-13	E330-B-012, 45'	5/30/2013	6/7/2013	S9	114.1	240.7	213.9	26.9
7514-19	S-17	E330-B-012, 65'	5/30/2013	6/7/2013	S10	114.1	263.2	232.9	25.5
7514-20	S-21	E330-B-012, 85'	5/30/2013	6/7/2013	X5	198.2	367.1	334.9	23.6
7514-21	S-2	E330-B-013, 2.5'	5/30/2013	6/7/2013	S7	193	623.6	581.2	10.9
7514-22	S-5	E330-B-013, 10'	5/30/2013	6/7/2013	S6	196.1	459.8	435.2	10.3
7514-23	S-9	E330-B-013, 25'	5/30/2013	6/7/2013	AJ2	164.9	405.4	383	10.3
7514-24	S-12	E330-B-013, 40'	5/30/2013	6/7/2013	M4	190.2	701.4	642	13.1
7514-25	S-18	E330-B-013, 70'	5/30/2013	6/7/2013	9A	162	317.5	283.2	28.3
7514-26	S-21	E330-B-013, 85'	5/30/2013	6/7/2013	AB	157.5	364.6	325.6	23.2
7514-27	S-3	E330-B-014, 5'	5/30/2013	6/7/2013	X9	230.9	413.5	381	21.7
7514-28	S-4	E330-B-014, 7.5'	5/30/2013	6/10/2013	X8	194.2	413.6	379.2	18.6
7514-29	S-8	E330-B-014, 20'	5/30/2013	6/10/2013	X10	234.7	474.3	432.7	21.0
7514-30	S-11	E330-B-014, 35'	5/30/2013	6/10/2013	B3	115.3	445.2	399.3	16.2

7514-31	S-14	E330-B-014, 50'	5/30/2013	6/10/2013	7A	87.3	277.6	254.4	13.9
7514-32	S-19	E330-B-014, 75'	5/30/2013	6/10/2013	8A	136.1	258.4	230.7	29.3
7514-33	S-23	E330-B-014, 95'	5/30/2013	6/10/2013	DEF	31.1	116.7	97.9	28.1
7514-34	S-2	E330-B-014B, 2.5'	5/30/2013	6/10/2013	M6	117.5	602.9	547.9	12.8
7514-35	S-7	E330-B-014B, 15'	5/30/2013	6/10/2013	6A	114.8	346.4	324.2	10.6
7514-36	S-10	E330-B-014B, 30'	5/30/2013	6/10/2013	5A	114.2	288.7	271.4	11.0
7514-37	S-17	E330-B-014B, 65'	5/30/2013	6/10/2013	S4	118.3	360	318.4	20.8
7514-38	S-20	E330-B-014B, 80'	5/30/2013	6/11/2013	JF	31.2	113.3	95.9	26.9
7514-39	s-2	E330-B-017, 12.5'	5/30/2013	6/11/2013	S8	113.2	400.7	369.3	12.3
7514-40	S-4	E330-B-017, 20'	5/30/2013	6/11/2013	X2	595.7	838.5	806.7	15.1
7514-41	S-9	E330-B-017, 45'	5/30/2013	6/11/2013	BB	621.4	868.8	840.6	12.9
7514-42	S-14	E330-B-017, 70'	5/30/2013	6/11/2013	1A	213.1	623.5	535.7	27.2
7514-43	S-17	E330-B-017, 85'	5/30/2013	6/11/2013	ABC	31.2	117.9	101.9	22.6
7514-44	S-3	E330-B-018, 5'	5/30/2013	6/11/2013	S1	118.3	501	435.5	20.6
7514-45	S-6	E330-B-018, 12.5'	5/30/2013	6/11/2013	M5	120.3	640.1	583.8	12.1
7514-46	S-12	E330-B-018, 40'	5/30/2013	6/12/2013	E4	199	405.8	384	11.8
7514-47	S-17	E330-B-018, 65'	5/30/2013	6/12/2013	S9	114.1	290.3	277.3	8.0
7514-48	S-21	E330-B-018, 85'	5/30/2013	6/12/2013	2A	217.3	342.7	321.8	20.0
7514-49	S-3	E330-B-019, 5'	5/30/2013	6/12/2013	S10	114	761.4	647.2	21.4
7514-50	S-6	E330-B-019, 12.5'	5/30/2013	6/13/2013	3A	213.7	706.2	652.2	12.3
7514-51	S-10	E330-B-019, 30'	5/30/2013	6/13/2013	S6	118	434.5	392.5	15.3
7514-52	S-15	E330-B-019, 55'	5/30/2013	6/13/2013	4A	212.5	511	483.8	10.0
7514-53	S-20	E330-B-019, 75'	5/30/2013	6/13/2013	2AA	214.2	501.9	457.9	18.1
7514-54	S-23	E330-B-019, 90'	5/30/2013	6/13/2013	A	603.6	802.9	766.3	22.5
7514-55	S-4	E330-B-021, 7.5'	5/30/2013	6/13/2013	M1	225.9	1006.4	914.3	13.4
7514-56	S-10	E330-B-021, 30'	5/30/2013	6/13/2013	M3	198.2	495.9	461.5	13.1
7514-57	S-15	E330-B-021, 55'	5/30/2013	6/13/2013	M2	214.1	563	528.8	10.9
7514-58	S-18	E330-B-021, 70'	5/30/2013	6/13/2013	A5	598.8	1385.9	1329.4	7.7
7514-59	S-21	E330-B-021, 85'	5/30/2013	6/13/2013	C	775.4	1044	1005.5	16.7
7514-60	S-22	E330-B-021, 89.4'	5/30/2013	6/13/2013	M7	123.2	232.9	206.9	31.1
7510-30	S-2	E330-B-022, 5'	5/3/2013	5/9/2013	X9	230.7	541.6	508.5	11.9
7510-31	S-5	E330-B-022, 12.5'	5/3/2013	5/9/2013	M4	190.3	595.2	557.1	10.4
7510-32	S-9	E330-B-022, 30'	5/3/2013	5/9/2013	AJ	164.9	402.1	380.6	10.0
7510-33	S-14	E330-B-022, 55'	5/3/2013	5/9/2013	X5	198.2	462.6	434.4	11.9
7510-34	S-17	E330-B-022, 70'	5/3/2013	5/9/2013	AB	157.4	462.7	416.5	17.8

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/24/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-008

Depth: 7.5'-9.0'

Sample Number: HMA #7519-1/S-3

Material Description: Olive Brown Silty Sand

Date Received: 6/7/2013

USCS Classification: SM

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TP/JF

Test Date: 6/17/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 461.50

Tare Wt. = 114.00

Minus #200 from wash = 35.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
650.50	114.00	3/4"	0.00	0.00	100.0
		1/2"	1429.50	1419.40	98.1
		3/8"	1486.40	1483.60	97.6
		#4	1375.60	1357.00	94.1
		#10	1533.80	1514.40	90.5
		#20	1084.80	1067.00	87.2
		#40	985.90	944.50	79.5
		#60	954.60	878.20	65.2
		#100	918.00	843.30	51.3
		#200	1098.20	1019.50	36.6

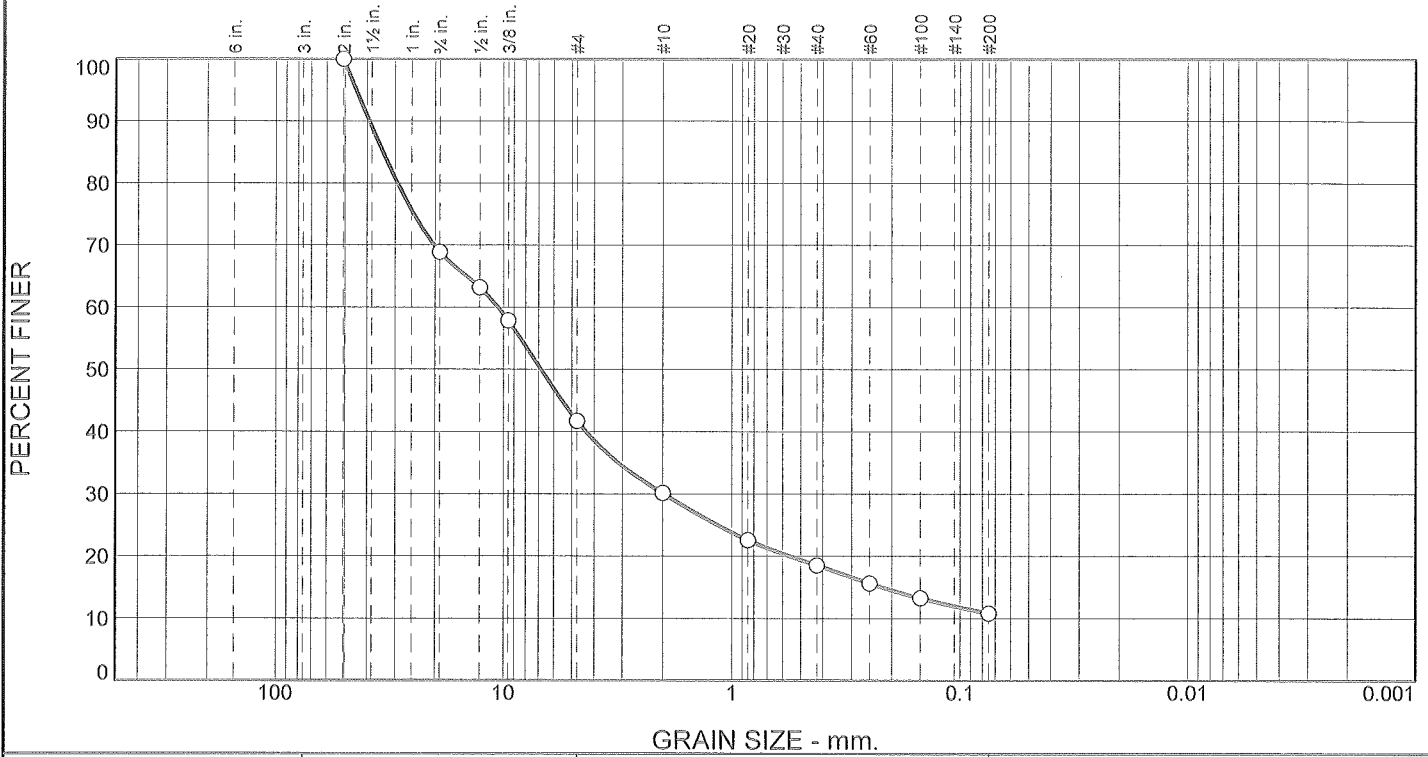
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	5.9	5.9	3.6	11.0	42.9	57.5			36.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1420	0.2084	0.4362	0.6228	1.7095	5.5245

<b>Fineness Modulus</b>
1.22

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	31.1	27.2	11.6	11.6	7.7	10.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2"	100.0		
3/4"	68.9		
1/2"	63.2		
3/8"	57.8		
#4	41.7		
#10	30.1		
#20	22.6		
#40	18.5		
#60	15.7		
#100	13.3		
#200	10.8		

**Material Description**

Olive Gray Poorly Graded Gravel with Silt and Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= GP-GM AASHTO (M 145)= A-1-a

**Coefficients**

D<sub>90</sub>= 39.0716      D<sub>85</sub>= 34.0307      D<sub>60</sub>= 10.5918  
D<sub>50</sub>= 6.8307      D<sub>30</sub>= 1.9775      D<sub>15</sub>= 0.2198  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


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Date Received: 6/7/2013      Date Tested: 6/17/2013

Tested By: TP/JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-008  
Sample Number: HMA #7519-2/S-7

Depth: 20'-20.8'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
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Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/24/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-008

**Depth:** 20'-20.8'

**Sample Number:** HMA #7519-2/S-7

**Material Description:** Olive Gray Poorly Graded Gravel with Silt and Sand

**Date Received:** 6/7/2013

**USCS Classification:** GP-GM

**AASHTO Classification:** A-1-a

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D1140

**Tested By:** TP/JF

**Test Date:** 6/17/2013

**Checked By:** JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 587.10  
 Tare Wt. = 213.70  
 Minus #200 from wash = 7.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
616.20	213.70	2"	0.00	0.00	100.0
		3/4"	1630.10	1504.90	68.9
		1/2"	1442.60	1419.50	63.2
		3/8"	1505.10	1483.60	57.8
		#4	1421.80	1357.00	41.7
		#10	1560.90	1514.20	30.1
		#20	1097.30	1067.00	22.6
		#40	960.90	944.60	18.5
		#60	889.80	878.20	15.7
		#100	852.90	843.30	13.3
		#200	1029.40	1019.60	10.8

**Fractional Components**

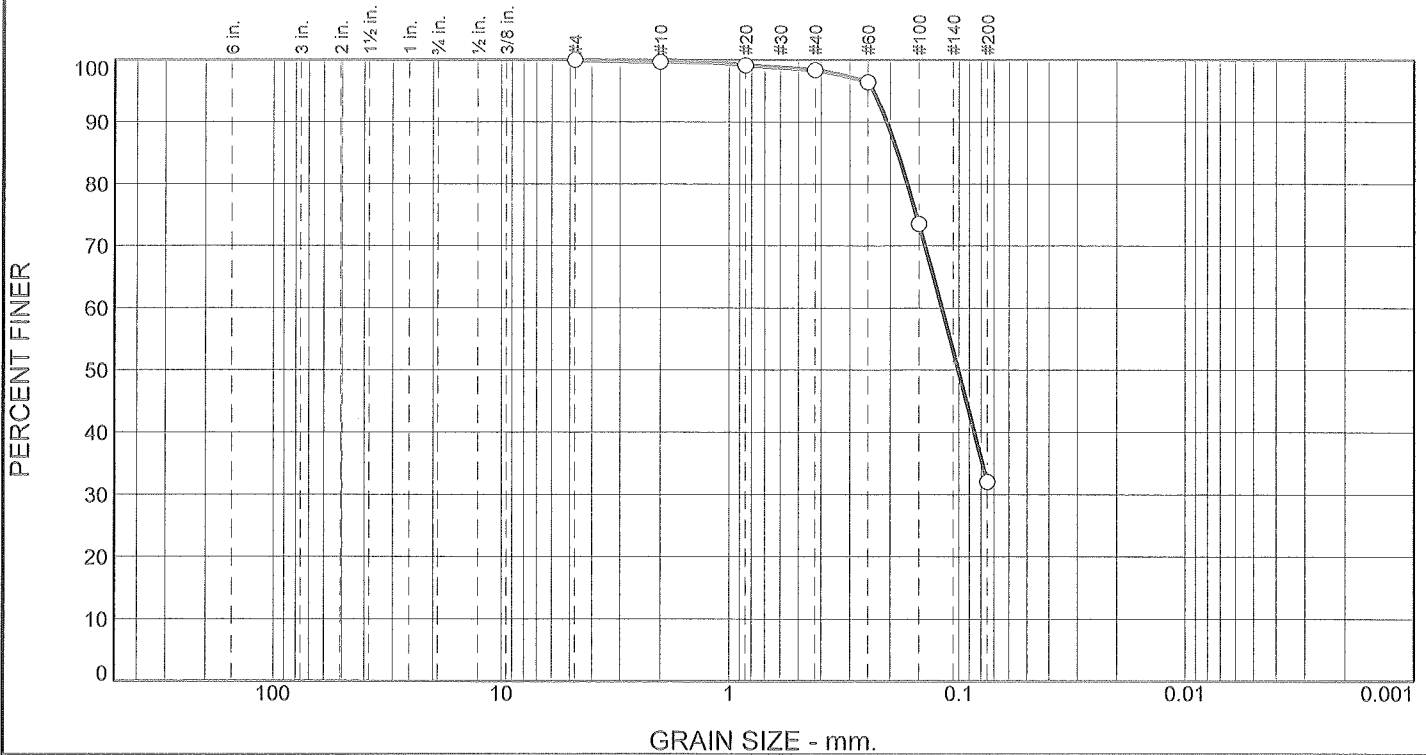
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	31.1	27.2	58.3	11.6	11.6	7.7	30.9			10.8

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
	0.2198	0.5575	1.9775	6.8307	10.5918	29.3404	34.0307	39.0716	44.6081

<b>Fineness Modulus</b>
5.35



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.3	66.4	32.0	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.7		
#20	99.1		
#40	98.4		
#60	96.4		
#100	73.6		
#200	32.0		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.2062      D<sub>85</sub>= 0.1851      D<sub>60</sub>= 0.1189  
D<sub>50</sub>= 0.1006      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 6/7/2013      Date Tested: 6/17/2013  
Tested By: TP/JF  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-008  
Sample Number: HMA #7519-3/S-9

Depth: 30'-31.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/24/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-008

Depth: 30'-31.5'

Sample Number: HMA #7519-3/S-9

Material Description: Gray Silty Sand

Date Received: 6/7/2013

AASHTO Classification: A-2-4(0)

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TP/JF

Test Date: 6/17/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 499.80  
 Tare Wt. = 117.90  
 Minus #200 from wash = 22.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
610.60	117.90	#4	0.00	0.00	100.0
		#10	1515.60	1514.20	99.7
		#20	1069.90	1067.00	99.1
		#40	948.10	944.50	98.4
		#60	887.70	878.10	96.4
		#100	955.90	843.20	73.6
		#200	1224.10	1019.50	32.0

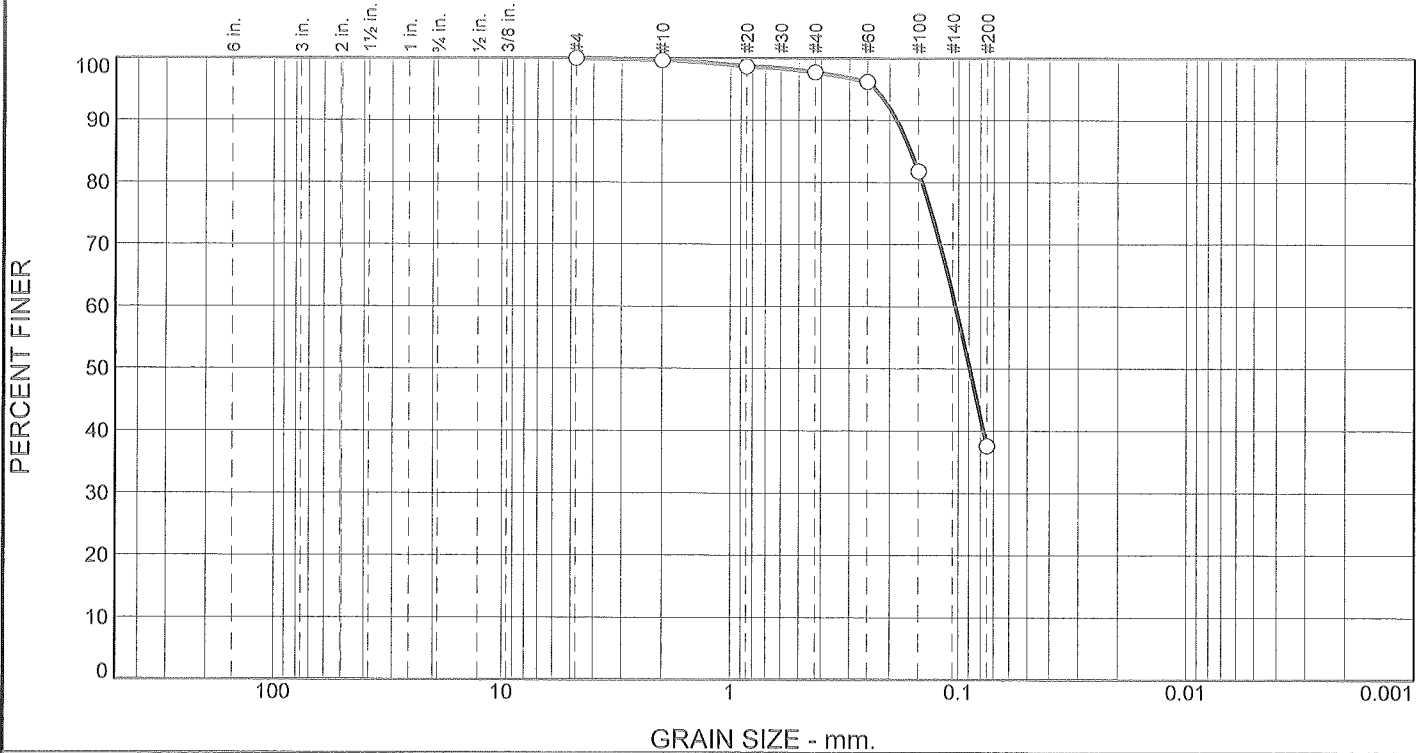
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.3	1.3	66.4	68.0			32.0

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1006	0.1189	0.1683	0.1851	0.2062	0.2366

<b>Fineness Modulus</b>
0.31

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.9	60.2	37.6	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.7		
#20	98.7		
#40	97.8		
#60	96.2		
#100	81.8		
#200	37.6		

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.1861      D<sub>85</sub>= 0.1616      D<sub>60</sub>= 0.1030  
D<sub>50</sub>= 0.0891      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 6/7/2013      Date Tested: 6/17/2013  
Tested By: TP/JF  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-008  
Sample Number: HMA #7519-4/S-11

Depth: 40'-40.9'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
---	--

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/24/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-008

**Depth:** 40'-40.9'

**Sample Number:** HMA #7519-4/S-11

**Material Description:** Olive Gray Silty Sand

**Date Received:** 6/7/2013

**USCS Classification:** SM

**AASHTO Classification:** A-4(0)

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D1140

**Tested By:** TP/JF

**Test Date:** 6/17/2013

**Checked By:** JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 508.70  
 Tare Wt. = 194.10  
 Minus #200 from wash = 27.3%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
626.90	194.10	#4	0.00	0.00	100.0
		#10	1515.70	1514.30	99.7
		#20	1071.20	1066.90	98.7
		#40	948.30	944.40	97.8
		#60	884.80	878.00	96.2
		#100	905.70	843.20	81.8
		#200	1210.80	1019.60	37.6

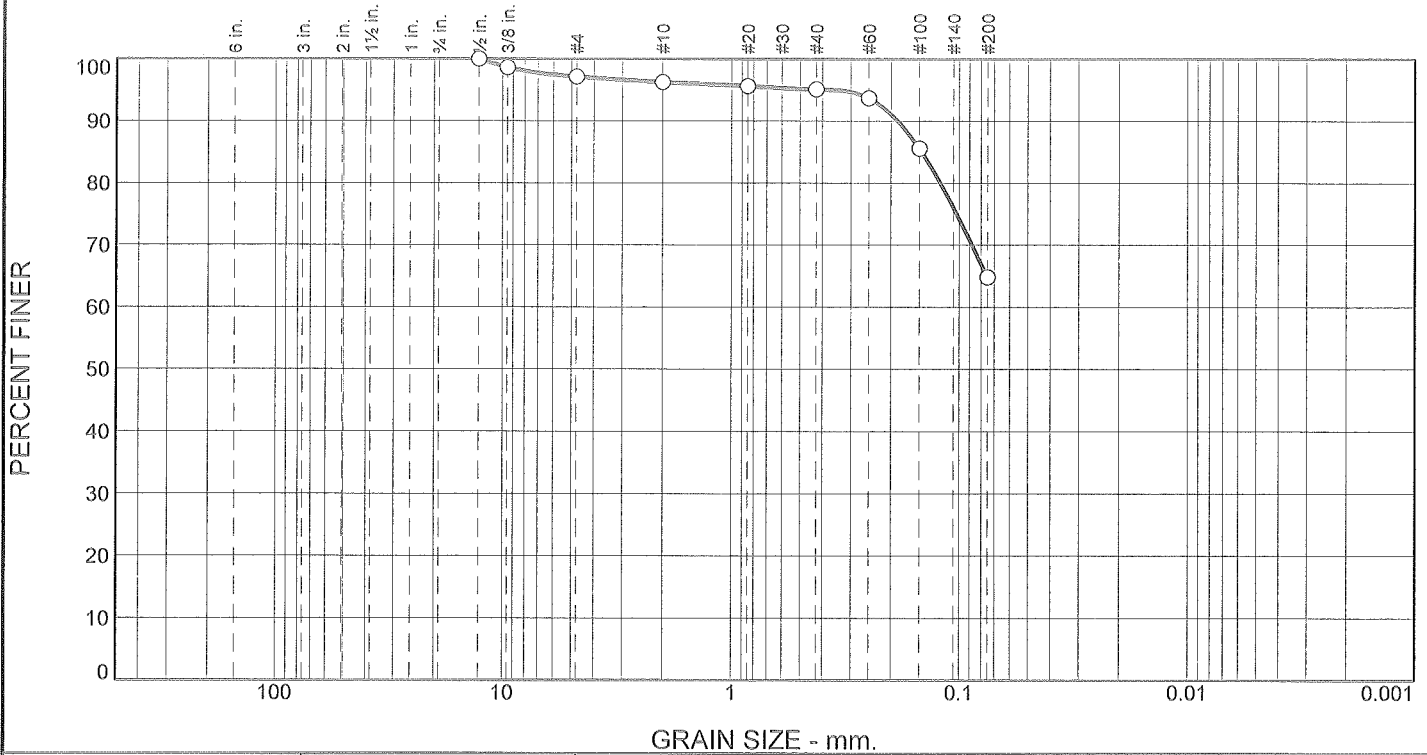
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.3	1.9	60.2	62.4			37.6

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
				0.0891	0.1030	0.1445	0.1616	0.1861	0.2300

<b>Fineness Modulus</b>
0.24

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.9	0.8	1.2	30.3	64.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	98.7		
#4	97.1		
#10	96.3		
#20	95.6		
#40	95.1		
#60	93.7		
#100	85.6		
#200	64.8		

**Material Description**

Olive Gray Sandy Silt

**Atterberg Limits (ASTM D 4318)**

PL=                                  LL=                                  PI=

**Classification**

USCS (D 2487)= ML                                  AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.1866                                  D<sub>85</sub>= 0.1465                                  D<sub>60</sub>=

D<sub>50</sub>=    D<sub>30</sub>=    D<sub>15</sub>=

D<sub>10</sub>=    C<sub>u</sub>=    C<sub>c</sub>=

Remarks

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Date Received: 6/7/2013                                  Date Tested: 6/17/2013

Tested By: TP/JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-008  
 Sample Number: HMA #7519-5/S-15

Depth: 60'-60.8'

Date Sampled:

**Hayre McElroy & Associates, LLC**

**Client:** Golder Associates  
**Project:** Sound Transit East Link

Redmond, WA

**Project No:** 12-450

**Figure**

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/24/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-008  
 Depth: 60'-60.8'

Sample Number: HMA #7519-5/S-15

Material Description: Olive Gray Sandy Silt

Date Received: 6/7/2013

AASHTO Classification: A-4(0)

USCS Classification: ML

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TP/JF

Test Date: 6/17/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 358.80  
 Tare Wt. = 212.20  
 Minus #200 from wash = 61.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
593.30	212.20	1/2"	0.00	0.00	100.0
		3/8"	1488.70	1483.60	98.7
		#4	1362.60	1356.80	97.1
		#10	1517.50	1514.20	96.3
		#20	1069.40	1067.00	95.6
		#40	946.40	944.40	95.1
		#60	883.50	878.10	93.7
		#100	874.20	843.20	85.6
		#200	1098.40	1019.40	64.8

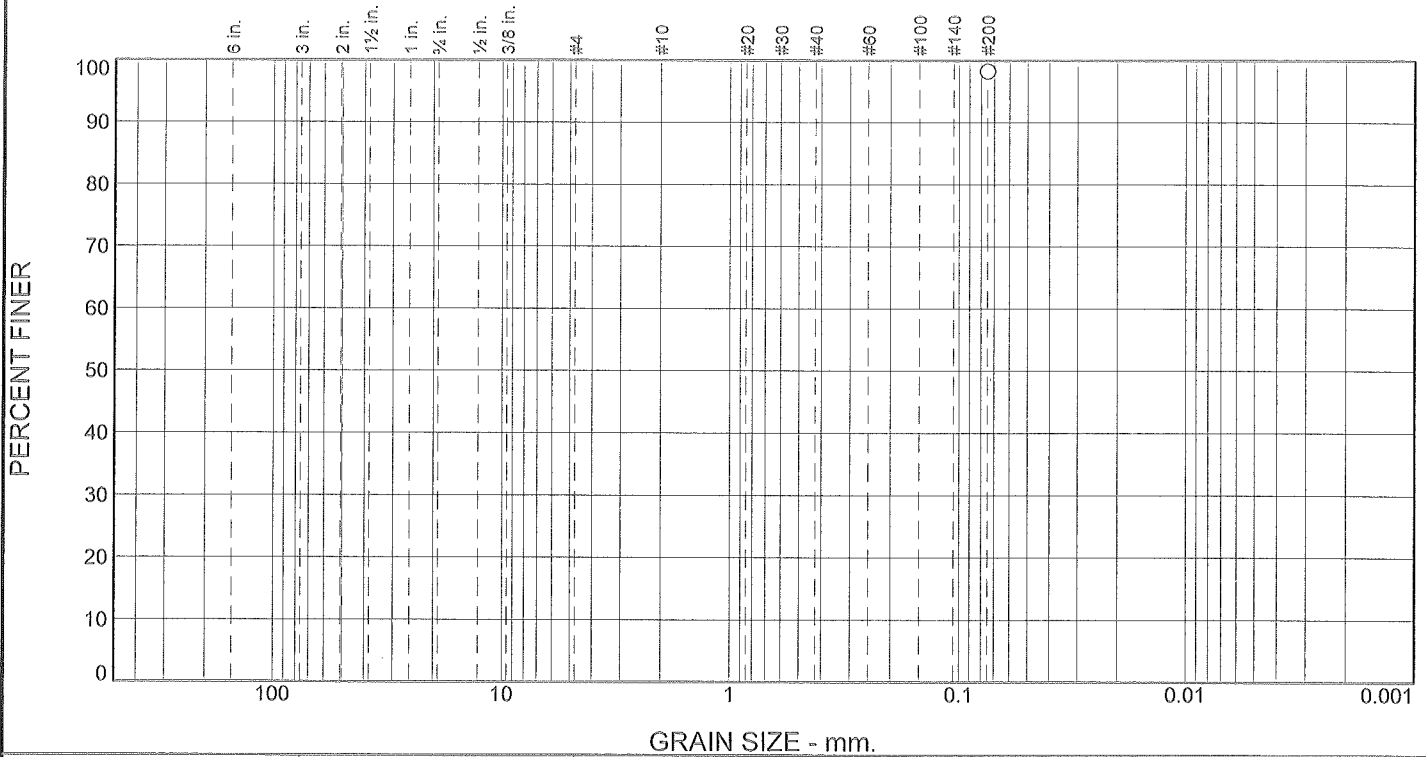
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.9	2.9	0.8	1.2	30.3	32.3			64.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
						0.1212	0.1465	0.1866	0.3405

<b>Fineness Modulus</b>
0.36

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						98.3	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	98.3		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 23                      LL= 51                      PI= 28

**Classification**

USCS (D 2487)= CH or OHAASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 6/7/13                      Date Tested: 6/17/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-008  
Sample Number: HMA#7519-6/S-17

Depth: 70'-71.5'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	<b>Figure</b>
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**GRAIN SIZE DISTRIBUTION TEST DATA**

7/2/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-008

**Depth:** 70'-71.5'

**Sample Number:** HMA#7519-6/S-17

**Material Description:** Gray Clay

**Date Received:** 6/7/13      **PL:** 23

**LL:** 51

**PI:** 28

**USCS Classification:** CH or OH

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D1140

**Tested By:** JF/TP

**Test Date:** 6/17/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 218.90  
 Tare Wt. = 217.20  
 Minus #200 from wash = 98.3%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
317.30	217.20	#200			98.3

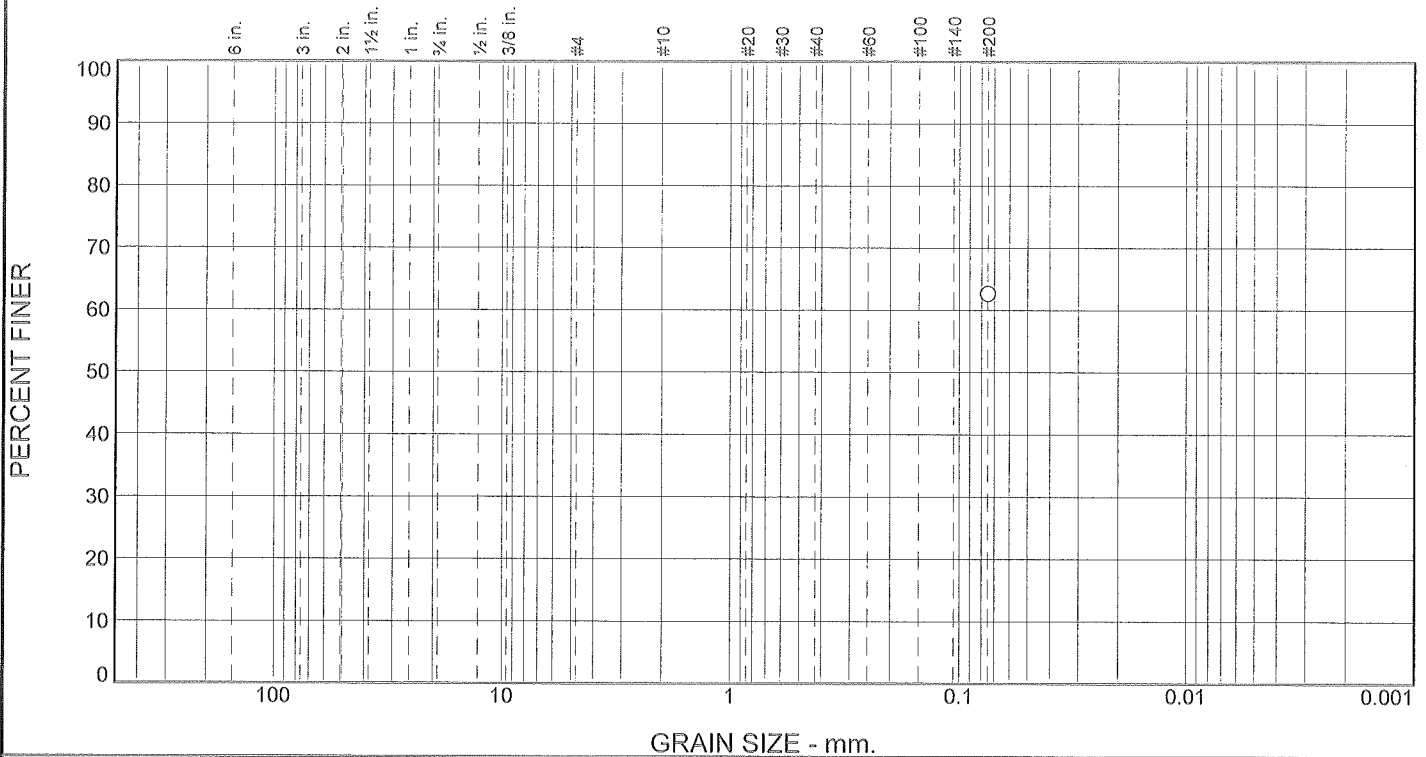
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										98.3

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						62.7	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	62.7		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 16                      LL= 32                      PI= 16

**Classification**

USCS (D 2487)= CL or OL    AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 6/7/13                      Date Tested: 6/18/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-008  
Sample Number: HMA#7519-7/S-21

Depth: 90'-90.9'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
---	--

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

7/2/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-008

Depth: 90'-90.9'

Sample Number: HMA#7519-7/S-21

Material Description: Gray Clay

Date Received: 6/7/13      PL: 16

LL: 32

PI: 16

USCS Classification: CL or OL

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/18/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 250.00

Tare Wt. = 162.00

Minus #200 from wash = 62.7%

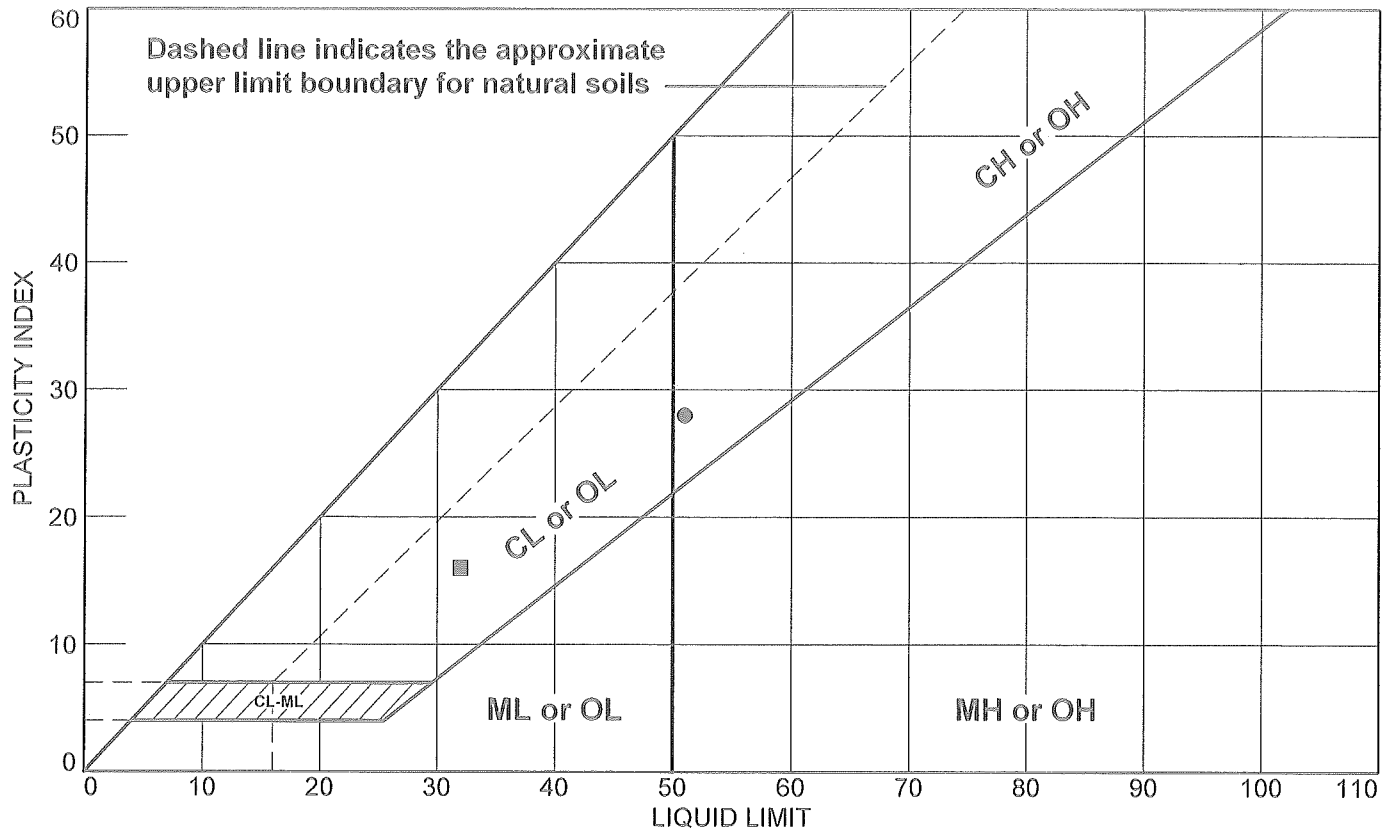
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
397.80	162.00	#200			62.7

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										62.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
● Boring E330-B-008	HMA#7519-6/S-17	70'-71.5'	18.8	23	51	28	CH or OH
■ Boring E330-B-008	HMA#7519-7/S-21	90'-90.9'	15.4	16	32	16	CL or OL

**Hayre McElroy & Associates, LLC**

Redmond, WA

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

7/2/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-008

Depth: 70'-71.5'

Sample Number: HMA#7519-6/S-17

Material Description: Gray Clay

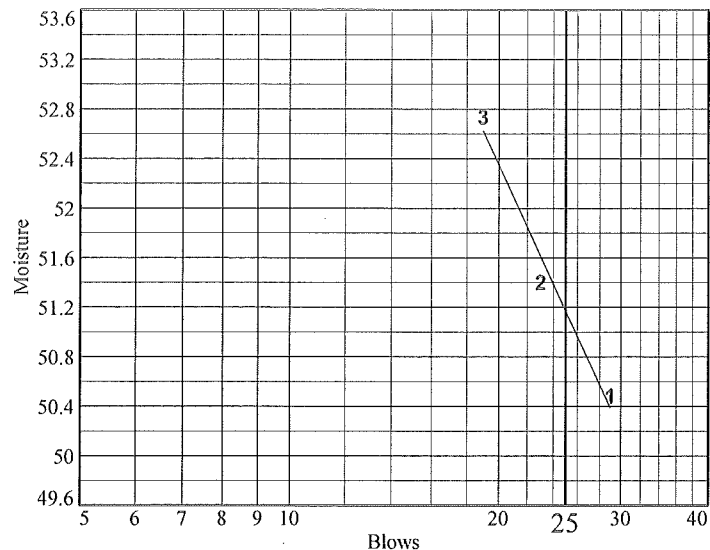
USCS: CH or OH

Tested by: JF/TP

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	29	29.8	26.33			
Dry+Tare	23.8	24.3	21.9			
Tare	13.5	13.6	13.5			
# Blows	29	23	19			
Moisture	50.5	51.4	52.7			



Liquid Limit= 51  
 Plastic Limit= 23  
 Plasticity Index= 28  
 Natural Moisture= 18.8  
 Liquidity Index= -0.1

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18	19.58	19.04	
Dry+Tare	16.7	18	17.6	
Tare	11.1	11.2	11	
Moisture	23.2	23.2	21.8	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
336.1	317.3	217.2	18.8

**LIQUID AND PLASTIC LIMIT TEST DATA**

7/2/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-008

Depth: 90'-90.9'

Sample Number: HMA#7519-7/S-21

Material Description: Gray Clay

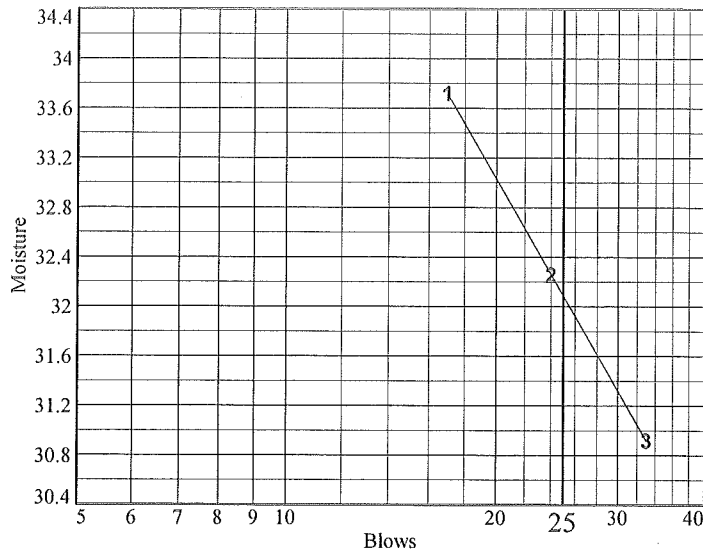
USCS: CL or OL

Tested by: JF/TP

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	36.5	30	33.6			
Dry+Tare	30.7	26.	28.9			
Tare	13.5	13.6	13.7			
# Blows	17	24	33			
Moisture	33.7	32.3	30.9			



Liquid Limit= 32  
 Plastic Limit= 16  
 Plasticity Index= 16  
 Natural Moisture= 15.4  
 Liquidity Index= 0.0

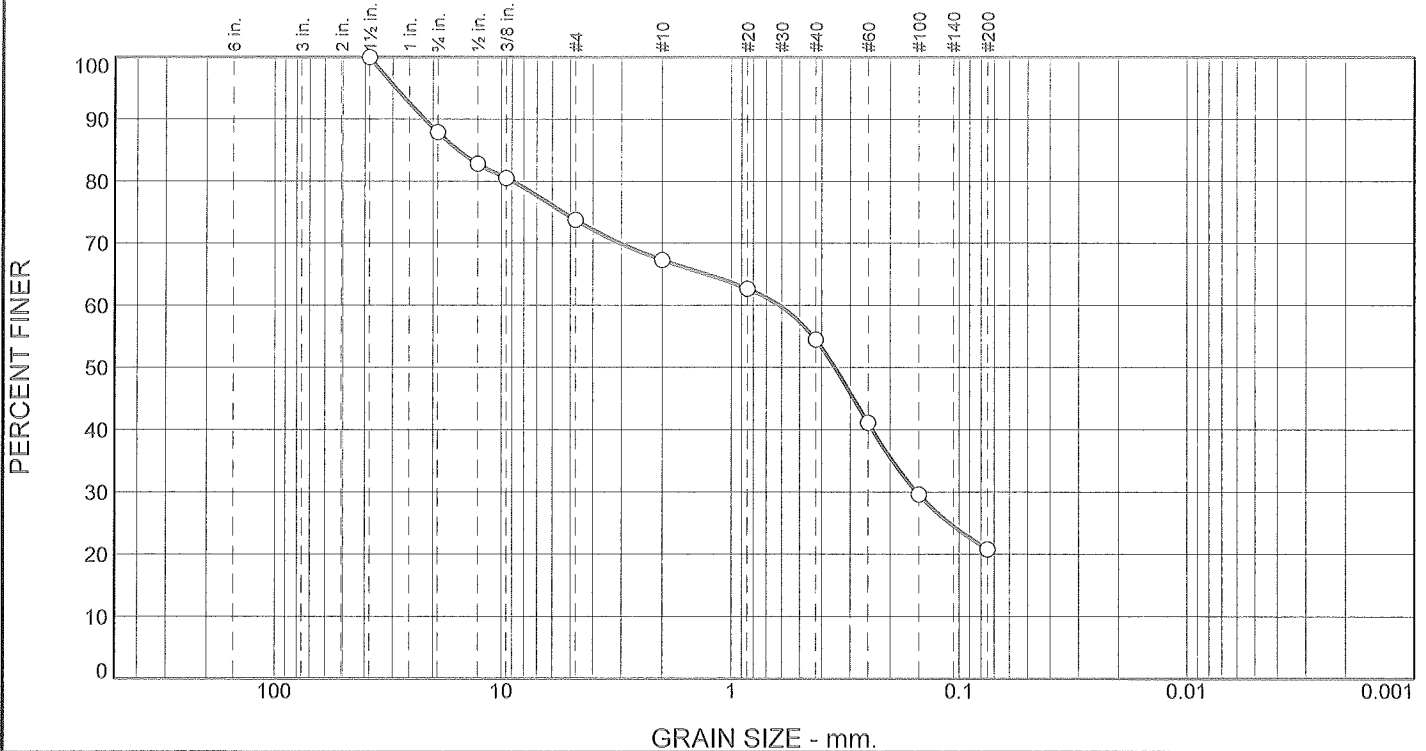
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	19.7	19.2	20.8	
Dry+Tare	18.5	18.1	19.4	
Tare	11	11.1	11.2	
Moisture	16.0	15.7	17.1	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
434	397.8	162	15.4

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.1	14.1	6.5	12.8	33.7	20.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1 1/2"	100.0		
3/4"	87.9		
1/2"	82.8		
3/8"	80.5		
#4	73.8		
#10	67.3		
#20	62.7		
#40	54.5		
#60	41.1		
#100	29.6		
#200	20.8		

**Material Description**

Olive Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 21.7219      D<sub>85</sub>= 15.4911      D<sub>60</sub>= 0.6142  
D<sub>50</sub>= 0.3495      D<sub>30</sub>= 0.1531      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

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Date Received: 7/15/13      Date Tested: 7/22/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-008A  
Sample Number: HMA#7529-17/S-1

Depth: 2.5'-4'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	<b>Figure</b>
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**GRAIN SIZE DISTRIBUTION TEST DATA**

7/25/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-008A

Depth: 2.5'-4'

Sample Number: HMA#7529-17/S-1

Material Description: Olive Brown Silty Sand W/Gravel

Date Received: 7/15/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 7/22/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 471.40  
 Tare Wt. = 117.30  
 Minus #200 from wash = 19.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
557.70	117.30	1 1/2"	0.00	0.00	100.0
		3/4"	1558.10	1504.90	87.9
		1/2"	1442.00	1419.40	82.8
		3/8"	1493.60	1483.60	80.5
		#4	1386.60	1356.80	73.8
		#10	1542.50	1514.10	67.3
		#20	1087.20	1066.80	62.7
		#40	980.10	944.10	54.5
		#60	936.90	878.00	41.1
		#100	893.90	843.30	29.6
		#200	1058.20	1019.30	20.8

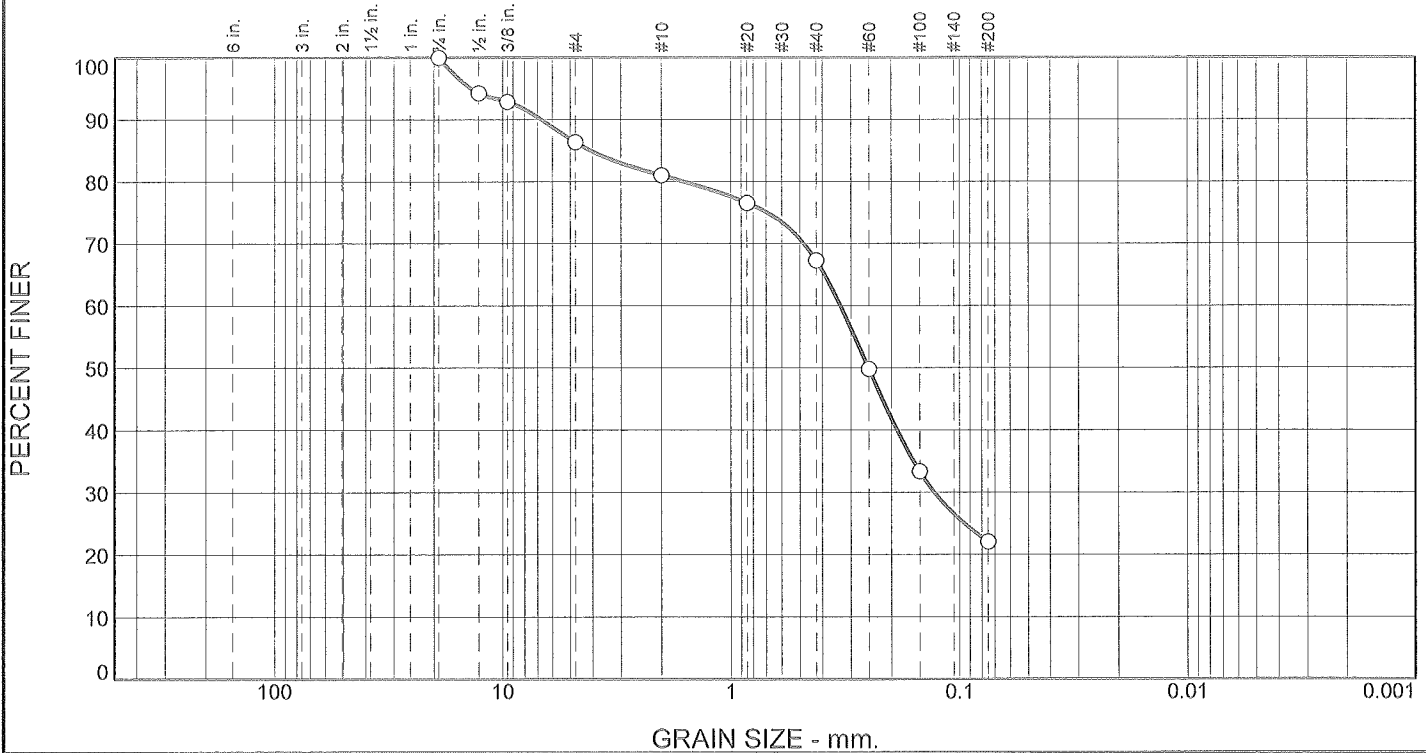
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	12.1	14.1	26.2	6.5	12.8	33.7	53.0			20.8

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
			0.1531	0.3495	0.6142	8.9462	15.4911	21.7219	29.0076

<b>Fineness Modulus</b>
2.90

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.7	5.3	13.7	45.2	22.1	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	94.2		
3/8"	92.9		
#4	86.3		
#10	81.0		
#20	76.6		
#40	67.3		
#60	49.8		
#100	33.3		
#200	22.1		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 6.7071      D<sub>85</sub>= 4.0733      D<sub>60</sub>= 0.3326  
D<sub>50</sub>= 0.2513      D<sub>30</sub>= 0.1293      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

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Date Received: 7/15/13      Date Tested: 7/23/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-08A <b>Sample Number:</b> HMA#7529-18/S-3	<b>Depth:</b> 7.5'-9'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	<b>Figure</b>



**GRAIN SIZE DISTRIBUTION TEST DATA**

7/25/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-08A

Depth: 7.5'-9'

Sample Number: HMA#7529-18/S-3

Material Description: Gray Silty Sand

Date Received: 7/15/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 7/23/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 454.60

Tare Wt. = 114.60

Minus #200 from wash = 21.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
545.80	114.60	3/4"	0.00	0.00	100.0
		1/2"	1444.20	1419.40	94.2
		3/8"	1489.20	1483.40	92.9
		#4	1384.90	1356.60	86.3
		#10	1536.90	1514.00	81.0
		#20	1086.10	1066.80	76.6
		#40	984.10	944.20	67.3
		#60	953.30	877.90	49.8
		#100	914.30	843.30	33.3
		#200	1068.00	1019.40	22.1

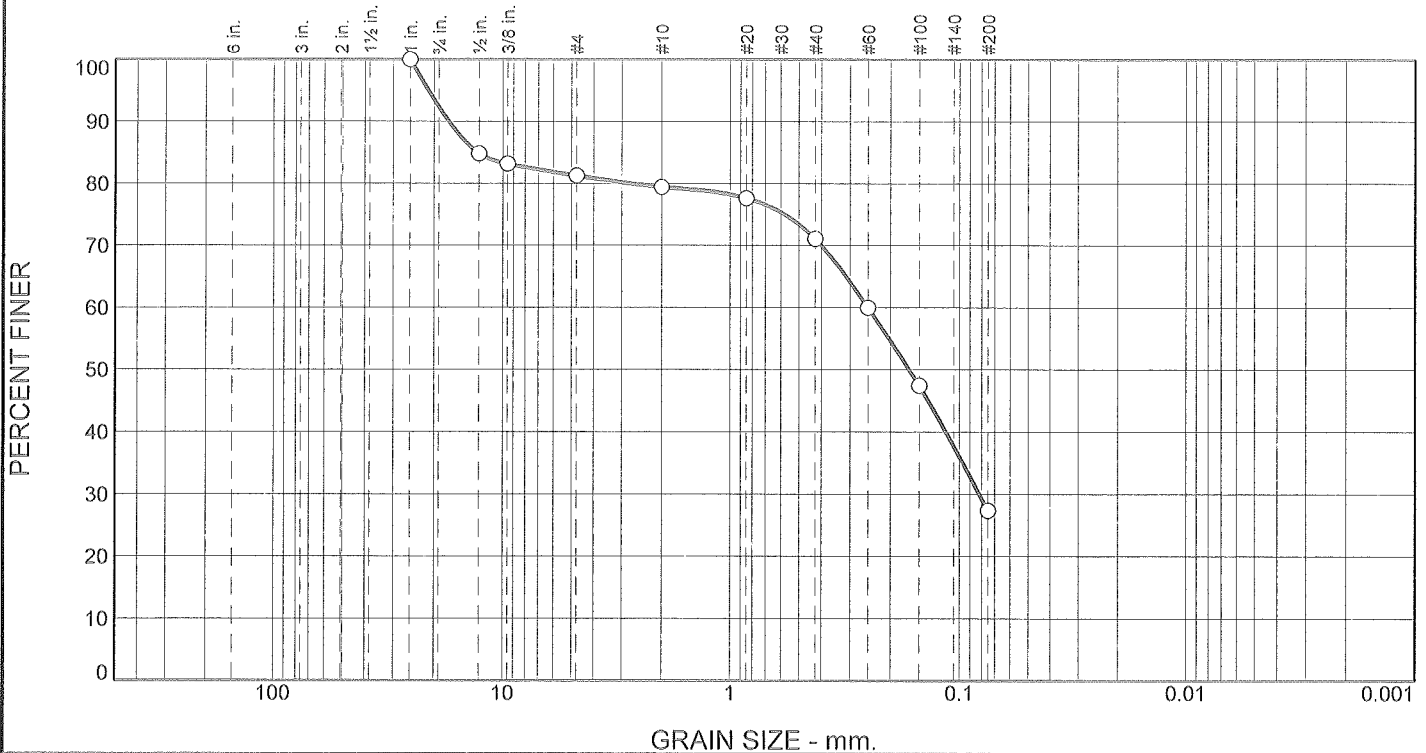
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	13.7	13.7	5.3	13.7	45.2	64.2			22.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1293	0.2513	0.3326	1.5933	4.0733	6.7071	13.7334

<b>Fineness Modulus</b>
1.97

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.6	11.2	1.8	8.3	43.7	27.4	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
1/2"	84.8		
3/8"	83.1		
#4	81.2		
#10	79.4		
#20	77.6		
#40	71.1		
#60	60.0		
#100	47.5		
#200	27.4		

**Material Description**

Gray Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 17.2295      D<sub>85</sub>= 12.9048      D<sub>60</sub>= 0.2502  
D<sub>50</sub>= 0.1654      D<sub>30</sub>= 0.0818      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


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Date Received: 7/15/13      Date Tested: 7/23/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-08A  
Sample Number: HMA#7529-19/S-7

Depth: 20'-21'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

7/29/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-08A  
 Depth: 20'-21'

Sample Number: HMA#7529-19/S-7

Material Description: Gray Silty Sand W/Gravel

Date Received: 7/15/13

AASHTO Classification: A-2-4(0)

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 7/23/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 389.90  
 Tare Wt. = 114.10  
 Minus #200 from wash = 22.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
471.90	114.10	1"	0.00	0.00	100.0
		1/2"	1474.00	1419.70	84.8
		3/8"	1489.70	1483.70	83.1
		#4	1364.00	1357.20	81.2
		#10	1520.80	1514.30	79.4
		#20	1073.60	1067.10	77.6
		#40	967.90	944.50	71.1
		#60	917.90	878.20	60.0
		#100	888.40	843.60	47.5
		#200	1091.60	1019.70	27.4

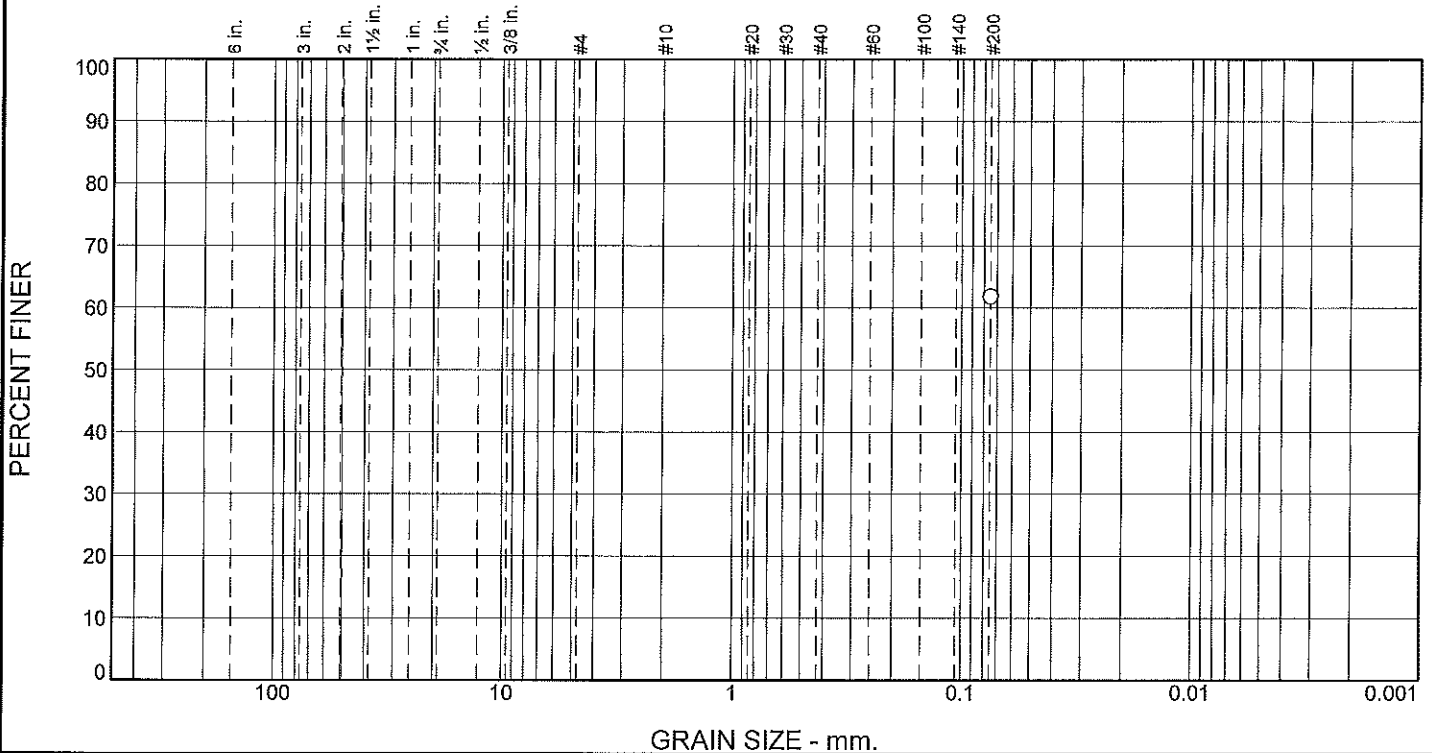
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	7.6	11.2	18.8	1.8	8.3	43.7	53.8			27.4

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.0818	0.1654	0.2502	2.7627	12.9048	17.2295	21.1255

<b>Fineness Modulus</b>
1.98

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						61.9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	61.9		

**Material Description**

Gray Silty Clay

**Atterberg Limits (ASTM D 4318)**

PL= 21                      LL= 27                      PI= 6

**Classification**

USCS (D 2487)= CL or ML AASHTO (M 145)=

**Coefficients**

D <sub>90</sub> =	D <sub>85</sub> =	D <sub>60</sub> =
D <sub>50</sub> =	D <sub>30</sub> =	D <sub>15</sub> =
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =

Remarks

---

Date Received: 7/15/13                      Date Tested: 7/23/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-08A <b>Sample Number:</b> HMA#7529-20/S-10	<b>Depth:</b> 35'-36.5'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  <b>Redmond, WA</b>	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	
		<b>Figure</b>

**GRAIN SIZE DISTRIBUTION TEST DATA**

11/13/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-08A

Sample Number: HMA#7529-20/S-10

Depth: 35'-36.5'

Material Description: Gray Silty Clay

Date Received: 7/15/13      PL: 21

LL: 27

PI: 6

USCS Classification: CL or ML

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 7/23/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 163.60  
 Tare Wt. = 118.40  
 Minus #200 from wash = 61.9%

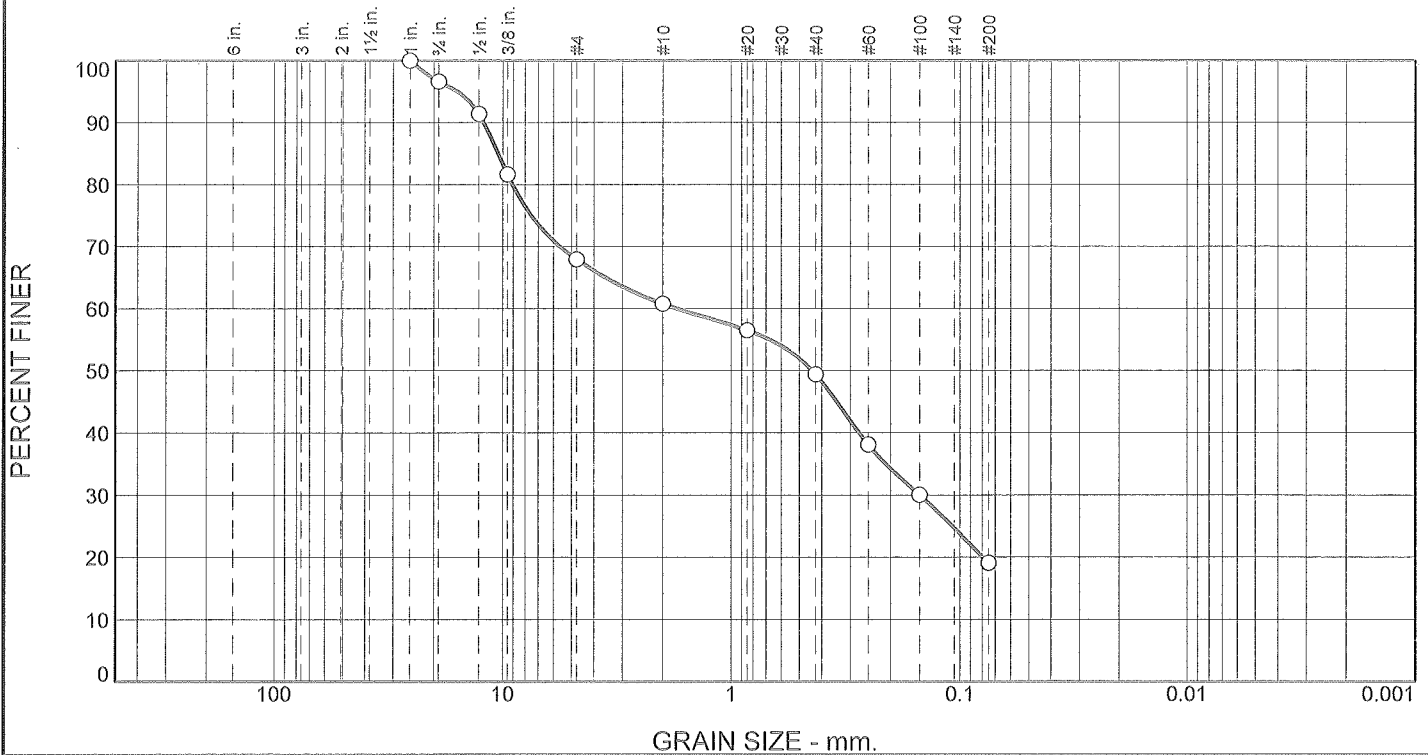
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
236.90	118.40	#200			61.9

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										61.9

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	28.7	7.1	11.4	30.3	19.1	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	96.6		
1/2"	91.4		
3/8"	81.6		
#4	67.9		
#10	60.8		
#20	56.5		
#40	49.4		
#60	38.1		
#100	30.0		
#200	19.1		

**Material Description**

Gray Silty Sand with Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 12.0924      D<sub>85</sub>= 10.4730      D<sub>60</sub>= 1.7354  
D<sub>50</sub>= 0.4398      D<sub>30</sub>= 0.1495      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 7/15/13      Date Tested: 7/23/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-08A  
Sample Number: HMA#7529-21/S-12

Depth: 45'-45.8'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

7/29/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-08A  
 Depth: 45'-45.8'

Sample Number: HMA#7529-21/S-12

Material Description: Gray Silty Sand with Gravel

Date Received: 7/15/13

AASHTO Classification: A-1-b

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 7/23/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 368.30  
 Tare Wt. = 113.30  
 Minus #200 from wash = 17.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
423.80	113.30	1"	0.00	0.00	100.0
		3/4"	1515.60	1505.10	96.6
		1/2"	1436.00	1419.80	91.4
		3/8"	1514.40	1484.00	81.6
		#4	1399.70	1357.20	67.9
		#10	1536.90	1514.70	60.8
		#20	1080.60	1067.30	56.5
		#40	966.80	944.80	49.4
		#60	913.70	878.60	38.1
		#100	868.90	843.90	30.0
		#200	1054.00	1019.90	19.1

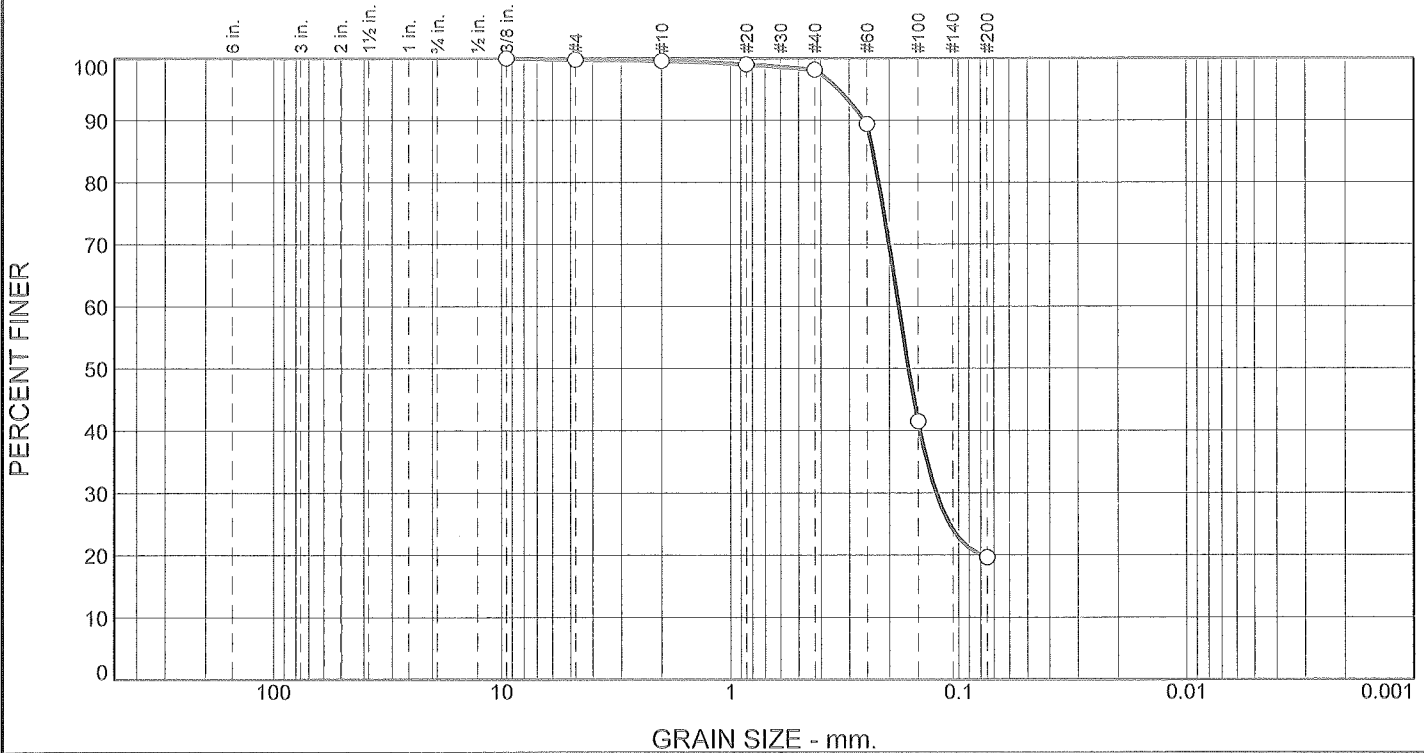
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	3.4	28.7	32.1	7.1	11.4	30.3	48.8			19.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
		0.0794	0.1495	0.4398	1.7354	9.0644	10.4730	12.0924	15.7513

<b>Fineness Modulus</b>
3.08

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.2	1.4	78.5	19.7	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.8		
#10	99.6		
#20	99.0		
#40	98.2		
#60	89.4		
#100	41.5		
#200	19.7		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.2570      D<sub>85</sub>= 0.2353      D<sub>60</sub>= 0.1820  
 D<sub>50</sub>= 0.1649      D<sub>30</sub>= 0.1251      D<sub>15</sub>= \_\_\_\_\_  
 D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

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Date Received: 7/15/2013      Date Tested: 7/23/2013  
 Tested By: TP/JF  
 Checked By: JAM  
 Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-08A  
 Sample Number: HMA#7529-22/S-15

Depth: 60'-60.8'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

7/29/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-08A

Sample Number: HMA#7529-22/S-15

Depth: 60'-60.8'  
 Material Description: Gray Silty Sand  
 Date Received: 7/15/2013

AASHTO Classification: A-2-4(0)

USCS Classification: SM  
 Grain Size Test Method: ASTM C136  
 #200 Wash Method: ASTM D1140

Tested By: TP/JF

Test Date: 7/23/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 403.80  
 Tare Wt. = 118.20  
 Minus #200 from wash = 17.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
466.20	118.20	3/8"	0.00	0.00	100.0
		#4	1357.30	1356.60	99.8
		#10	1514.80	1514.10	99.6
		#20	1068.70	1066.70	99.0
		#40	947.10	944.10	98.2
		#60	908.50	877.90	89.4
		#100	1010.10	843.50	41.5
		#200	1095.40	1019.40	19.7

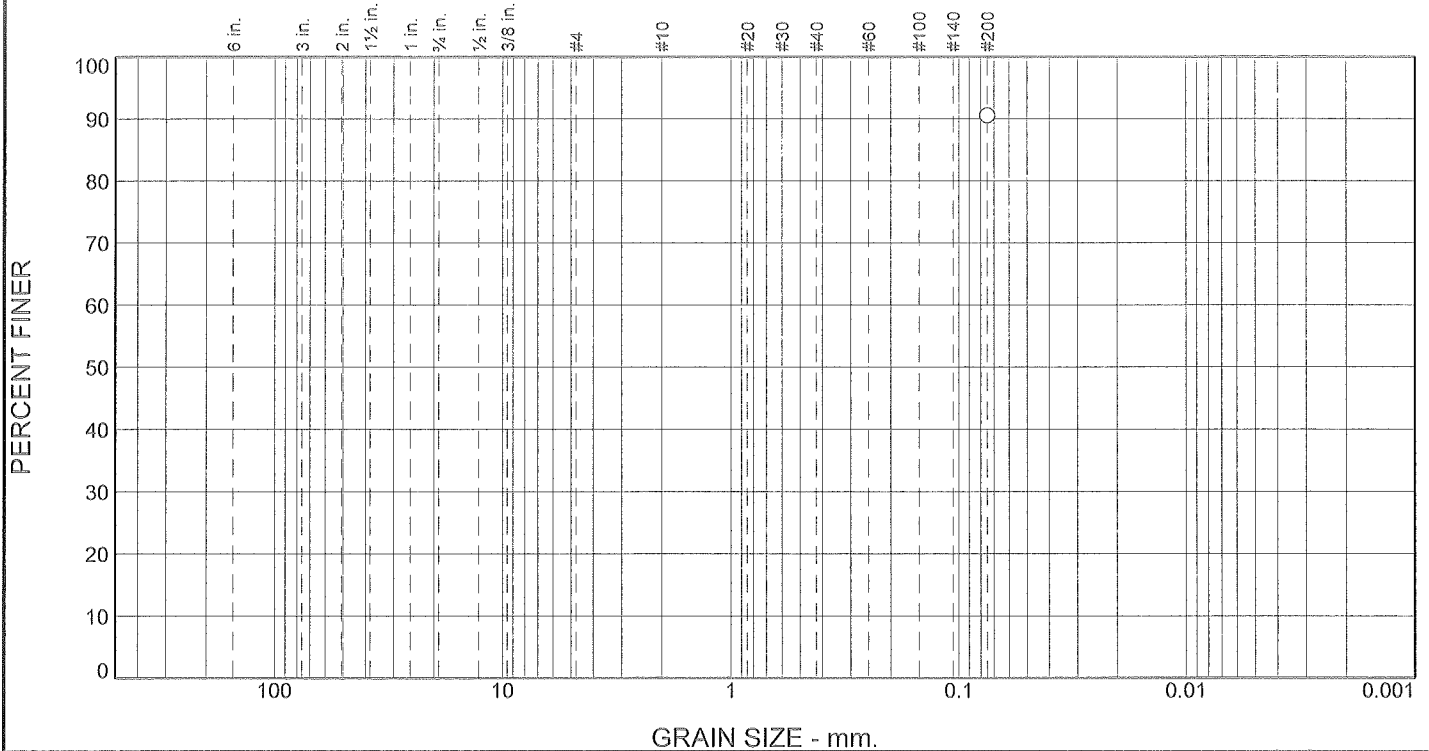
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.2	0.2	0.2	1.4	78.5	80.1			19.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
		0.0789	0.1251	0.1649	0.1820	0.2219	0.2353	0.2570	0.3331

<b>Fineness Modulus</b>
0.68

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						90.6	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	90.6		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL= 27                      LL= 40                      PI= 13

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)= A-6(13)

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 7/15/2013                      Date Tested: 7/24/2013  
Tested By: TP/JF  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-08A  
Sample Number: HMA#7529-23/S-18

Depth: 75'-76'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

7/29/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-08A  
 Depth: 75'-76'  
 Material Description: Gray Silt  
 Date Received: 7/15/2013      PL: 27  
 USCS Classification: ML  
 #200 Wash Method: ASTM D1140  
 Tested By: TP/JF  
 Checked By: JAM

Sample Number: HMA#7529-23/S-18  
 LL: 40                                      PI: 13  
 AASHTO Classification: A-6(13)  
 Test Date: 7/24/2013

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 130.90  
 Tare Wt. = 118.40  
 Minus #200 from wash = 90.6%

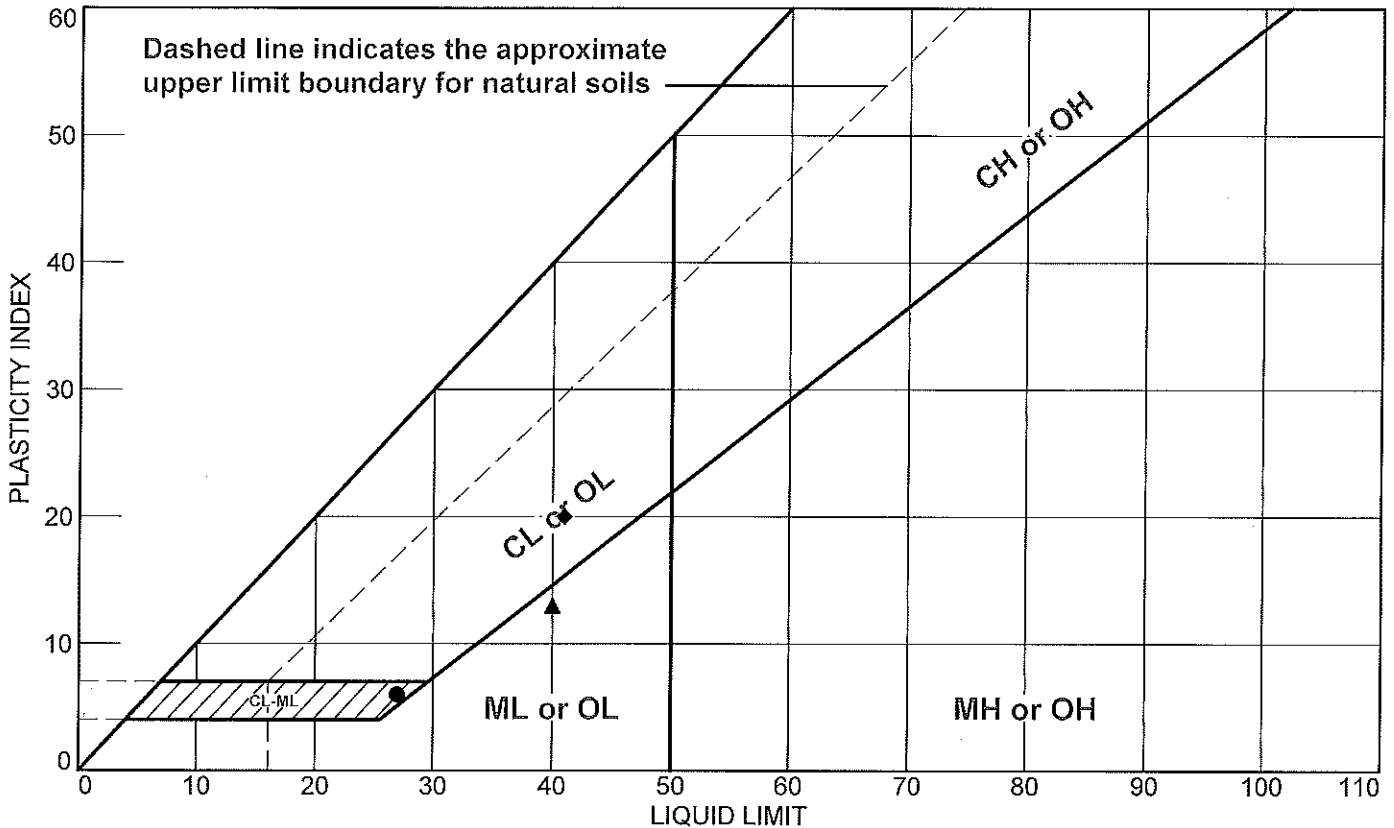
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
251.20	118.40	#200			90.6

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										90.6

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
● Boring E330-B-08A	HMA#7529-20/S-10	35'-36.5'	18.7	21	27	6	CL or ML
■ Boring E330-B-08A	HMA#7529-21/S-12	45'-45.8'		NP	NP	NP	SM
▲ Boring E330-B-08A	HMA#7529-23/S-18	75'-76'	23.3	27	40	13	ML
◆ Boring E330-B-08A	HMA#7529-24/S-20	85'-85.5'	18.3	21	41	20	CL

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

Client: Golder Associates

Project: Sound Transit East Link

Project No.: 12-450

Figure

Tested By: ● JF/TP ▲ TEP ◆ TEP \_\_\_\_\_ Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

11/13/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-08A  
 Depth: 35'-36.5'

Sample Number: HMA#7529-20/S-10

Material Description: Gray Silty Clay

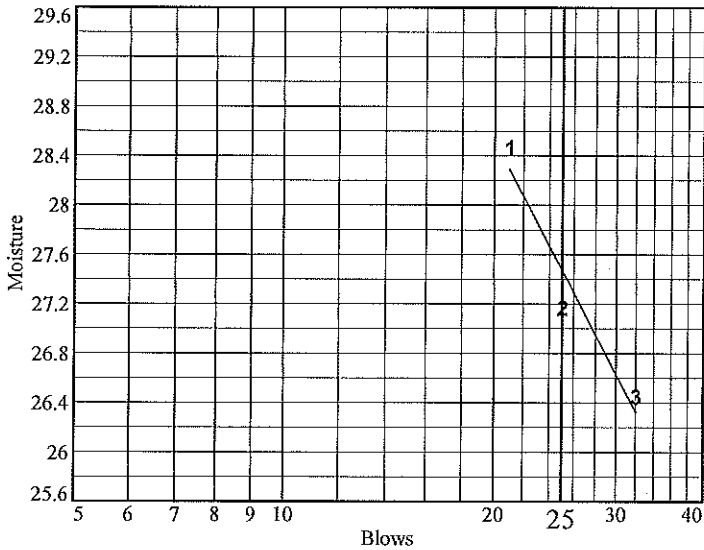
USCS: CL or ML

Tested by: JF/TP

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	31.1	31.55	33.1			
Dry+Tare	27.2	27.7	29			
Tare	13.5	13.53	13.5			
# Blows	21	25	32			
Moisture	28.5	27.2	26.5			



Liquid Limit= 27  
 Plastic Limit= 21  
 Plasticity Index= 6  
 Natural Moisture= 18.7  
 Liquidity Index= -0.4

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18.30	17.32	18.6	
Dry+Tare	17.1	16.2	17.3	
Tare	11.02	11.04	11.12	
Moisture	19.7	21.7	21.0	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
259.1	236.9	118.4	18.7

**LIQUID AND PLASTIC LIMIT TEST DATA**

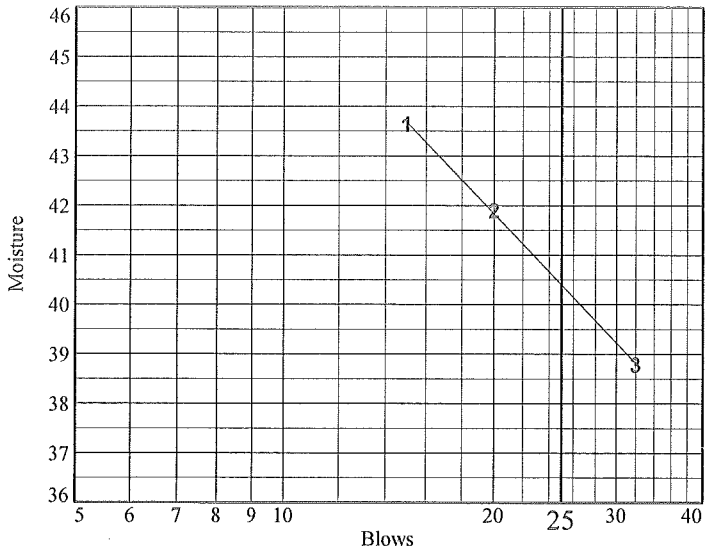
7/29/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-08A  
 Depth: 75'-76'  
 Material Description: Gray Silt  
 USCS: ML  
 Tested by: TEP

Sample Number: HMA#7529-23/S-18  
 AASHTO: A-6(13)  
 Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	37.1	36.6	34.0			
Dry+Tare	29.2	29.1	27.6			
Tare	11.1	11.2	11.1			
# Blows	15	20	32			
Moisture	43.6	41.9	38.8			



Liquid Limit= 40  
 Plastic Limit= 27  
 Plasticity Index= 13  
 Natural Moisture= 23.3  
 Liquidity Index= -0.3

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	20.8	20.2	20.0	
Dry+Tare	19.3	18.8	18.7	
Tare	13.7	13.6	13.7	
Moisture	26.8	26.9	26.0	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
282.2	251.2	118.4	23.3

**LIQUID AND PLASTIC LIMIT TEST DATA**

7/29/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-08A

Depth: 85'-85.5'

Sample Number: HMA#7529-24/S-20

Material Description: Gray Lean Clay

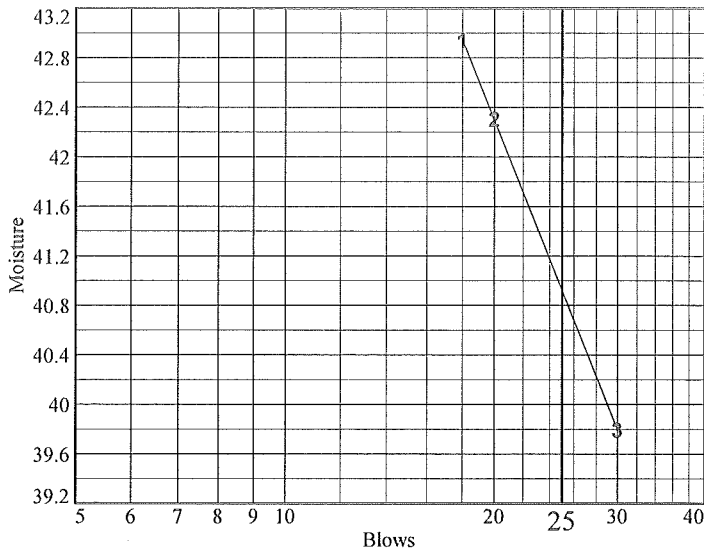
USCS: CL

Tested by: TEP

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	37.9	35.8	27.4			
Dry+Tare	30.6	29.2	23.5			
Tare	13.6	13.6	13.7			
# Blows	18	20	30			
Moisture	42.9	42.3	39.8			



Liquid Limit= 41  
 Plastic Limit= 21  
 Plasticity Index= 20  
 Natural Moisture= 18.3  
 Liquidity Index= -0.1

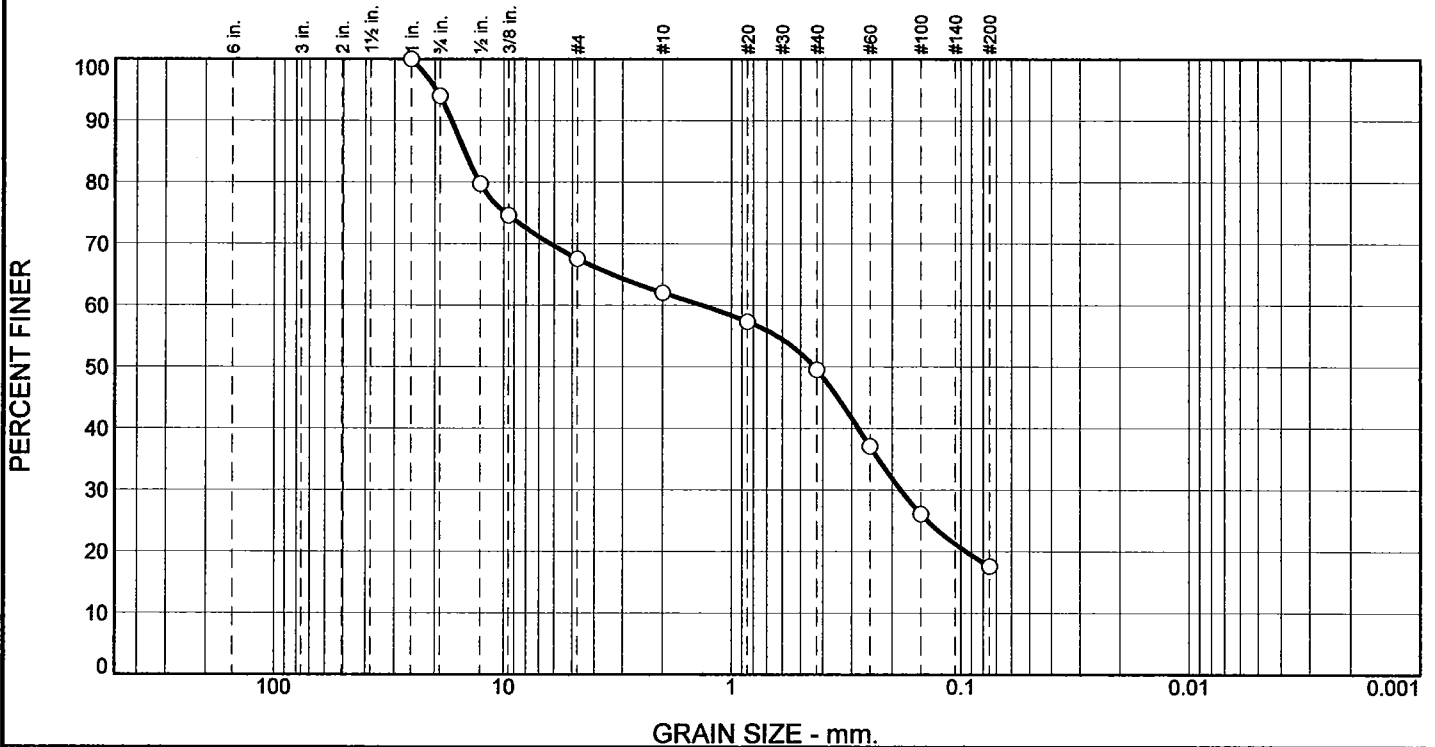
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	23.0	20.2	23.2	
Dry+Tare	21.4	19.1	21.5	
Tare	13.6	13.6	13.6	
Moisture	20.5	20.0	21.5	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
211.3	196.4	115.2	18.3

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.0	26.4	5.6	12.5	31.9	17.6	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
¾"	94.0		
½"	79.8		
3/8"	74.6		
#4	67.6		
#10	62.0		
#20	57.4		
#40	49.5		
#60	37.1		
#100	26.1		
#200	17.6		

**Material Description**

Gray/Olive Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 16.9252      D<sub>85</sub>= 14.8380      D<sub>60</sub>= 1.3390  
D<sub>50</sub>= 0.4357      D<sub>30</sub>= 0.1838      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 05/03/13      Date Tested: 05/09/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-009  
Sample Number: HMA#7510-22/S-1

Depth: 2.5'-4'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

**Redmond, WA**

Project No: 12-450

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-009

**Depth:** 2.5'-4'

**Sample Number:** HMA#7510-22/S-1

**Material Description:** Gray/Olive Silty Sand W/Gravel

**Date Received:** 05/03/13

**USCS Classification:** SM

**AASHTO Classification:** A-1-b

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/09/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 510.90  
 Tare Wt. = 161.80  
 Minus #200 from wash = 15.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
577.00	161.80	1"	0.00	0.00	100.0
		3/4"	1530.00	1505.10	94.0
		1/2"	1478.80	1419.70	79.8
		3/8"	1505.10	1483.80	74.6
		#4	1386.50	1357.20	67.6
		#10	1537.80	1514.80	62.0
		#20	1087.20	1067.80	57.4
		#40	977.50	945.00	49.5
		#60	930.10	878.40	37.1
		#100	889.20	843.60	26.1
		#200	1055.30	1020.10	17.6

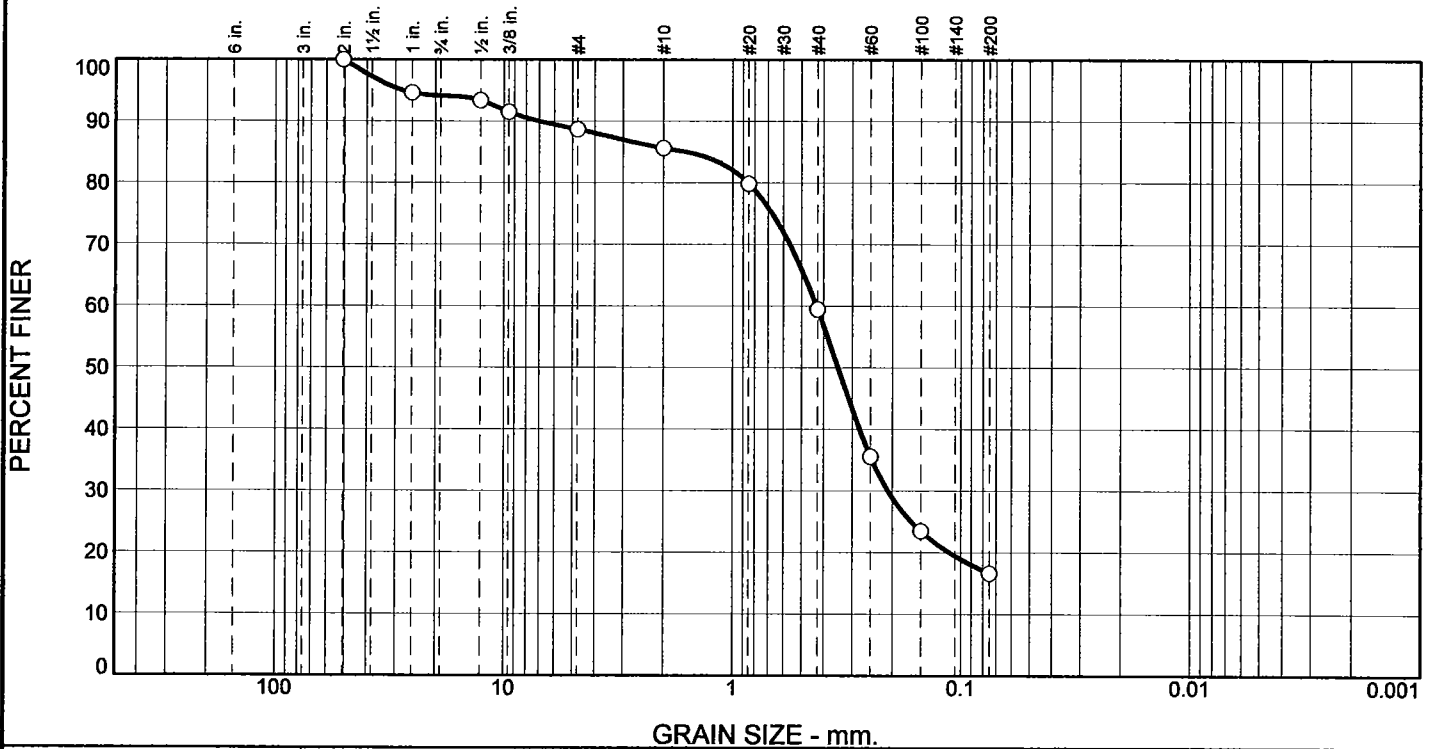
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	6.0	26.4	32.4	5.6	12.5	31.9	50.0			17.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
		0.0950	0.1838	0.4357	1.3390	12.8047	14.8380	16.9252	19.7402

<b>Fineness Modulus</b>
3.19

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.8	5.5	3.1	26.1	42.9	16.6	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2"	100.0		
1"	94.6		
1/2"	93.4		
3/8"	91.5		
#4	88.7		
#10	85.6		
#20	79.9		
#40	59.5		
#60	35.6		
#100	23.5		
#200	16.6		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 7.0186      D<sub>85</sub>= 1.5903      D<sub>60</sub>= 0.4299  
D<sub>50</sub>= 0.3462      D<sub>30</sub>= 0.2091      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 05/03/13      Date Tested: 05/09/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-009  
Sample Number: HMA#7510-23/S-4

Depth: 10'-11.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-009

**Depth:** 10'-11.5'

**Sample Number:** HMA#7510-23/S-4

**Material Description:** Gray Silty Sand

**Date Received:** 05/03/13

**USCS Classification:** SM

**AASHTO Classification:** A-2-4(0)

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/09/13

**Checked By:** JAM

Sieve Test Date

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 548.40  
 Tare Wt. = 194.30  
 Minus #200 from wash = 15.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
613.40	194.30	2"	0.00	0.00	100.0
		1"	1492.10	1469.60	94.6
		1/2"	1424.80	1419.60	93.4
		3/8"	1491.40	1483.60	91.5
		#4	1369.00	1357.10	88.7
		#10	1527.50	1514.70	85.6
		#20	1091.80	1067.60	79.9
		#40	1030.30	945.00	59.5
		#60	978.70	878.50	35.6
		#100	894.10	843.40	23.5
		#200	1048.80	1020.00	16.6

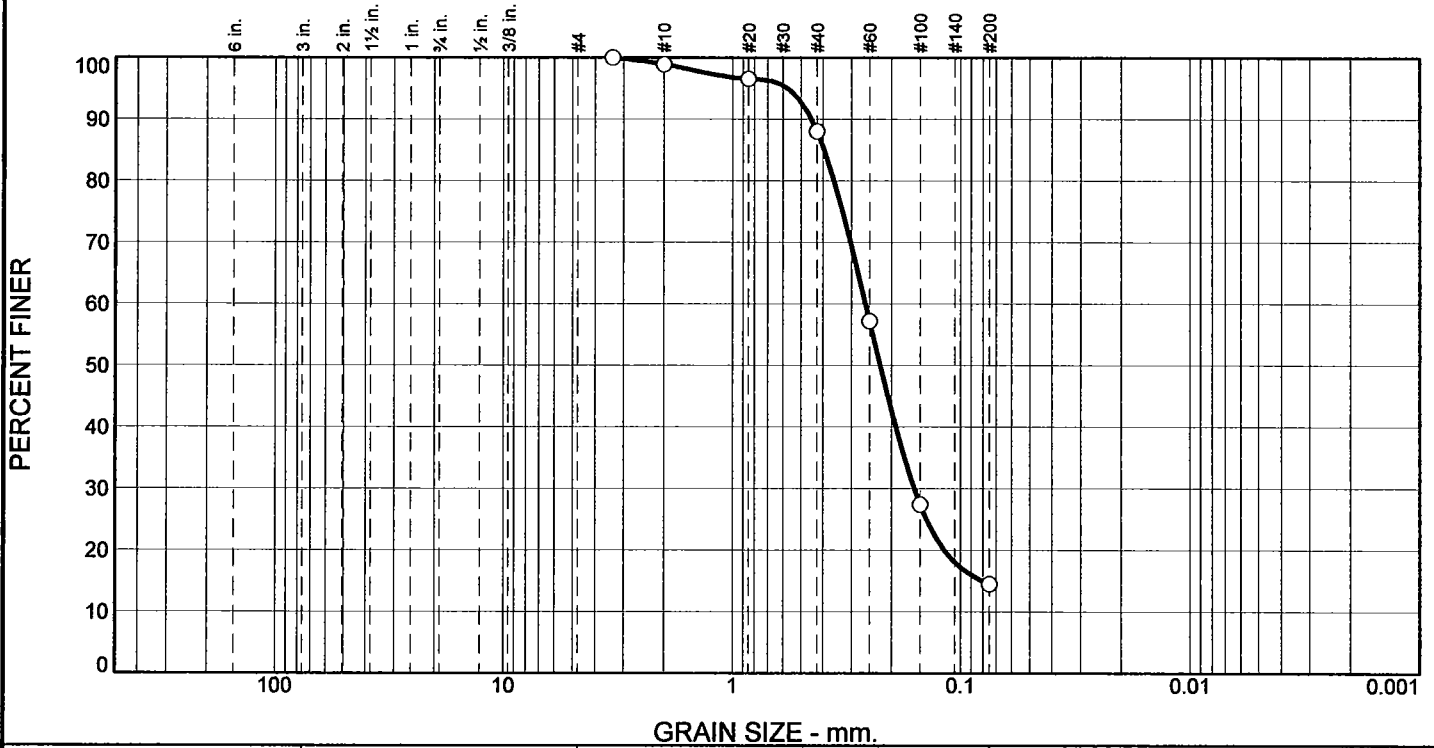
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	5.8	5.5	11.3	3.1	26.1	42.9	72.1			16.6

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
		0.1121	0.2091	0.3462	0.4299	0.8573	1.5903	7.0186	27.7086

<b>Fineness Modulus</b>
2.20

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.1	10.8	73.6	14.5	

Test Results (ASTM C136 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#6	100.0		
#10	98.9		
#20	96.6		
#40	88.1		
#60	57.2		
#100	27.4		
#200	14.5		

**Material Description**

Dark Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.4493                      D<sub>85</sub>= 0.3952                      D<sub>60</sub>= 0.2605  
D<sub>50</sub>= 0.2244                      D<sub>30</sub>= 0.1590                      D<sub>15</sub>= 0.0802  
D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

Remarks

---

Date Received: 05/03/13                      Date Tested: 05/09/13

Tested By: JF

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-009  
Sample Number: HMA#7510-24/S-9

Depth: 30'-31'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/15/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-009

**Depth:** 30'-31'

**Sample Number:** HMA#7510-24/S-9

**Material Description:** Dark Gray Silty Sand

**Date Received:** 05/03/13

**AASHTO Classification:** A-2-4(0)

**USCS Classification:** SM

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D 1140

**Tested By:** JF

**Test Date:** 05/09/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 646.80

Tare Wt. = 234.70

Minus #200 from wash = 10.7%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
696.20	234.70	#6	0.00	0.00	100.0
		#10	1519.60	1514.60	98.9
		#20	1078.50	1067.70	96.6
		#40	984.30	945.00	88.1
		#60	1020.70	878.40	57.2
		#100	980.90	843.40	27.4
		#200	1079.70	1020.00	14.5

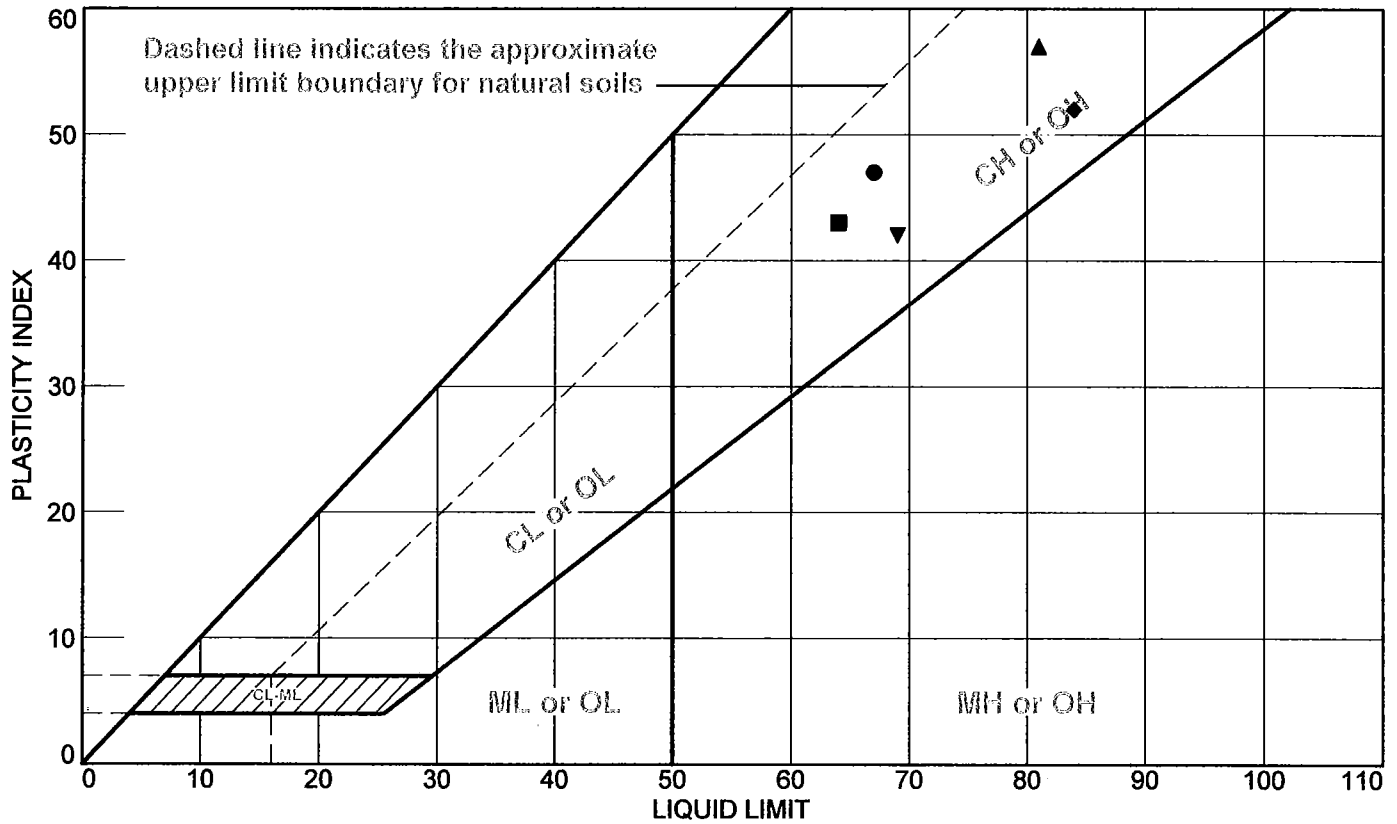
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	1.1	10.8	73.6	85.5			14.5

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
	0.0802	0.1179	0.1590	0.2244	0.2605	0.3579	0.3952	0.4493	0.5700

<b>Fineness Modulus</b>
1.11

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-009	HMA#7510-25/S-12	45'-46.5'	31.6	20	67	47	CH or OH
■	Boring E330-B-009	HMA#7510-26/S-17	70'-71.5'	27.2	21	64	43	CH or OH
▲	Boring E330-B-009	HMA#7510-28/S-26	115'-116.5'	33.5	24	81	57	CH or OH
◆	Boring E330-B-009	HMA#7510-27/S-21	90'-91.5'	38.0	32	84	52	CH or OH
▼	Boring E330-B-009	HMA#7510-29/S-30	135'-136.5'	37.4	27	69	42	CH or OH

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF

Checked By: JAM

## LIQUID AND PLASTIC LIMIT TEST DATA

5/15/2013

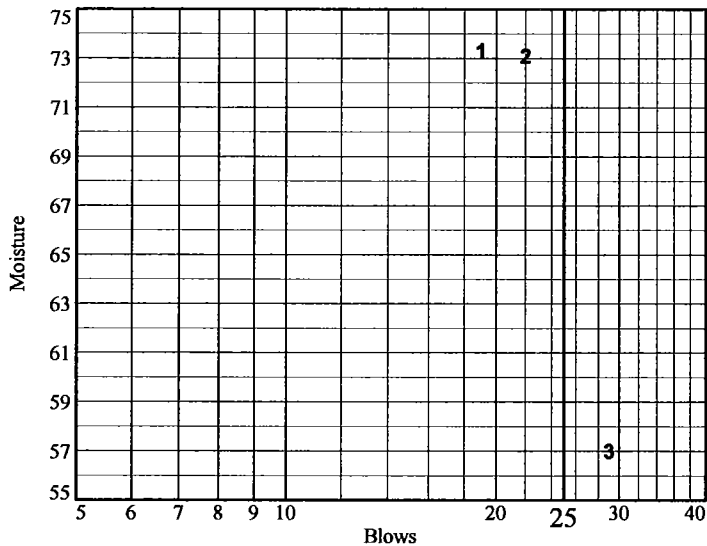
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-009  
**Depth:** 45'-46.5'  
**USCS:** CH or OH  
**Tested by:** JF

**Sample Number:** HMA#7510-25/S-12

**Checked by:** JAM

### Liquid Limit Data

Run No.	1	2	3	4	5	6
<b>Wet+Tare</b>	32.72	31.49	29.61			
<b>Dry+Tare</b>	23.6	22.9	22.9			
<b>Tare</b>	11.16	11.15	11.13			
<b># Blows</b>	19	22	29			
<b>Moisture</b>	73.3	73.1	57.0			



**Liquid Limit=** 67  
**Plastic Limit=** 20  
**Plasticity Index=** 47  
**Natural Moisture=** 31.6  
**Liquidity Index=** 0.2

### Plastic Limit Data

Run No.	1	2	3	4
<b>Wet+Tare</b>	19.1	17	17.4	
<b>Dry+Tare</b>	17.7	16.1	16.4	
<b>Tare</b>	11.2	11.1	11.3	
<b>Moisture</b>	21.5	18.0	19.6	

### Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
83.7	66.9	13.7	31.6

**LIQUID AND PLASTIC LIMIT TEST DATA**

5/15/2013

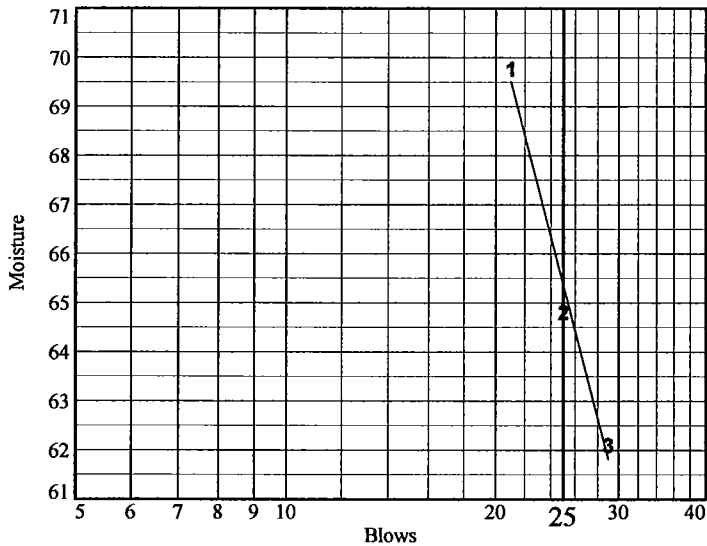
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-009  
**Depth:** 70'-71.5'  
**Material Description:** Gray Clay  
**USCS:** CH or OH  
**Tested by:** JF

**Sample Number:** HMA#7510-26/S-17

**Checked by:** JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
<b>Wet+Tare</b>	28.3	31.4	29.1			
<b>Dry+Tare</b>	22.3	24.4	23.2			
<b>Tare</b>	13.7	13.6	13.7			
<b># Blows</b>	21	25	29			
<b>Moisture</b>	69.8	64.8	62.1			



**Liquid Limit=** 65  
**Plastic Limit=** 21  
**Plasticity Index=** 44  
**Natural Moisture=** 27.2  
**Liquidity Index=** 0.1

**Plastic Limit Data**

Run No.	1	2	3	4
<b>Wet+Tare</b>	21.4	23.3	24.3	
<b>Dry+Tare</b>	20.2	21.5	22.4	
<b>Tare</b>	13.5	13.6	13.6	
<b>Moisture</b>	17.9	22.8	21.6	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
71.2	58.9	13.7	27.2



**LIQUID AND PLASTIC LIMIT TEST DATA**

5/15/2013

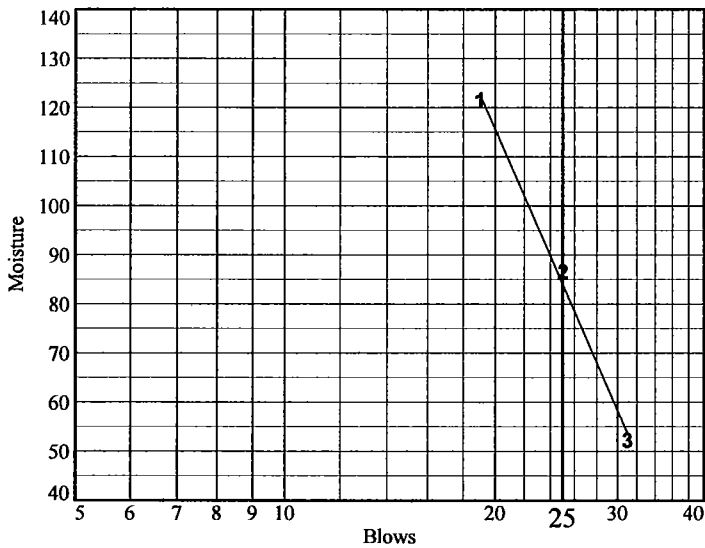
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-009  
**Depth:** 90'-91.5'  
**Material Description:** Gray Clay  
**USCS:** CH or OH  
**Tested by:** JF

**Sample Number:** HMA#7510-27/S-21

**Checked by:** JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	30.7	29.3	27.4			
Dry+Tare	20	20.9	21.7			
Tare	11.2	11.2	10.8			
# Blows	19	25	31			
Moisture	121.6	86.6	52.3			



Liquid Limit= 84  
 Plastic Limit= 32  
 Plasticity Index= 52  
 Natural Moisture= 38.0  
 Liquidity Index= 0.1

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	19.6	19.5	19	
Dry+Tare	17.7	17.5	17.1	
Tare	11.4	11.2	11.4	
Moisture	30.2	31.7	33.3	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
70.2	54.6	13.6	38.0

**LIQUID AND PLASTIC LIMIT TEST DATA**

5/15/2013

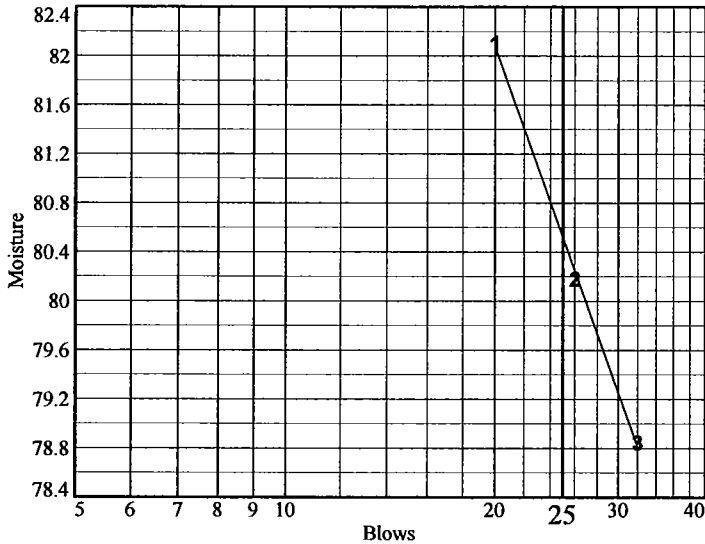
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-009  
**Depth:** 115'-116.5'  
**Material Description:** Gray Clay  
**USCS:** CH or OH  
**Tested by:** JF

**Sample Number:** HMA#7510-28/S-26

**Checked by:** JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
<b>Wet+Tare</b>	31	33.5	32.3			
<b>Dry+Tare</b>	23.2	24.6	24.1			
<b>Tare</b>	13.7	13.5	13.7			
<b># Blows</b>	20	26	32			
<b>Moisture</b>	82.1	80.2	78.8			



**Liquid Limit=** 81  
**Plastic Limit=** 24  
**Plasticity Index=** 57  
**Natural Moisture=** 33.5  
**Liquidity Index=** 0.2

**Plastic Limit Data**

Run No.	1	2	3	4
<b>Wet+Tare</b>	23.7	23.6	22.7	
<b>Dry+Tare</b>	21.7	21.7	20.9	
<b>Tare</b>	13.6	13.6	13.6	
<b>Moisture</b>	24.7	23.5	24.7	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
61.9	49.8	13.7	33.5

**LIQUID AND PLASTIC LIMIT TEST DATA**

5/15/2013

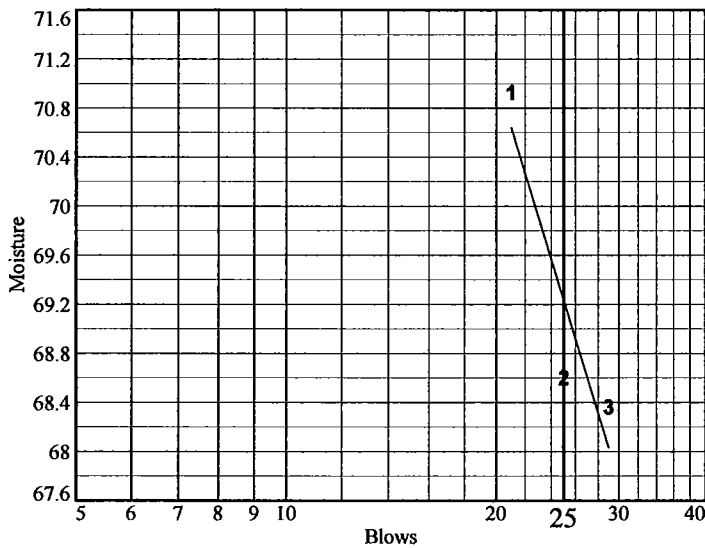
**Client:** Golder Associates  
**Project:** Sound Transit East Link  
**Project Number:** 12-450  
**Location:** Boring E330-B-009  
**Depth:** 135'-136.5'  
**Material Description:** Gray Clay  
**USCS:** CH or OH  
**Tested by:** JF

**Sample Number:** HMA#7510-29/S-30

**Checked by:** JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
<b>Wet+Tare</b>	28.3	28.1	30.1			
<b>Dry+Tare</b>	22.2	22.2	23.4			
<b>Tare</b>	13.6	13.6	13.6			
<b># Blows</b>	21	25	29			
<b>Moisture</b>	70.9	68.6	68.4			



**Liquid Limit=** 69  
**Plastic Limit=** 27  
**Plasticity Index=** 42  
**Natural Moisture=** 37.4  
**Liquidity Index=** 0.2

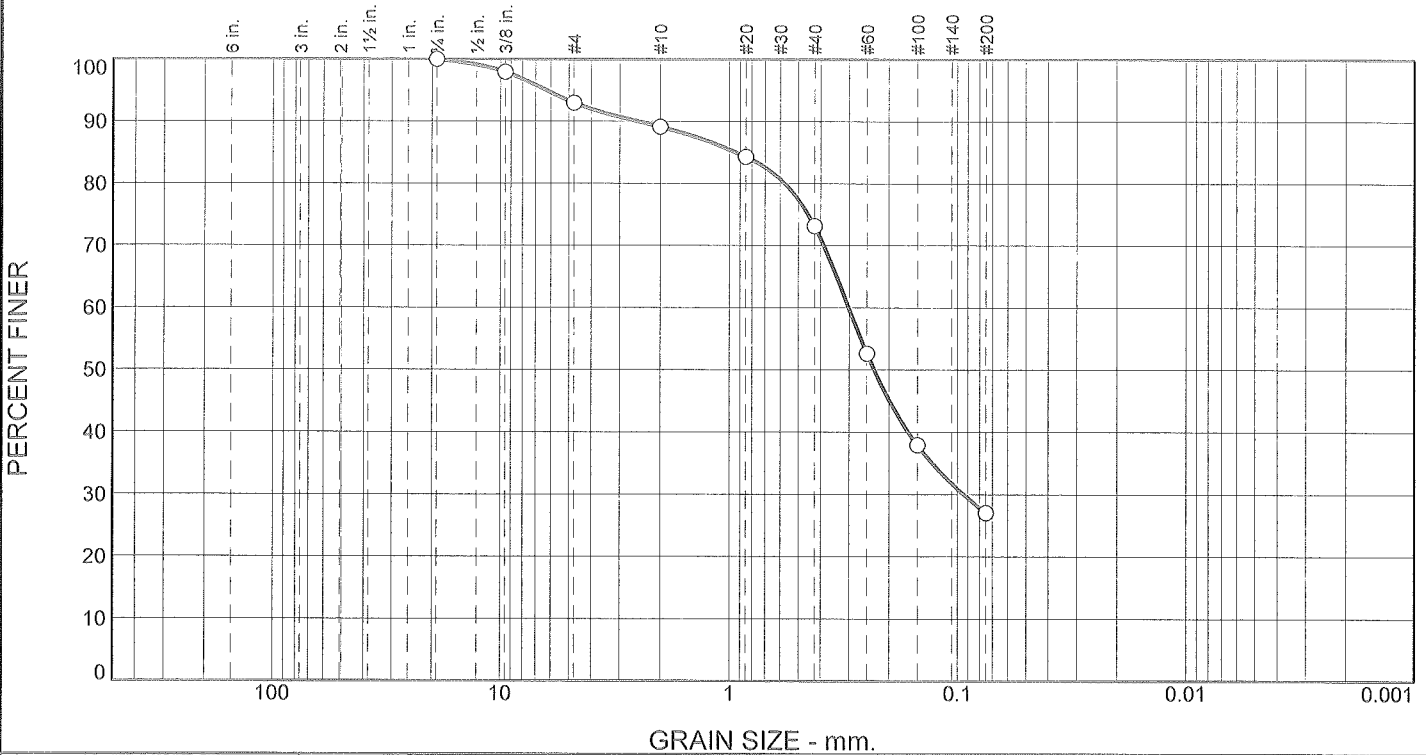
**Plastic Limit Data**

Run No.	1	2	3	4
<b>Wet+Tare</b>	20.8	20.7	19.6	
<b>Dry+Tare</b>	18.9	18.7	17.9	
<b>Tare</b>	11.6	11.4	11.5	
<b>Moisture</b>	26.0	27.4	26.6	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
62.9	49.5	13.7	37.4

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.0	3.8	16.0	46.1	27.1	

Test Results (ASTM C1363 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
3/8"	98.0		
#4	93.0		
#10	89.2		
#20	84.3		
#40	73.2		
#60	52.7		
#100	37.9		
#200	27.1		

\* (no specification provided)

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 2.4935      D<sub>85</sub>= 0.9365      D<sub>60</sub>= 0.3005  
D<sub>50</sub>= 0.2322      D<sub>30</sub>= 0.0938      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/10/13      Date Tested: 5/15/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-010  
Sample Number: HMA#7511-23/S-5

Depth: 10'-10.7'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
Redmond, WA

**Client:** Golder Associates  
**Project:** Sound Transit East Link  
  
**Project No:** 12-450

**Figure**

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/23/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-010

Depth: 10'-10.7'

Sample Number: HMA#7511-23/S-5

Material Description: Olive Gray Silty Sand

Date Received: 5/10/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C1363

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 5/15/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 311.20  
 Tare Wt. = 113.20  
 Minus #200 from wash = 24.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
374.10	113.20	3/4"	0.00	0.00	100.0
		3/8"	1489.10	1483.80	98.0
		#4	1370.30	1357.30	93.0
		#10	1524.60	1514.60	89.2
		#20	1080.20	1067.50	84.3
		#40	973.80	944.80	73.2
		#60	931.90	878.40	52.7
		#100	881.60	843.20	37.9
		#200	1048.30	1019.90	27.1

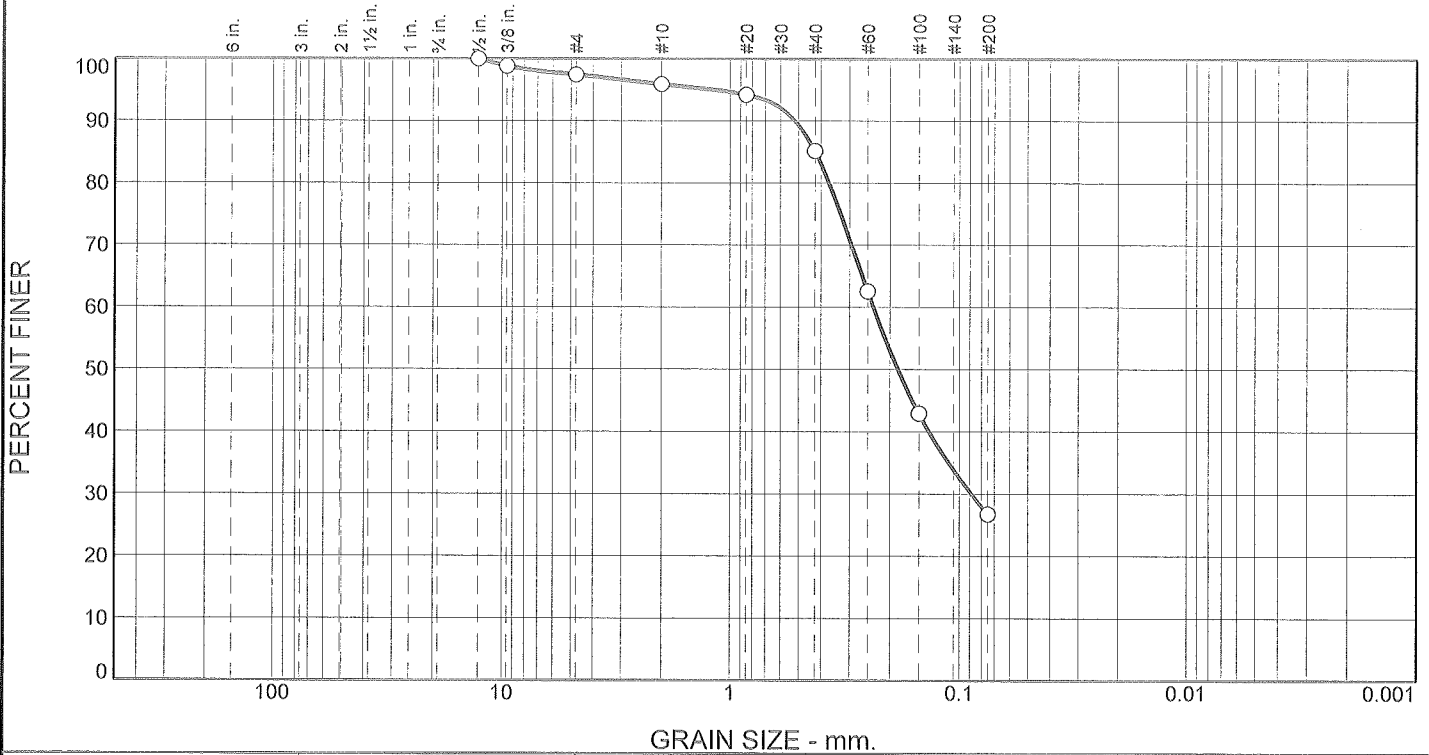
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	7.0	7.0	3.8	16.0	46.1	65.9			27.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.0938	0.2322	0.3005	0.5721	0.9365	2.4935	6.2594

<b>Fineness Modulus</b>
1.54

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	1.6	10.7	58.4	26.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	98.9		
#4	97.5		
#10	95.9		
#20	94.2		
#40	85.2		
#60	62.5		
#100	42.9		
#200	26.8		

\* (no specification provided)

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.5178      D<sub>85</sub>= 0.4225      D<sub>60</sub>= 0.2361  
D<sub>50</sub>= 0.1847      D<sub>30</sub>= 0.0884      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/10/13      Date Tested: 5/16/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-010  
Sample Number: HMA#7511-24/S-7

Depth: 15'-15.4'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
Redmond, WA

**Client:** Golder Associates  
**Project:** Sound Transit East Link  
  
**Project No:** 12-450

**Figure**

**GRAIN SIZE DISTRIBUTION TEST DATA**

5/23/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010  
 Depth: 15'-15.4'

Sample Number: HMA#7511-24/S-7

Material Description: Olive Gray Silty Sand

Date Received: 5/10/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 5/16/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 278.40  
 Tare Wt. = 118.20  
 Minus #200 from wash = 23.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
327.50	118.20	1/2"	0.00	0.00	100.0
		3/8"	1486.40	1484.00	98.9
		#4	1360.00	1357.10	97.5
		#10	1517.90	1514.60	95.9
		#20	1070.80	1067.30	94.2
		#40	963.70	944.80	85.2
		#60	925.80	878.40	62.5
		#100	884.30	843.20	42.9
		#200	1053.50	1019.70	26.8

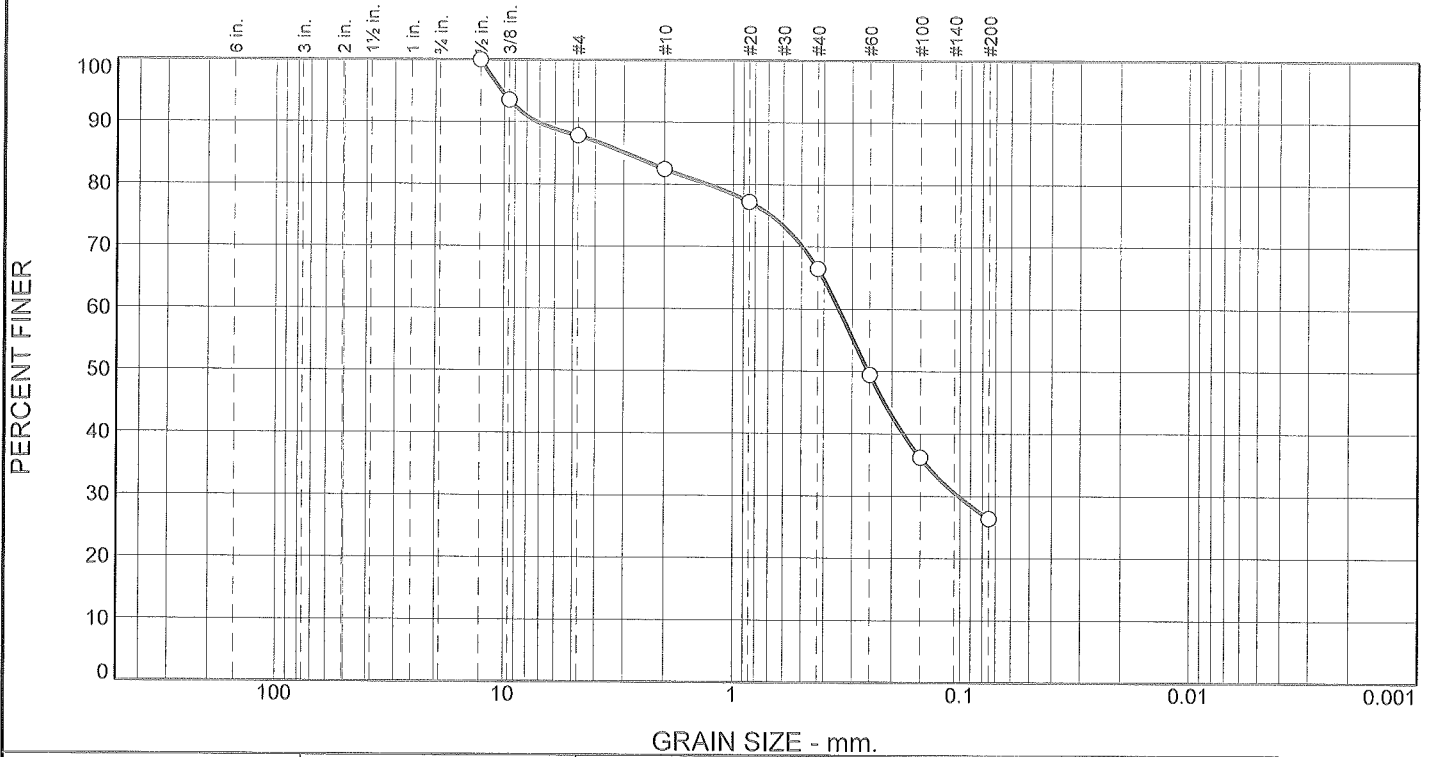
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.5	2.5	1.6	10.7	58.4	70.7			26.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.0884	0.1847	0.2361	0.3681	0.4225	0.5178	1.1643

<b>Fineness Modulus</b>
1.06

# Particle Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.2	5.4	15.9	40.1	26.4	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	93.5		
#4	87.8		
#10	82.4		
#20	77.2		
#40	66.5		
#60	49.5		
#100	36.2		
#200	26.4		

**Material Description**

Gray Brown Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 7.1850                      D<sub>85</sub>= 2.9542                      D<sub>60</sub>= 0.3429  
D<sub>50</sub>= 0.2543                      D<sub>30</sub>= 0.1017                      D<sub>15</sub>=  
D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

Remarks

Date Received: 5/10/2013                      Date Tested: 5/16/2013  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-010  
Sample Number: HMA#7511-26/S-10

Depth: 30'-30.9'

Date Sampled:

Hayre McElroy & Associates, LLC

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

5/23/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010

Depth: 30'-30.9'

Sample Number: HMA#7511-26/S-10

Material Description: Gray Brown Silty Sand

Date Received: 5/10/2013

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 5/16/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 231.40  
 Tare Wt. = 117.90  
 Minus #200 from wash = 22.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
264.90	117.90	1/2"	0.00	0.00	100.0
		3/8"	1493.50	1484.00	93.5
		#4	1365.70	1357.30	87.8
		#10	1522.70	1514.80	82.4
		#20	1075.40	1067.70	77.2
		#40	960.80	945.00	66.5
		#60	903.50	878.50	49.5
		#100	863.10	843.60	36.2
		#200	1034.40	1020.00	26.4

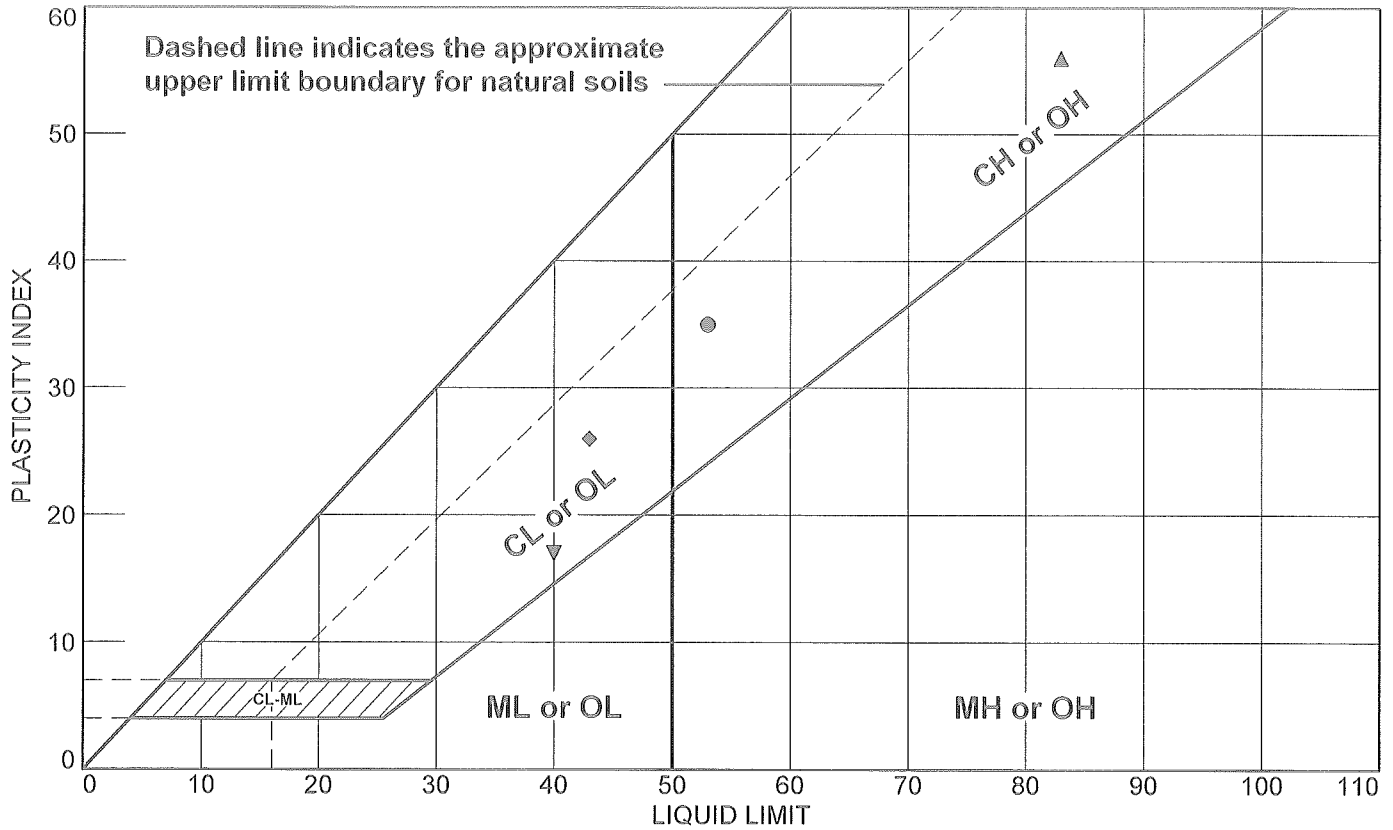
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	12.2	12.2	5.4	15.9	40.1	61.4			26.4

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1017	0.2543	0.3429	1.2867	2.9542	7.1850	10.2627

<b>Fineness Modulus</b>
1.91

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-010	HMA#7511-22/S-2	2.5'-4'	25.6	18	53	35	CH or OH
■	Boring E330-B-010	HMA#7511-24/S-7	15'-15.4'		NP	NP	NP	SM
▲	Boring E330-B-010	HMA#7511-25/S-13	45'-46.5'	28.0	27	83	56	CH or OH
◆	Boring E330-B-010	HMA#7511-27/S-15	55'-56'	18.1	17	43	26	CL or OL
▼	Boring E330-B-010	HMA#7511-28/S-18	70'-70.9'	22.3	23	40	17	CL or OL

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

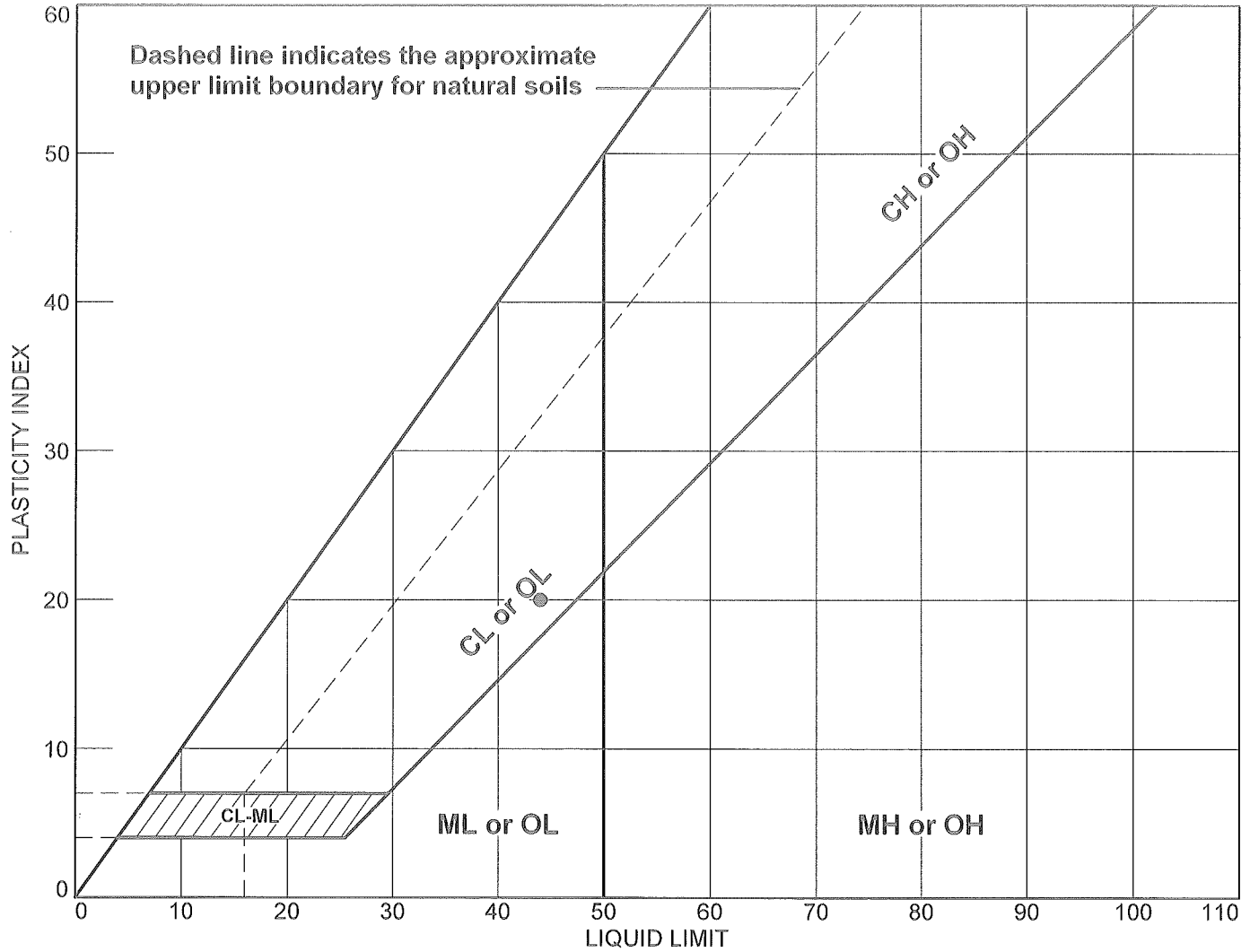
**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-010	HMA7511-35/S-21	85'-85.8'	17.7	24	44	20	CL or OL
■	Boring E330-B-010	HMA#7511-36/S-24	100'-100.3'	13.3	NP	NP	NP	ML

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By:  TP/JF  JF/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

5/23/2013

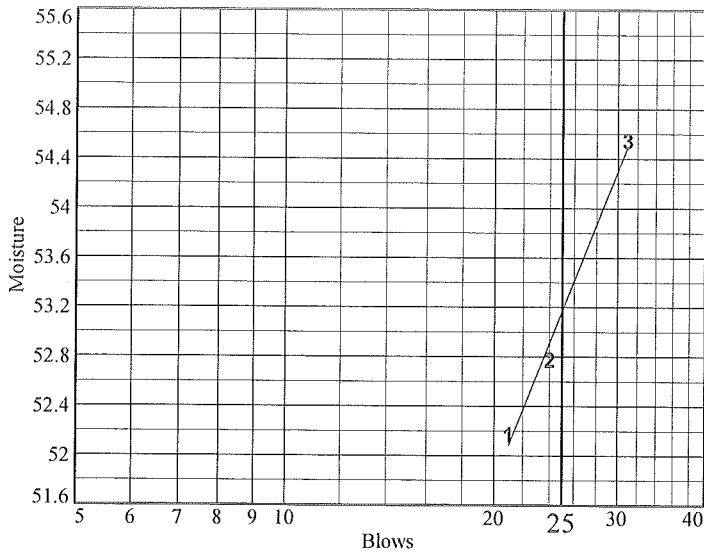
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010  
 Depth: 2.5'-4'  
 Material Description: Brown Clay  
 USCS: CH or OH  
 Tested by: JF/TP

Sample Number: HMA#7511-22/S-2

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	21.8	22.3	19.9			
Dry+Tare	18.2	18.5	16.9			
Tare	11.3	11.3	11.4			
# Blows	21	24	31			
Moisture	52.2	52.8	54.5			



Liquid Limit= 53  
 Plastic Limit= 18  
 Plasticity Index= 35  
 Natural Moisture= 25.6  
 Liquidity Index= 0.2

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	17.6	17.4	19.5	
Dry+Tare	16.6	16.4	18.3	
Tare	11.4	11	11.2	
Moisture	19.2	18.5	16.9	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
67.6	56.6	13.6	25.6

**LIQUID AND PLASTIC LIMIT TEST DATA**

5/23/2013

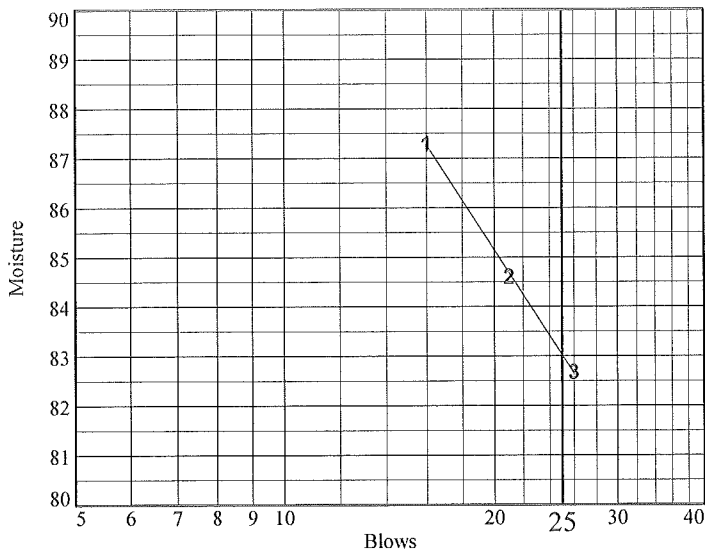
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010  
 Depth: 45'-46.5'  
 Material Description: Gray Clay  
 USCS: CH or OH  
 Tested by: JF/TP

Sample Number: HMA#7511-25/S-13

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	23.1	20.7	20.8			
Dry+Tare	17.6	16.3	16.5			
Tare	11.3	11.1	11.3			
# Blows	16	21	26			
Moisture	87.3	84.6	82.7			



Liquid Limit= 83  
 Plastic Limit= 27  
 Plasticity Index= 56  
 Natural Moisture= 28.0  
 Liquidity Index= 0.0

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	20.7	22.1	20.0	
Dry+Tare	18.7	19.8	18.1	
Tare	11.2	11.0	11.2	
Moisture	26.7	26.1	27.5	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
61.4	50.9	13.4	28.0

**LIQUID AND PLASTIC LIMIT TEST DATA**

5/23/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010  
 Depth: 55'-56'

Sample Number: HMA#7511-27/S-15

Material Description: Dark Gray Clay

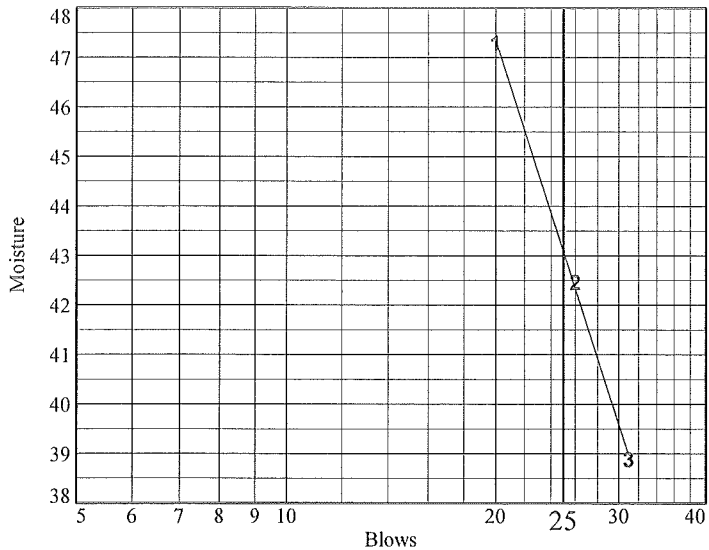
USCS: CL or OL

Tested by: JF/TP

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	24.5	24.2	26.1			
Dry+Tare	21.0	21.1	22.6			
Tare	13.6	13.8	13.6			
# Blows	20	26	31			
Moisture	47.3	42.5	38.9			



Liquid Limit = 43  
 Plastic Limit = 17  
 Plasticity Index = 26  
 Natural Moisture = 18.1  
 Liquidity Index = 0.0

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18.4	20.0	19.9	
Dry+Tare	17.3	18.6	18.7	
Tare	11.1	11.2	11.0	
Moisture	17.7	18.9	15.6	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
72.5	63.5	13.7	18.1

LIQUID AND PLASTIC LIMIT TEST DATA

5/23/2013

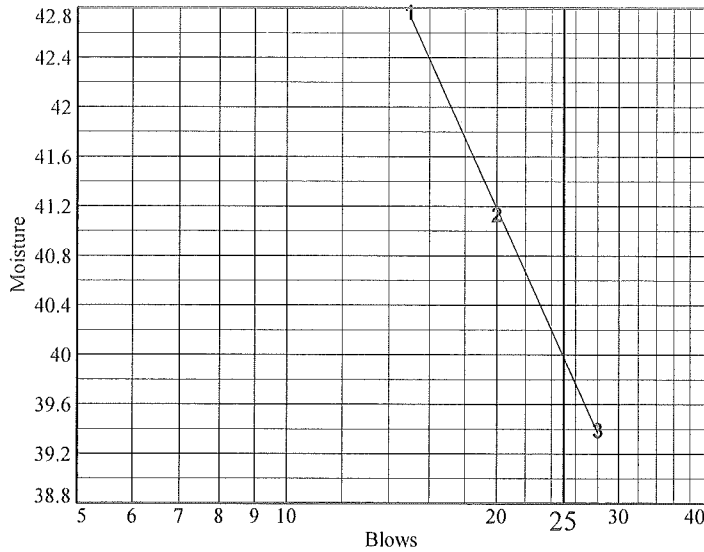
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010  
 Depth: 70'-70.9'  
 Material Description: Gray Clay  
 USCS: CL or OL  
 Tested by: JF/TP

Sample Number: HMA#7511-28/S-18

Checked by: JAM

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.1	33.5	41.2			
Dry+Tare	29.3	27.7	33.4			
Tare	13.4	13.6	13.6			
# Blows	15	20	28			
Moisture	42.8	41.1	39.4			



Liquid Limit= 40  
 Plastic Limit= 23  
 Plasticity Index= 17  
 Natural Moisture= 22.3  
 Liquidity Index= 0.0

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	21.2	23.7	24.6	
Dry+Tare	19.8	21.8	22.5	
Tare	13.5	13.6	13.6	
Moisture	22.2	23.2	23.6	

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
47.9	41.2	11.2	22.3

**LIQUID AND PLASTIC LIMIT TEST DATA**

5/23/2013

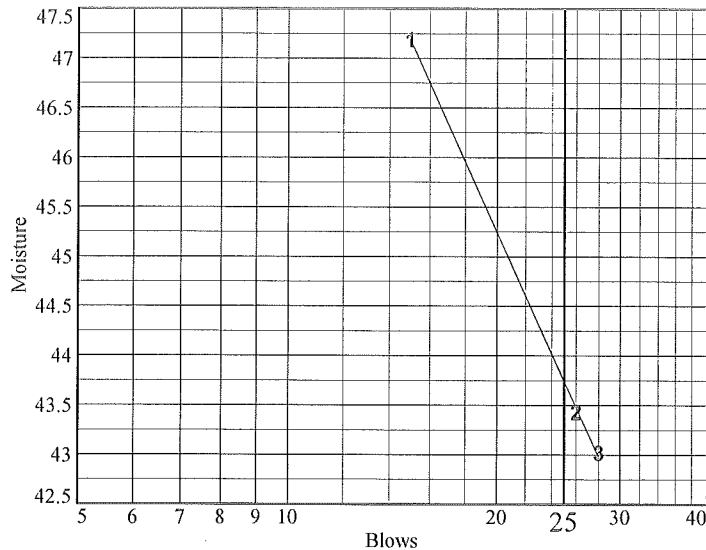
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010  
 Depth: 85'-85.8'  
 Material Description: Gray Clay  
 USCS: CL or OL  
 Tested by: TP/JF

Sample Number: HMA7511-35/S-21

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	24.3	27.7	23.6			
Dry+Tare	20.1	23.4	19.9			
Tare	11.2	13.5	11.3			
# Blows	15	26	28			
Moisture	47.2	43.4	43.0			



Liquid Limit= 44  
 Plastic Limit= 24  
 Plasticity Index= 20  
 Natural Moisture= 17.7  
 Liquidity Index= -0.3

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18.4	20.0	16.0	
Dry+Tare	17.0	18.7	15.1	
Tare	11.2	13.7	11.1	
Moisture	24.1	26.0	22.5	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
63.8	56.3	13.9	17.7



**LIQUID AND PLASTIC LIMIT TEST DATA**

5/23/2013

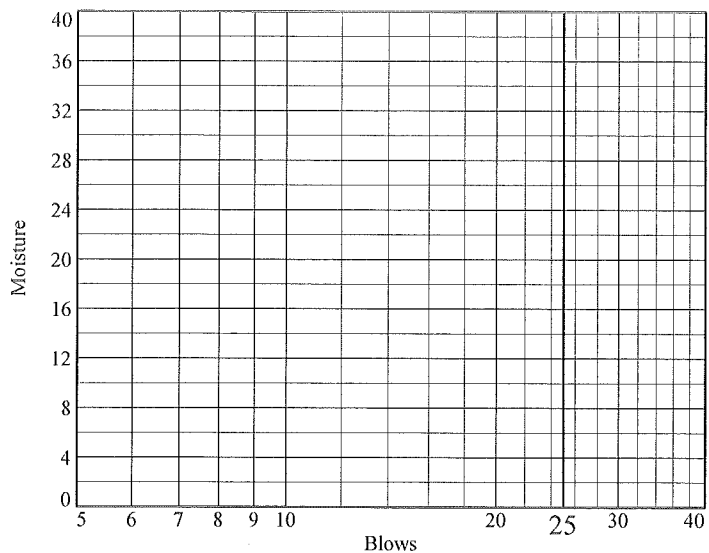
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-010  
 Depth: 100'-100.3'  
 Material Description: Gray Silt  
 USCS: ML  
 Tested by: JF/TP

Sample Number: HMA#7511-36/S-24

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



Liquid Limit= NP  
 Plastic Limit= NP  
 Plasticity Index= NP  
 Natural Moisture= 13.3

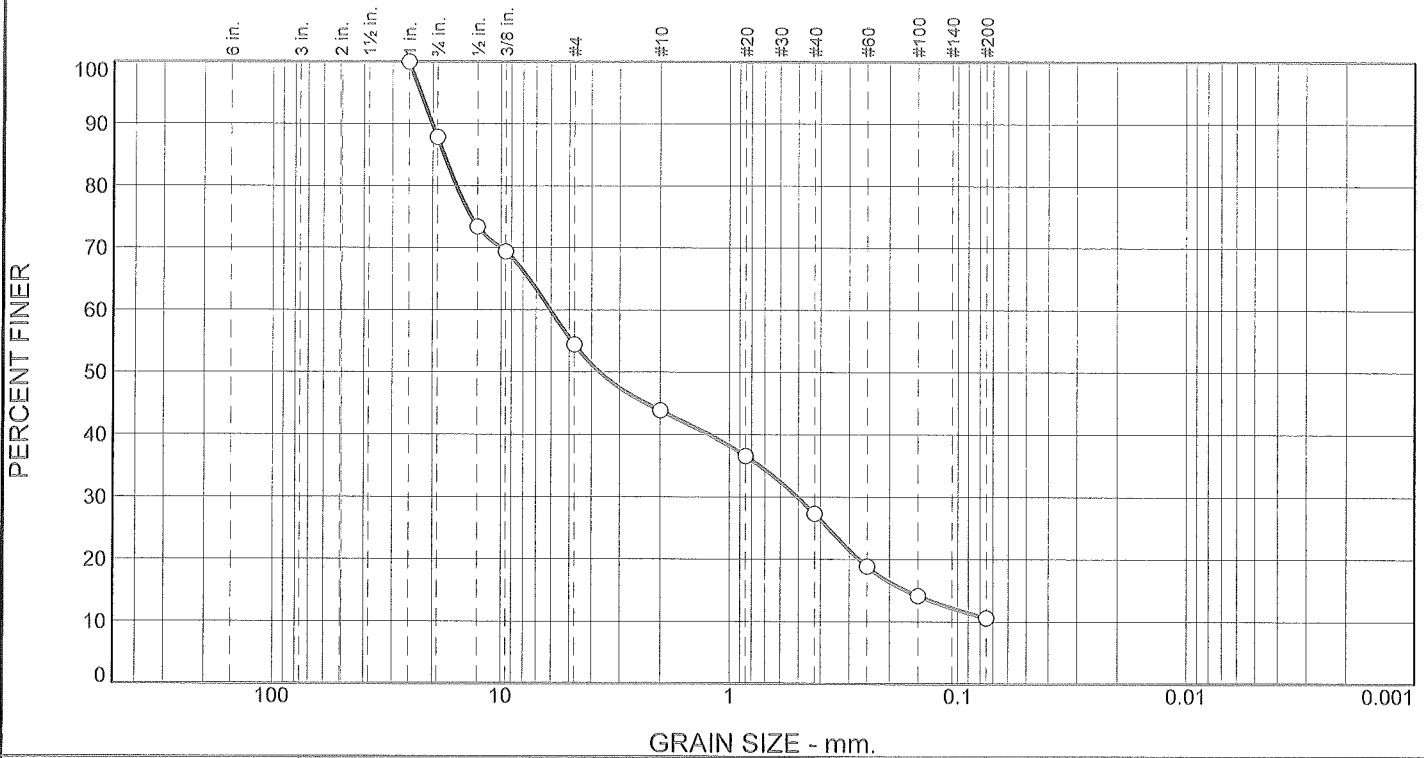
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare				
Dry+Tare				
Tare				
Moisture				

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
45.8	42	13.5	13.3

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.2	33.4	10.6	16.5	16.7	10.6	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	87.8		
1/2"	73.4		
3/8"	69.4		
#4	54.4		
#10	43.8		
#20	36.6		
#40	27.3		
#60	18.9		
#100	14.2		
#200	10.6		

**Material Description**

Olive Gray Poorly Graded Gravel W/Silt & Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= GP-GM AASHTO (M 145)= A-1-a

**Coefficients**

D<sub>90</sub>= 20.0503      D<sub>85</sub>= 17.8173      D<sub>60</sub>= 6.0571  
 D<sub>50</sub>= 3.6752      D<sub>30</sub>= 0.5050      D<sub>15</sub>= 0.1693  
 D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/6/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-011  
 Sample Number: HMA#7514-9/S-2

Depth: 2.5'-4'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-011

Depth: 2.5'-4'

Sample Number: HMA#7514-9/S-2

Material Description: Olive Gray Poorly Graded Gravel W/Silt & Sand

Date Received: 5/30/13

USCS Classification: GP-GM

AASHTO Classification: A-1-a

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 645.10

Tare Wt. = 214.10

Minus #200 from wash = 10.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
695.60	214.10	1"	0.00	0.00	100.0
		3/4"	1563.60	1505.00	87.8
		1/2"	1488.90	1419.40	73.4
		3/8"	1502.80	1483.50	69.4
		#4	1428.90	1356.90	54.4
		#10	1565.50	1514.50	43.8
		#20	1102.40	1067.30	36.6
		#40	989.10	944.70	27.3
		#60	919.10	878.30	18.9
		#100	865.80	843.20	14.2
		#200	1036.80	1019.60	10.6

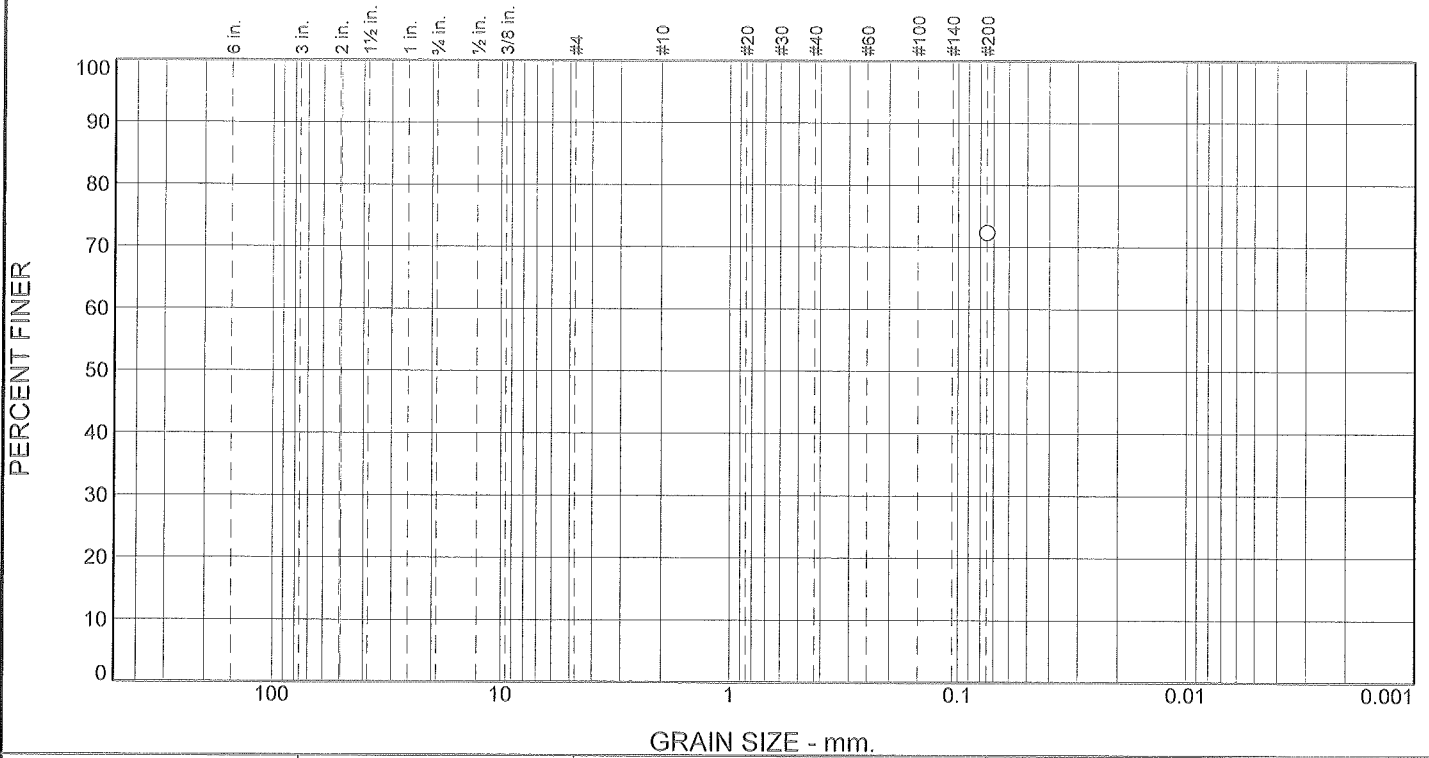
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	12.2	33.4	45.6	10.6	16.5	16.7	43.8			10.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
	0.1693	0.2714	0.5050	3.6752	6.0571	15.7383	17.8173	20.0503	22.5649

<b>Fineness Modulus</b>
4.35

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						72.3	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	72.3		

**Material Description**

Gray Silt W/Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
 D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
 D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/6/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-011  
 Sample Number: HMA#7514-10/S-5

Depth: 12.5'-14'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-011

Depth: 12.5'-14'

Sample Number: HMA#7514-10/S-5

Material Description: Gray Silt W/Sand

Date Received: 5/30/13

USCS Classification: ML

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 178.60  
 Tare Wt. = 120.10  
 Minus #200 from wash = 72.3%

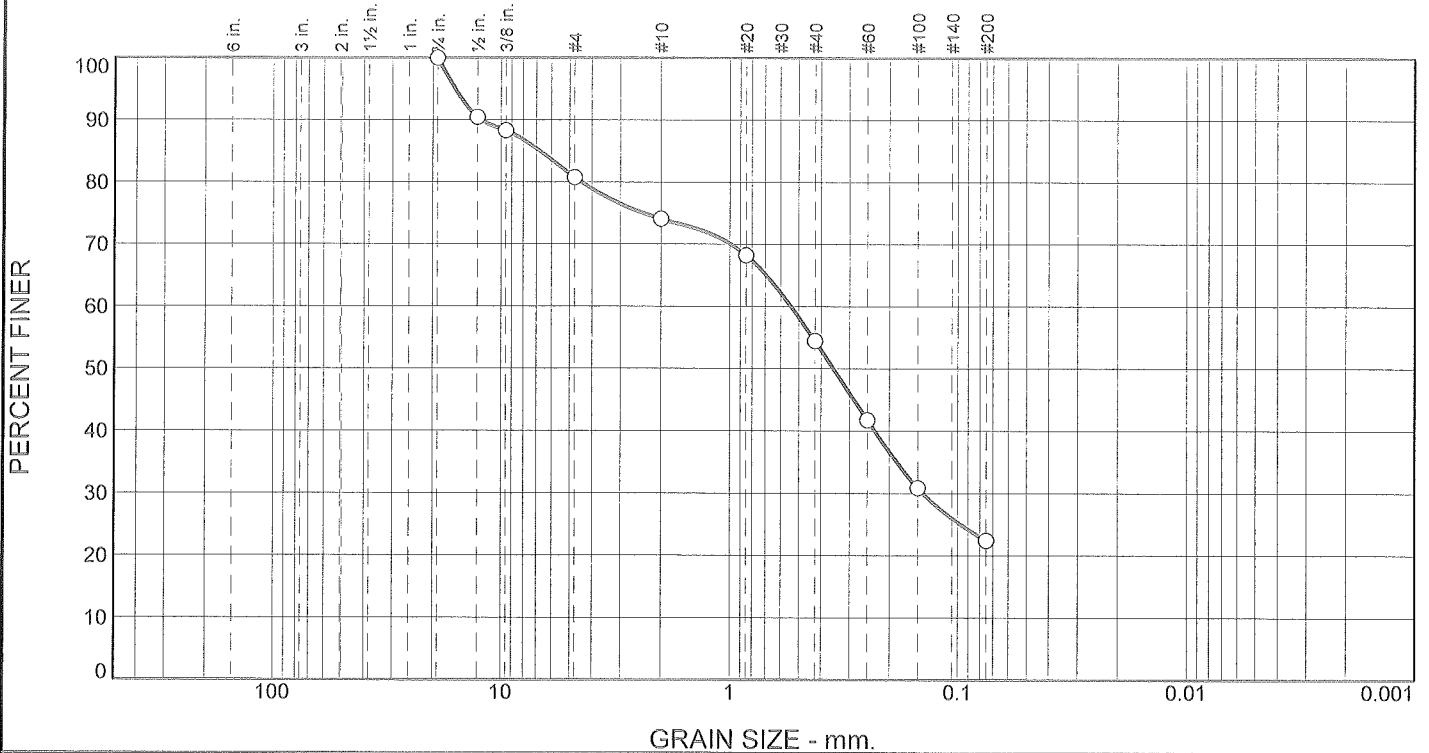
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
331.30	120.10	#200			72.3

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										72.3

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.3	6.6	19.6	32.1	22.4	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	90.5		
3/8"	88.3		
#4	80.7		
#10	74.1		
#20	68.2		
#40	54.5		
#60	41.8		
#100	30.9		
#200	22.4		

**Material Description**

Gray Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 12.2287      D<sub>85</sub>= 6.7487      D<sub>60</sub>= 0.5414  
D<sub>50</sub>= 0.3526      D<sub>30</sub>= 0.1424      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/6/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-011  
Sample Number: HMA#7514-11/S-8

Depth: 25'-25.7'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-011

Depth: 25'-25.7'

Sample Number: HMA#7514-11/S-8

Material Description: Gray Silty Sand W/Gravel

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 199.80  
 Tare Wt. = 118.50  
 Minus #200 from wash = 26.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
229.60	118.50	3/4"	0.00	0.00	100.0
		1/2"	1430.10	1419.50	90.5
		3/8"	1486.10	1483.70	88.3
		#4	1365.30	1356.90	80.7
		#10	1521.80	1514.40	74.1
		#20	1073.80	1067.30	68.2
		#40	959.80	944.50	54.5
		#60	892.30	878.20	41.8
		#100	855.30	843.20	30.9
		#200	1029.20	1019.80	22.4

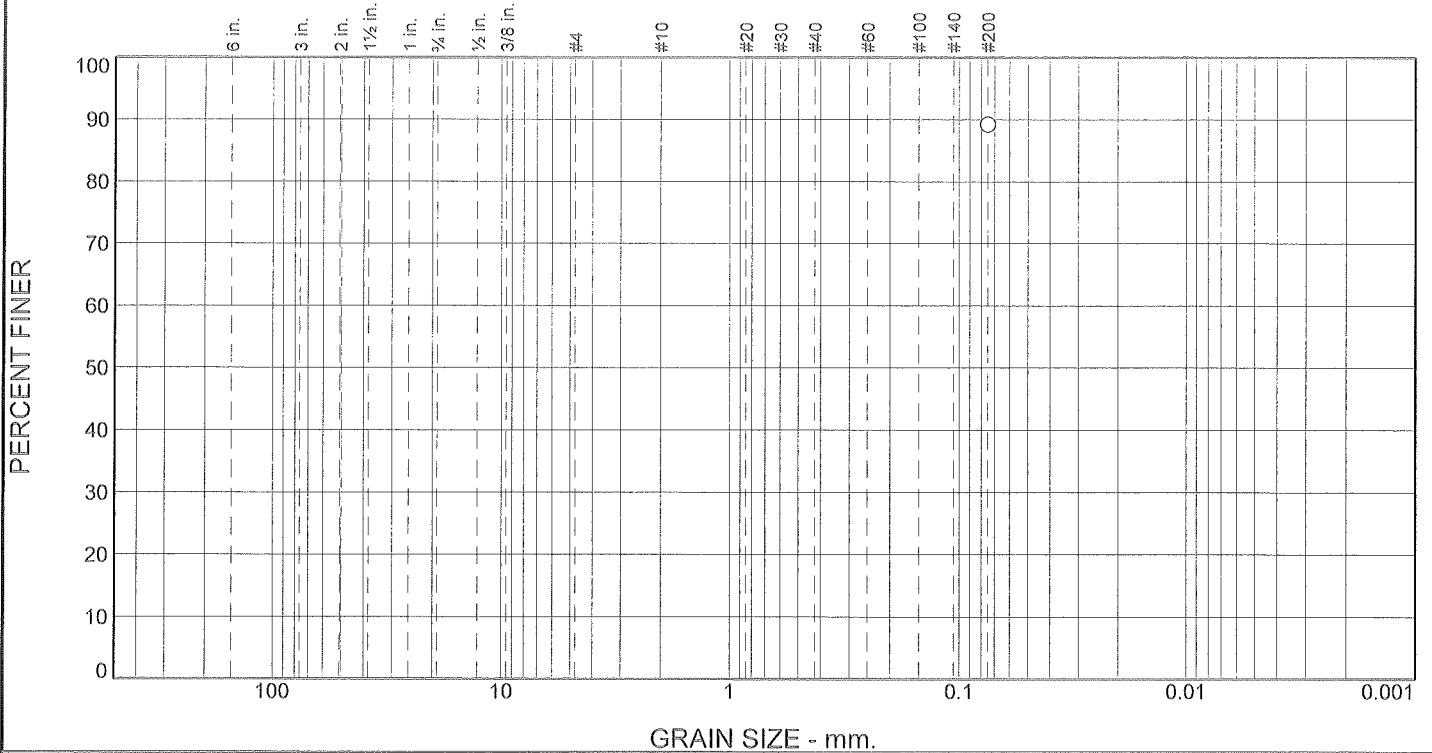
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	19.3	19.3	6.6	19.6	32.1	58.3			22.4

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1424	0.3526	0.5414	4.4434	6.7487	12.2287	15.8888

<b>Fineness Modulus</b>
2.45

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						89.3	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	89.3		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 24                      LL= 64                      PI= 40

**Classification**

USCS (D 2487)= CH or OHAASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/6/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-011  
Sample Number: HMA#7514-12/S-13

Depth: 50'-51.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
Redmond, WA

**Client:** Golder Associates  
**Project:** Sound Transit East Link  
  
**Project No:** 12-450

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-011

Depth: 50'-51.5'

Sample Number: HMA#7514-12/S-13

Material Description: Gray Clay

Date Received: 5/30/13      PL: 24

LL: 64

PI: 40

USCS Classification: CH or OH

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 131.20  
 Tare Wt. = 118.10  
 Minus #200 from wash = 89.3%

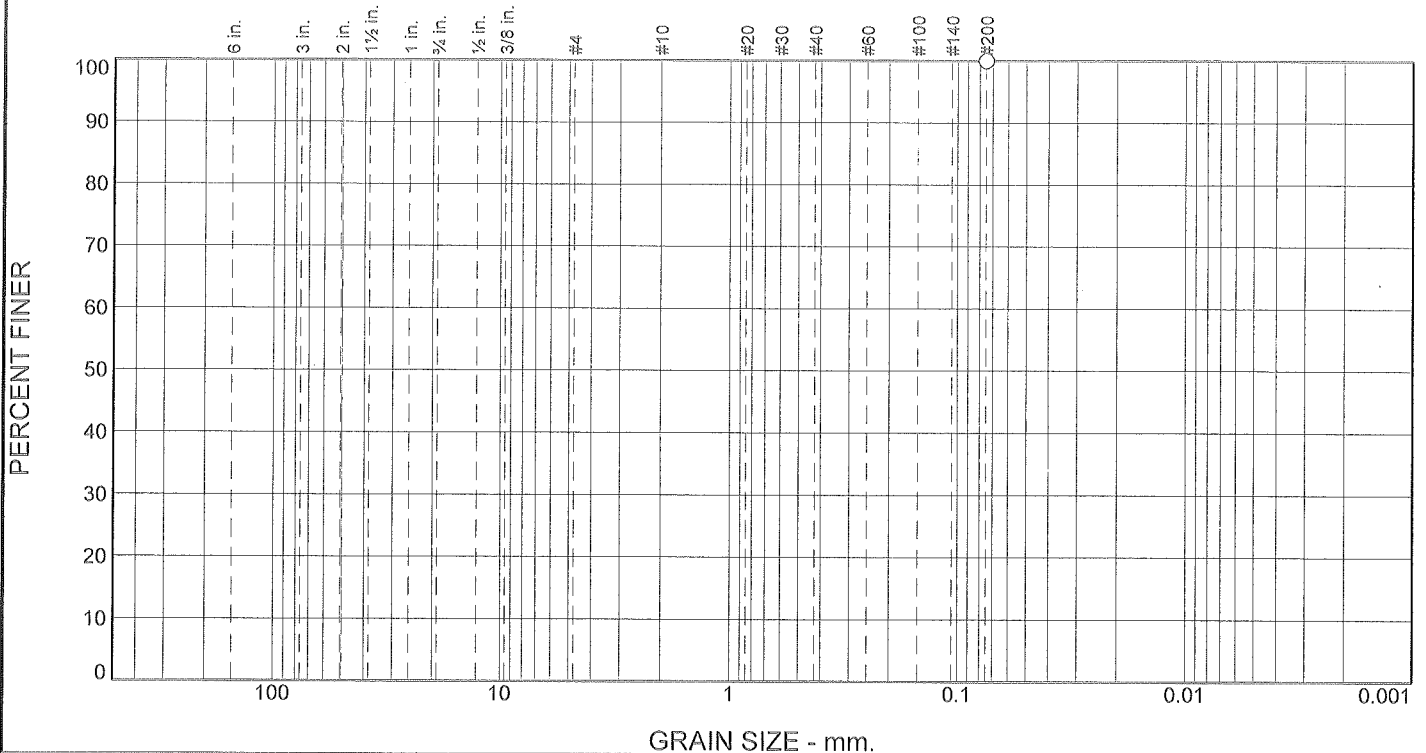
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
240.00	118.10	#200			89.3

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										89.3

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	0.0	100.0	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	100.0		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL= NP      LL= NP      PI= NP

**Classification**

USCS (D 2487)= ML      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>=      D<sub>85</sub>=      D<sub>60</sub>=  
 D<sub>50</sub>=      D<sub>30</sub>=      D<sub>15</sub>=  
 D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13      Date Tested: 6/6/13  
 Tested By: JF/TP  
 Checked By: JAM  
 Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-011      Depth: 70'-70.4'      Date Sampled: \_\_\_\_\_  
 Sample Number: HMA#7514-13/S-17

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	Client: Golder Associates Project: Sound Transit East Link  Project No: 12-450
---	---

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/20/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-011

Depth: 70'-70.4'

Sample Number: HMA#7514-13/S-17

Material Description: Gray Silt

Date Received: 5/30/13      PL: NP

LL: NP      PI: NP

USCS Classification: ML

AASHTO Classification: A-4(0)

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 31.10  
Tare Wt. = 31.10

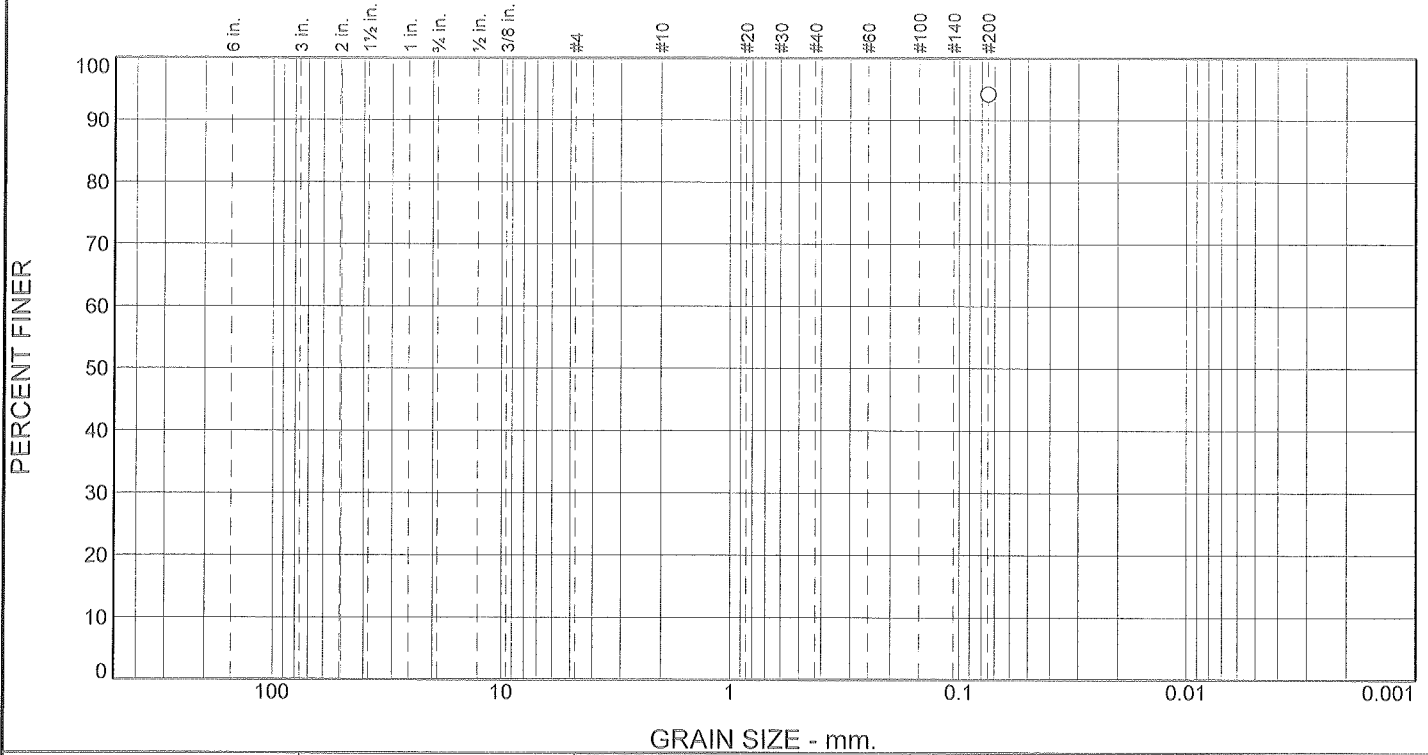
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
68.90	31.10	#200	0.00	0.00	100.0

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			100.0

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						94.2	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	94.2		

\* (no specification provided)

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 23                      LL= 62                      PI= 39

**Classification**

USCS (D 2487)= CH or OH AASHTO (M 145)=

**Coefficients**

D <sub>90</sub> =	D <sub>85</sub> =	D <sub>60</sub> =
D <sub>50</sub> =	D <sub>30</sub> =	D <sub>15</sub> =
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/6/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

Source of Sample: Boring E330-B-011  
 Sample Number: HMA#7514-14/S-20

Depth: 85'-86.3'

Date Sampled:

Hayre McElroy & Associates, LLC

Client: Golder Associates  
 Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-011

Depth: 85'-86.3'

Sample Number: HMA#7514-14/S-20

Material Description: Gray Clay

Date Received: 5/30/13      PL: 23

LL: 62

PI: 39

USCS Classification: CH or OH

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 123.50  
 Tare Wt. = 117.90  
 Minus #200 from wash = 94.2%

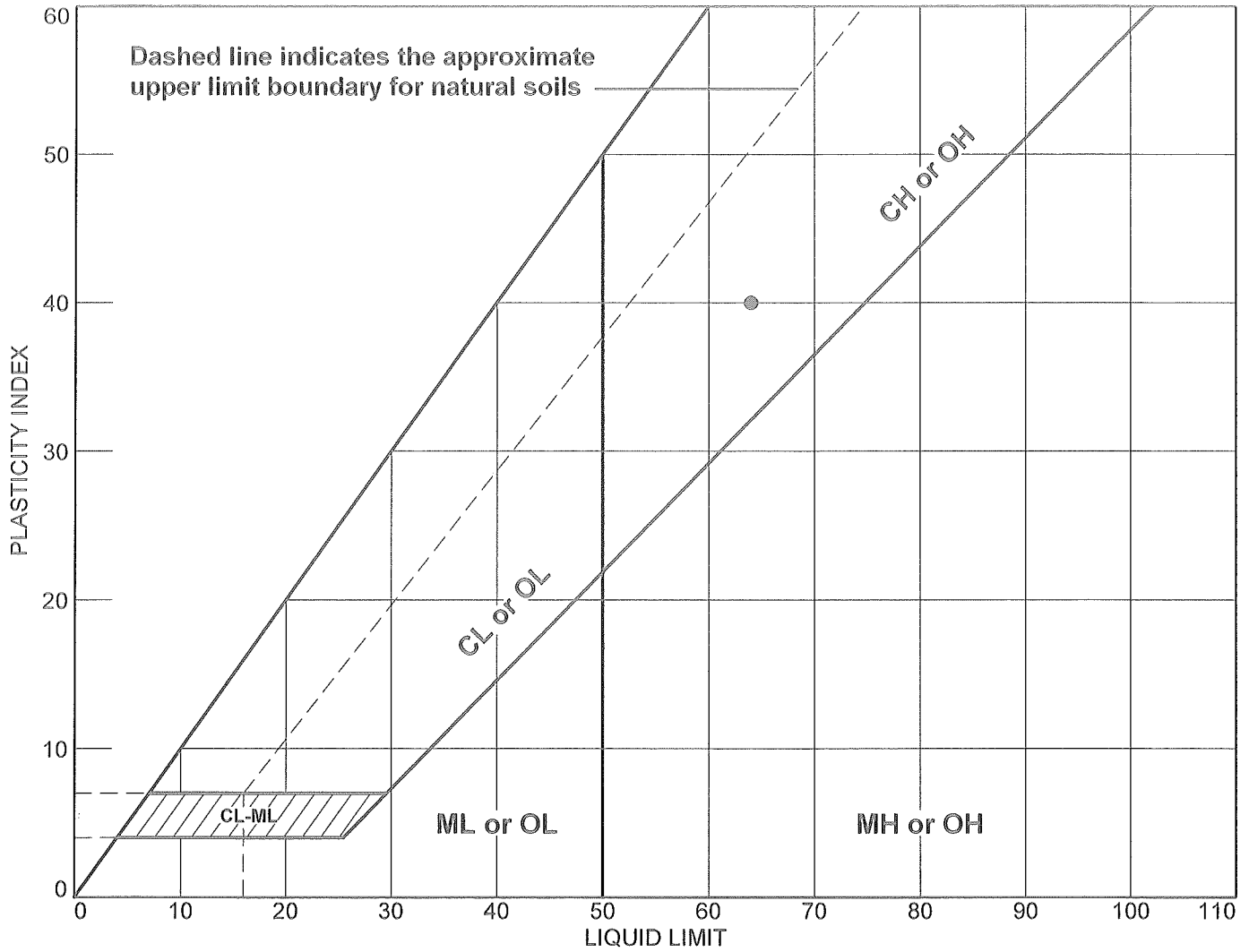
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
215.10	117.90	#200			94.2

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										94.2

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-011	HMA#7514-12/S-13	50'-51.5'	24.9	24	64	40	CH or OH

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/14/2013

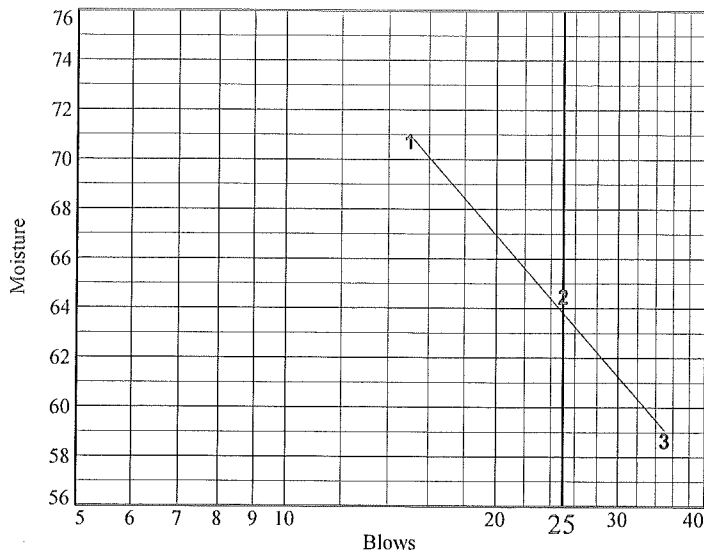
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-011  
 Depth: 50'-51.5'  
 Material Description: Gray Clay  
 USCS: CH or OH  
 Tested by: JF/TP

Sample Number: HMA#7514-12/S-13

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	34.5	31.2	32.7			
Dry+Tare	25.8	24.3	25.6			
Tare	13.5	13.6	13.5			
# Blows	15	25	35			
Moisture	70.7	64.5	58.7			



Liquid Limit= 64  
 Plastic Limit= 24  
 Plasticity Index= 40  
 Natural Moisture= 24.9  
 Liquidity Index= 0.0

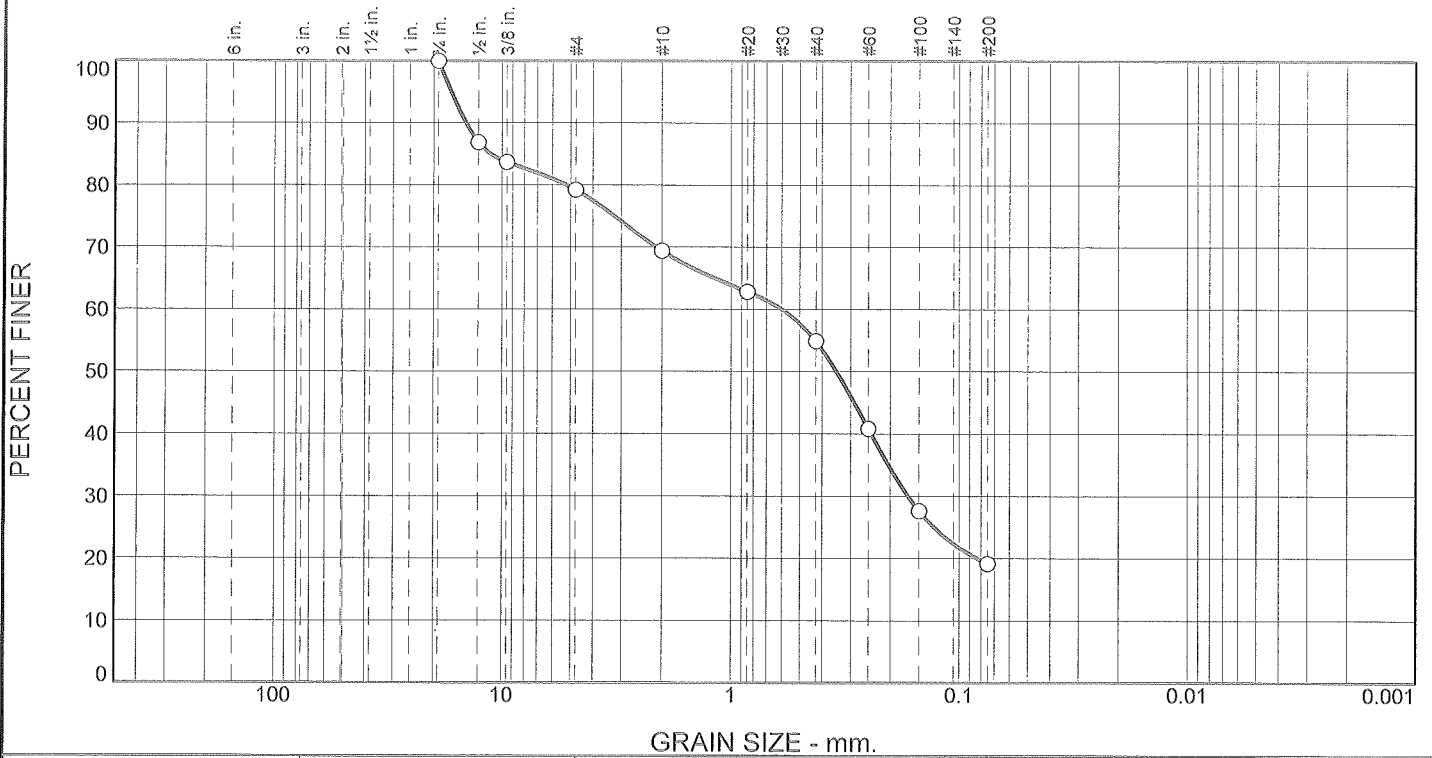
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	21	19.2	20.9	
Dry+Tare	19.5	18.1	19.6	
Tare	13.7	13.6	13.6	
Moisture	25.9	24.4	21.7	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
270.4	240	118.1	24.9

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	20.8	9.8	14.5	35.8	19.1	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	86.8		
3/8"	83.7		
#4	79.2		
#10	69.4		
#20	62.8		
#40	54.9		
#60	40.8		
#100	27.6		
#200	19.1		

\* (no specification provided)

**Material Description**

Olive Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 14.3938      D<sub>85</sub>= 11.2421      D<sub>60</sub>= 0.5986  
D<sub>50</sub>= 0.3452      D<sub>30</sub>= 0.1674      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

Date Received: 5/30/13      Date Tested: 6/6/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

<b>Source of Sample:</b> Boring E330-B-12 <b>Sample Number:</b> HMA#7514-15/S-2	<b>Depth:</b> 2.5'-3.3'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	<b>Figure</b>



**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-12

Depth: 2.5'-3.3'

Sample Number: HMA#7514-15/S-2

Material Description: Olive Brown Silty Sand W/Gravel

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 332.30  
 Tare Wt. = 123.20  
 Minus #200 from wash = 18.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
380.20	123.20	3/4"	0.00	0.00	100.0
		1/2"	1453.30	1419.50	86.8
		3/8"	1491.70	1483.60	83.7
		#4	1368.40	1356.90	79.2
		#10	1539.50	1514.30	69.4
		#20	1084.10	1067.20	62.8
		#40	964.80	944.40	54.9
		#60	914.20	878.00	40.8
		#100	877.10	843.20	27.6
		#200	1041.40	1019.60	19.1

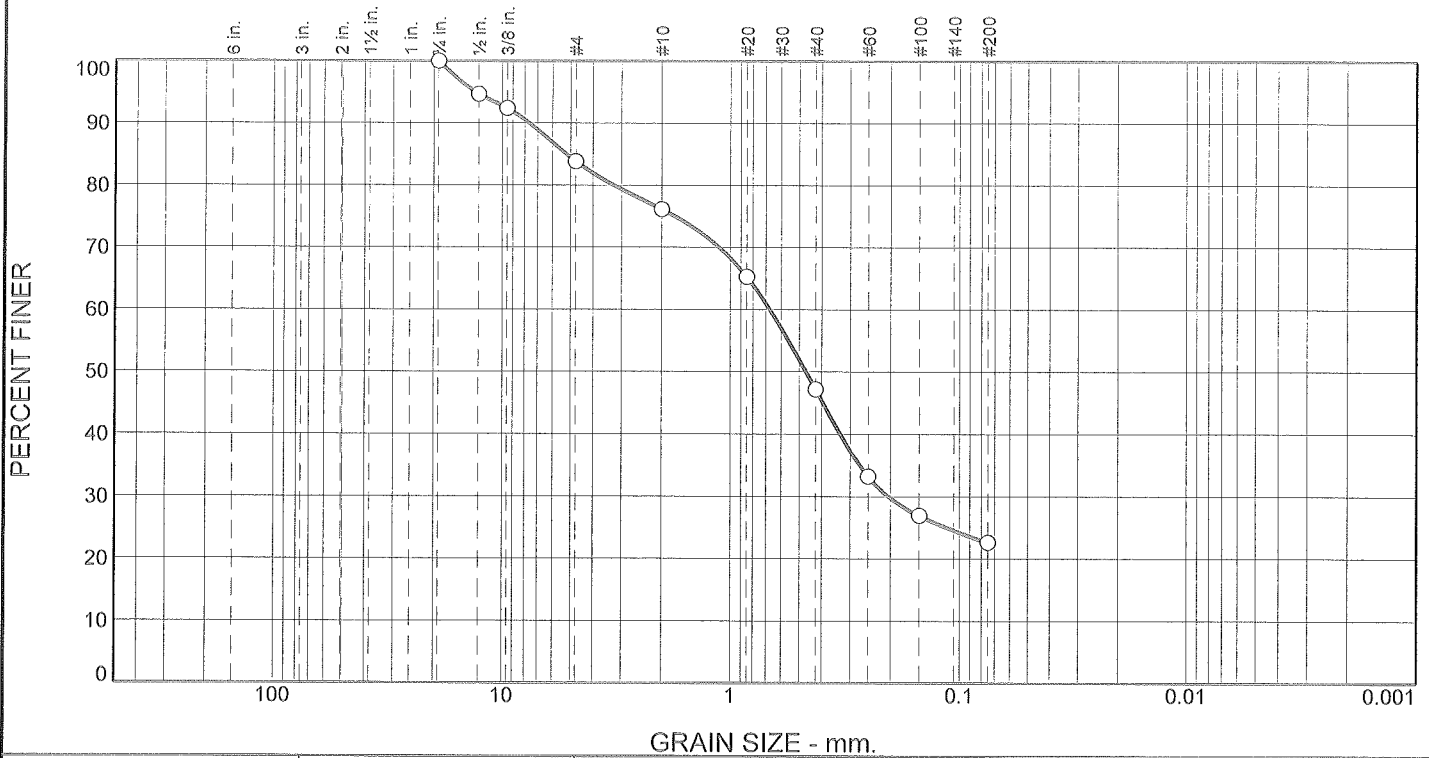
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	20.8	20.8	9.8	14.5	35.8	60.1			19.1

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
		0.0830	0.1674	0.3452	0.5986	5.2134	11.2421	14.3938	16.7009

<b>Fineness Modulus</b>
2.67

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.2	7.7	28.9	24.6	22.6	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	94.7		
3/8"	92.4		
#4	83.8		
#10	76.1		
#20	65.3		
#40	47.2		
#60	33.2		
#100	26.9		
#200	22.6		

**Material Description**

Gray Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 7.5968      D<sub>85</sub>= 5.2134      D<sub>60</sub>= 0.6735  
D<sub>50</sub>= 0.4680      D<sub>30</sub>= 0.2046      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/7/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-12  
Sample Number: HMA#7514-16/S-5

Depth: 10'-10.5'

Date Sampled:

Hayre McElroy & Associates, LLC

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-12

**Depth:** 10'-10.5'

**Sample Number:** HMA#7514-16/S-5

**Material Description:** Gray Brown Silty Sand W/Gravel

**Date Received:** 5/30/13

**USCS Classification:** SM

**AASHTO Classification:** A-1-b

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D1140

**Tested By:** JF/TP

**Test Date:** 6/7/13

**Checked By:** JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 277.00  
 Tare Wt. = 118.70  
 Minus #200 from wash = 22.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
322.20	118.70	3/4"	0.00	0.00	100.0
		1/2"	1430.50	1419.70	94.7
		3/8"	1488.40	1483.80	92.4
		#4	1374.60	1357.10	83.8
		#10	1530.30	1514.60	76.1
		#20	1089.50	1067.50	65.3
		#40	981.50	944.60	47.2
		#60	906.60	878.20	33.2
		#100	855.90	843.10	26.9
		#200	1028.40	1019.60	22.6

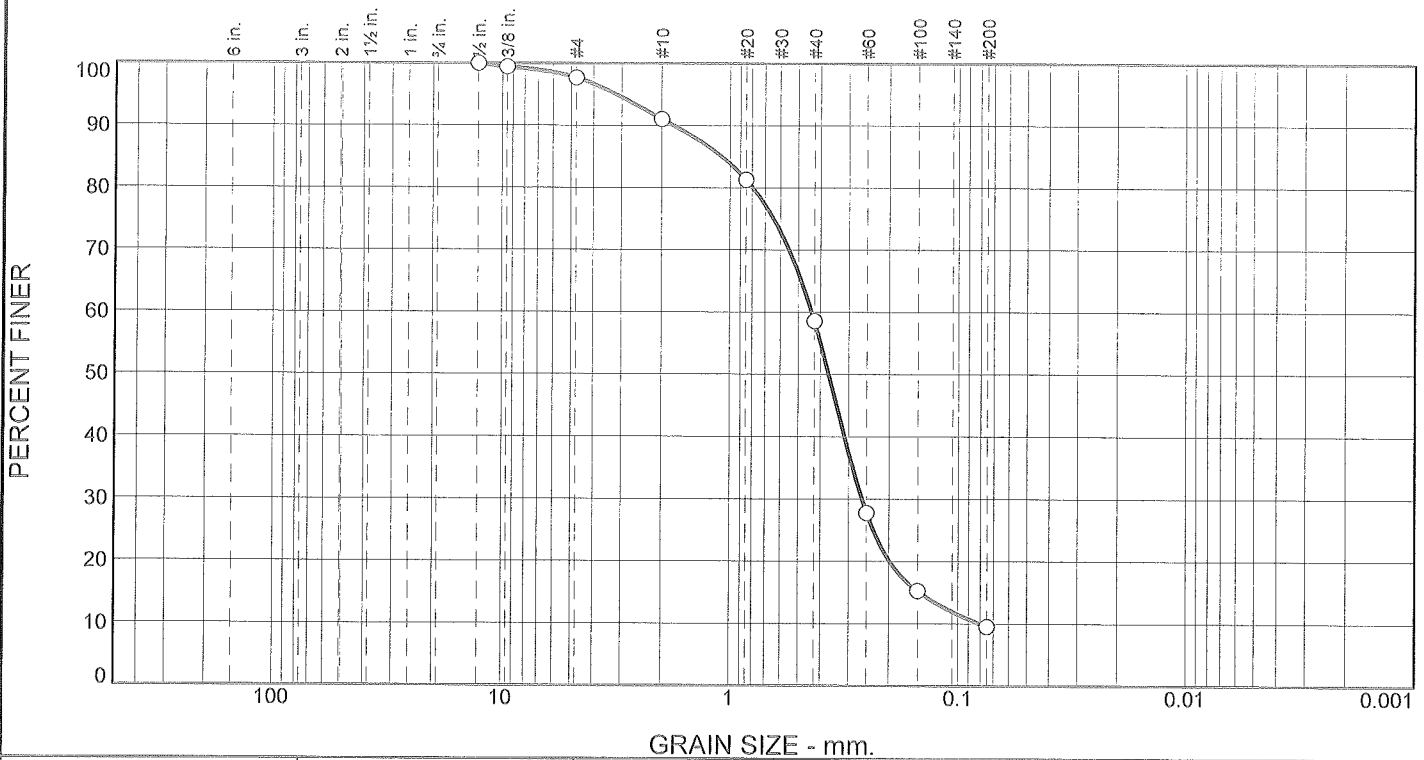
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	16.2	16.2	7.7	28.9	24.6	61.2			22.6

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
			0.2046	0.4680	0.6735	3.2497	5.2134	7.5968	13.1034

<b>Fineness Modulus</b>
2.54

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	6.6	32.5	49.1	9.5	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2"	100.0		
3/8"	99.5		
#4	97.7		
#10	91.1		
#20	81.2		
#40	58.6		
#60	27.8		
#100	15.3		
#200	9.5		

**Material Description**

Gray Brown Poorly Graded Sand W/Silt

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SP-SM    AASHTO (M 145)= A-3

**Coefficients**

D<sub>90</sub>= 1.7692      D<sub>85</sub>= 1.0848      D<sub>60</sub>= 0.4368  
D<sub>50</sub>= 0.3671      D<sub>30</sub>= 0.2619      D<sub>15</sub>= 0.1464  
D<sub>10</sub>= 0.0805      C<sub>u</sub>= 5.43            C<sub>c</sub>= 1.95

Remarks


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Date Received: 5/30/13      Date Tested: 6/7/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-12      Depth: 15'-16.4'      Date Sampled: \_\_\_\_\_  
Sample Number: HMA#7514-17/S-7

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450 <b>Figure</b>
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**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-12

Depth: 15'-16.4'

Sample Number: HMA#7514-17/S-7

Material Description: Gray Brown Poorly Graded Sand W/Silt

Date Received: 5/30/13

USCS Classification: SP-SM

AASHTO Classification: A-3

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 507.20  
 Tare Wt. = 116.10  
 Minus #200 from wash = 9.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
546.50	116.10	1/2"	0.00	0.00	100.0
		3/8"	1485.90	1483.60	99.5
		#4	1364.30	1356.80	97.7
		#10	1543.00	1514.30	91.1
		#20	1109.40	1067.20	81.2
		#40	1042.20	944.50	58.6
		#60	1010.60	878.20	27.8
		#100	896.90	843.10	15.3
		#200	1044.30	1019.60	9.5

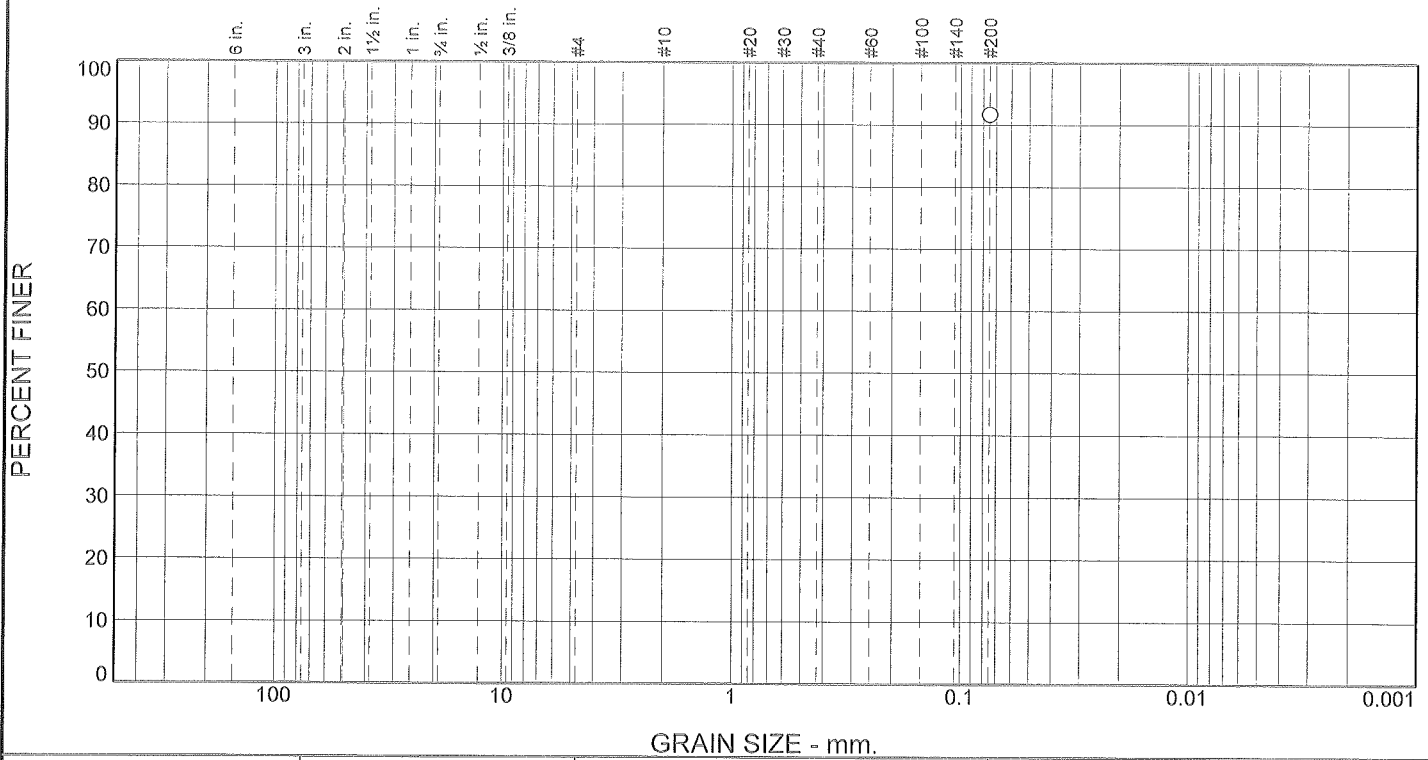
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.3	2.3	6.6	32.5	49.1	88.2			9.5

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
0.0805	0.1464	0.1984	0.2619	0.3671	0.4368	0.7955	1.0848	1.7692	3.1583

Fineness Modulus	C <sub>u</sub>	C <sub>c</sub>
1.99	5.43	1.95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						91.7	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	91.7		

\* (no specification provided)

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL = 26                      LL = 64                      PI = 38

**Classification**

USCS (D 2487) = CH or OHAASHTO (M 145) =

**Coefficients**

D<sub>90</sub> =                      D<sub>85</sub> =                      D<sub>60</sub> =  
D<sub>50</sub> =                      D<sub>30</sub> =                      D<sub>15</sub> =  
D<sub>10</sub> =                      C<sub>u</sub> =                      C<sub>c</sub> =

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/7/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

Source of Sample: Boring E330-B-12                      Depth: 45'-46.5'                      Date Sampled:

Sample Number: HMA#7514-18/S-13

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	Client: Golder Associates Project: Sound Transit East Link  Project No: 12-450
---	---

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-12

Depth: 45'-46.5'

Sample Number: HMA#7514-18/S-13

Material Description: Gray Clay

Date Received: 5/30/13      PL: 26

LL: 64

PI: 38

USCS Classification: CH or OH

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 122.40  
 Tare Wt. = 114.10  
 Minus #200 from wash = 91.7%

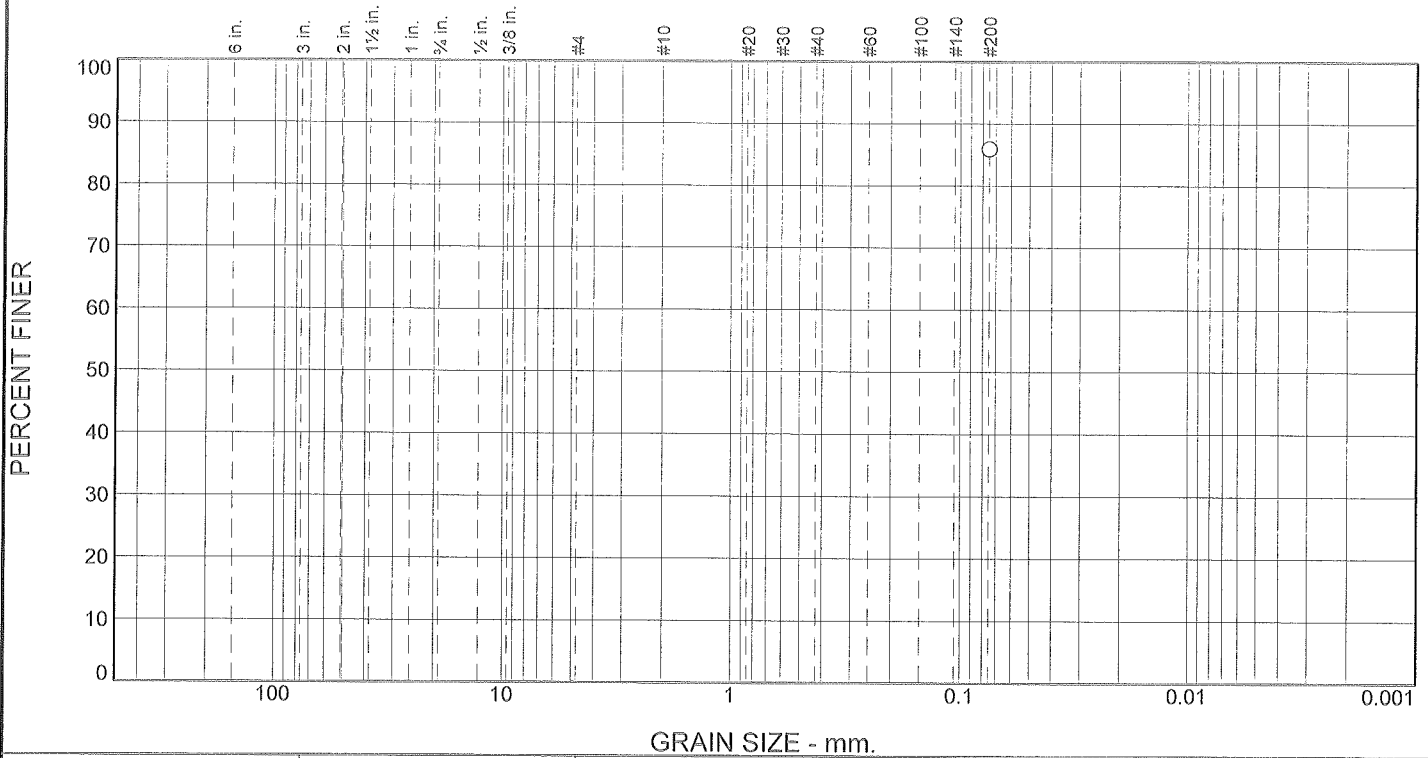
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
213.90	114.10	#200			91.7

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										91.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						85.9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	85.9		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 24                      LL= 68                      PI= 44

**Classification**

USCS (D 2487)= CH or OHAASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/7/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-12                      Depth: 65'-66.4'                      Date Sampled:

Sample Number: HMA#7514-19/S-17

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	Client: Golder Associates Project: Sound Transit East Link  Project No: 12-450
---	---



**GRAIN SIZE DISTRIBUTION TEST DATA**

6/14/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-12

**Depth:** 65'-66.4'

**Sample Number:** HMA#7514-19/S-17

**Material Description:** Gray Clay

**Date Received:** 5/30/13      **PL:** 24

**LL:** 68

**PI:** 44

**USCS Classification:** CH or OH

**#200 Wash Method:** ASTM D1140

**Tested By:** JF/TP

**Test Date:** 6/7/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 130.80  
 Tare Wt. = 114.10  
 Minus #200 from wash = 85.9%

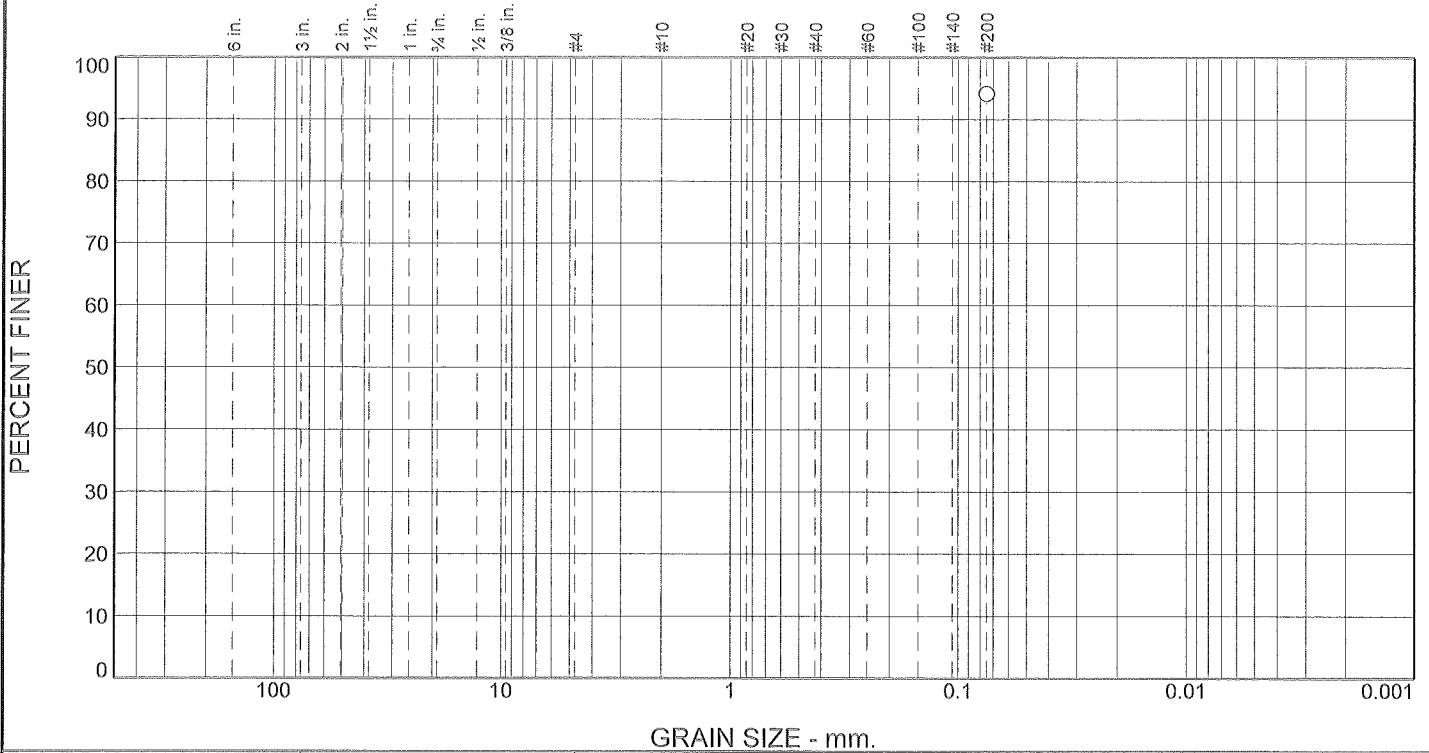
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
232.90	114.10	#200			85.9

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										85.9

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						94.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	94.1		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 24                      LL= 52                      PI= 28

**Classification**

USCS (D 2487)= CH or OHAASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/7/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-012 <b>Sample Number:</b> HMA#7514-20/S-21	<b>Depth:</b> 85'-86'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	<b>Figure</b>

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-012

Depth: 85'-86'

Sample Number: HMA#7514-20/S-21

Material Description: Gray Clay

Date Received: 5/30/13      PL: 24

LL: 52

PI: 28

USCS Classification: CH or OH

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 206.20  
 Tare Wt. = 198.20  
 Minus #200 from wash = 94.1%

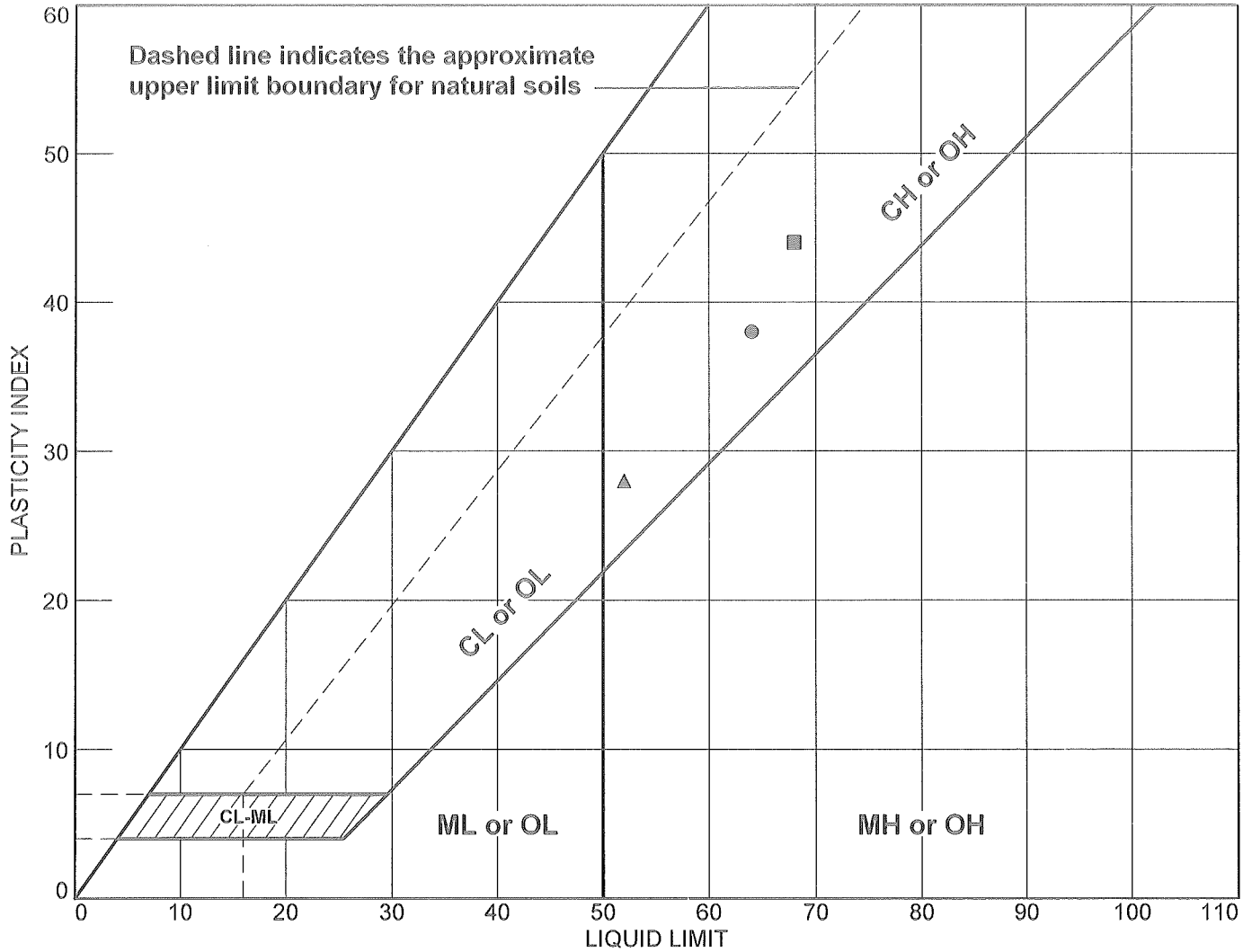
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
334.90	198.20	#200			94.1

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										94.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-012	HMA#7514-18/S-13	45'-46.5'	26.9	26	64	38	CH or OH
■	Boring E330-B-012	HMA#7514-19/S-17	65'-66.4'	25.5	24	68	44	CH or OH
▲	Boring E330-	HMA#7514-	85'-86'	23.6	24	52	28	CH or OH

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/14/2013

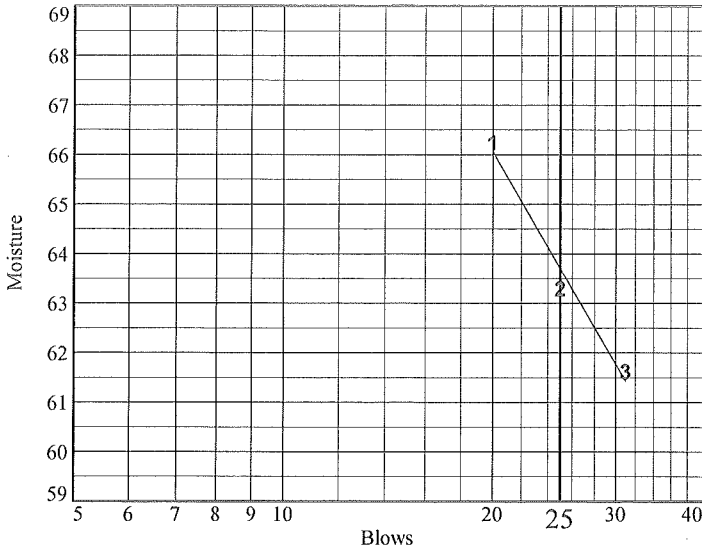
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-12  
 Depth: 45'-46.5'  
 Material Description: Gray Clay  
 USCS: CH or OH  
 Tested by: JF/TP

Sample Number: HMA#7514-18/S-13

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	27.2	31.6	27.8			
Dry+Tare	21.9	24.7	22.5			
Tare	13.9	13.8	13.9			
# Blows	20	25	31			
Moisture	66.3	63.3	61.6			



Liquid Limit= 64  
 Plastic Limit= 26  
 Plasticity Index= 38  
 Natural Moisture= 26.9  
 Liquidity Index= 0.0

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	22.2	22.1	21	
Dry+Tare	20.1	20	18.8	
Tare	11.4	11.4	11.4	
Moisture	24.1	24.4	29.7	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
240.7	213.9	114.1	26.9

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/14/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-12

Depth: 65'-66.4'

Sample Number: HMA#7514-19/S-17

Material Description: Gray Clay

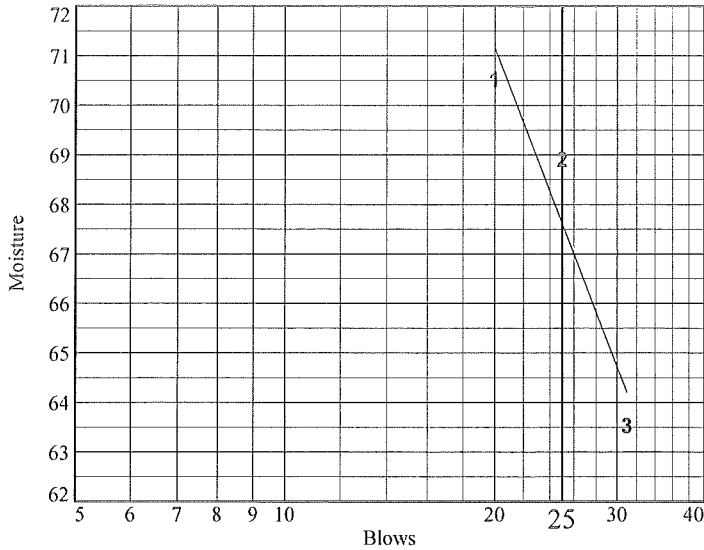
USCS: CH or OH

Tested by: JF/TP

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	30.0	29.24	26.62			
Dry+Tare	23.3	22.9	21.6			
Tare	13.8	13.7	13.7			
# Blows	20	25	31			
Moisture	70.5	68.9	63.5			



Liquid Limit= 68  
 Plastic Limit= 24  
 Plasticity Index= 44  
 Natural Moisture= 25.5  
 Liquidity Index= 0.0

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	22.0	20.0	20.2	
Dry+Tare	19.9	18.3	18.4	
Tare	11.3	11.2	11.2	
Moisture	24.4	23.9	25.0	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
263.2	232.9	114.1	25.5

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/17/2013

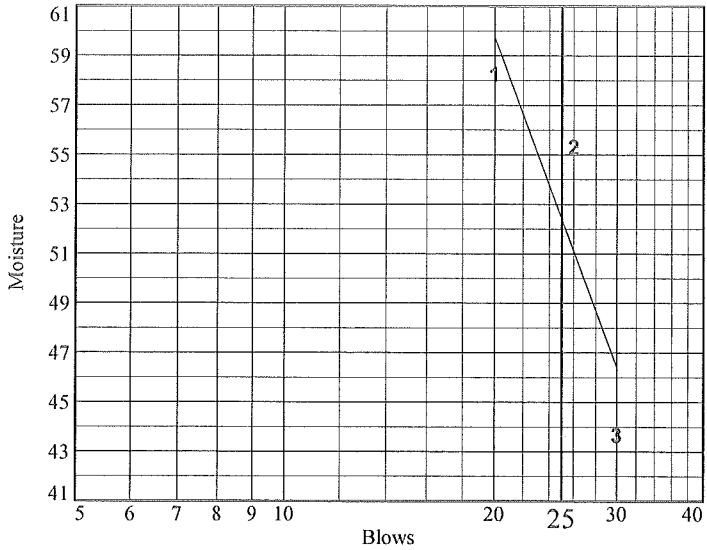
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-012  
 Depth: 85'-86'  
 Material Description: Gray Clay  
 USCS: CH or OH  
 Tested by: JF/TP

Sample Number: HMA#7514-20/S-21

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	33.7	28.2	28.3			
Dry+Tare	26.3	23.0	23.8			
Tare	13.6	13.6	13.5			
# Blows	20	26	30			
Moisture	58.3	55.3	43.7			



Liquid Limit= 52  
 Plastic Limit= 24  
 Plasticity Index= 28  
 Natural Moisture= 23.6  
 Liquidity Index= 0.0

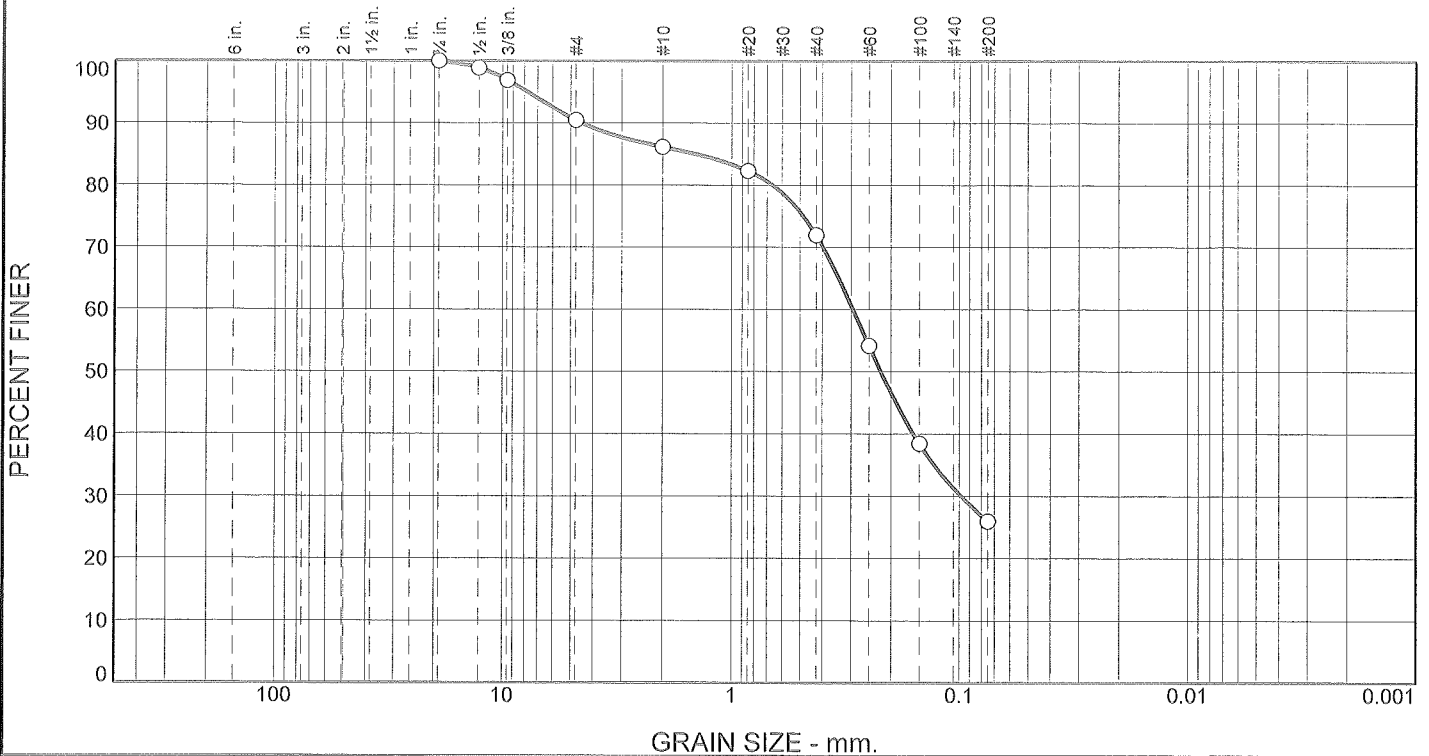
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	21.2	23.6	23.5	
Dry+Tare	19.2	21.2	21.1	
Tare	11.3	11.1	11.1	
Moisture	25.3	23.8	24.0	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
367.1	334.9	198.2	23.6

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.6	4.2	14.2	46.0	26.0	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	98.9		
3/8"	96.9		
#4	90.4		
#10	86.2		
#20	82.3		
#40	72.0		
#60	54.2		
#100	38.4		
#200	26.0		

**Material Description**

Gray Brown Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 4.4829      D<sub>85</sub>= 1.4237      D<sub>60</sub>= 0.2938  
D<sub>50</sub>= 0.2214      D<sub>30</sub>= 0.0979      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/7/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-013  
Sample Number: HMA#7514-21/S-2

Depth: 2.5'-3.3'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-013

Depth: 2.5'-3.3'

Sample Number: HMA#7514-21/S-2

Material Description: Gray Brown Silty Sand

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 482.00  
 Tare Wt. = 193.00  
 Minus #200 from wash = 25.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
581.20	193.00	3/4"	0.00	0.00	100.0
		1/2"	1423.80	1419.50	98.9
		3/8"	1491.30	1483.60	96.9
		#4	1382.00	1356.90	90.4
		#10	1530.90	1514.30	86.2
		#20	1082.20	1067.10	82.3
		#40	984.50	944.50	72.0
		#60	947.20	878.20	54.2
		#100	904.30	843.10	38.4
		#200	1067.80	1019.50	26.0

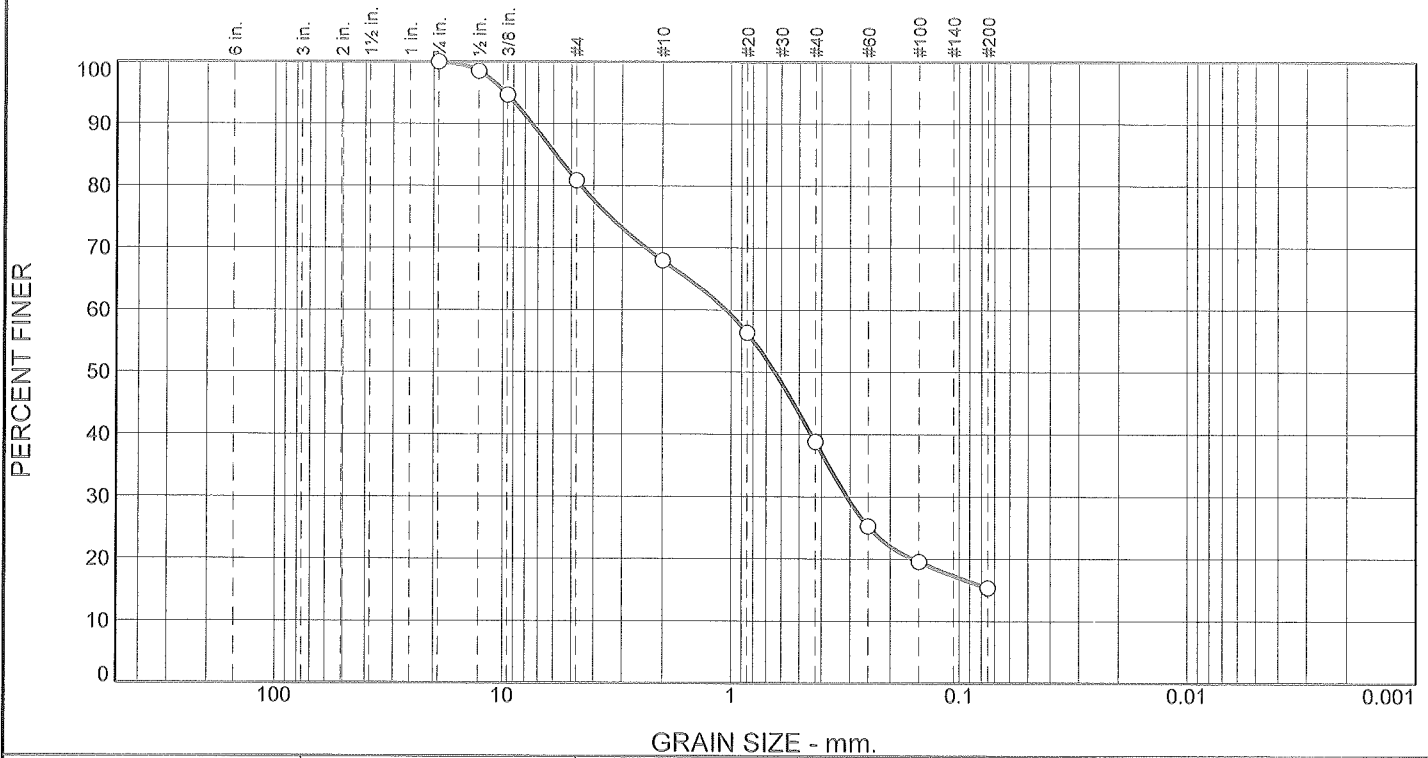
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	9.6	9.6	4.2	14.2	46.0	64.4			26.0

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
			0.0979	0.2214	0.2938	0.6617	1.4237	4.4829	7.7370

<b>Fineness Modulus</b>
1.64

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.2	12.8	29.2	23.5	15.3	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	98.5		
3/8"	94.7		
#4	80.8		
#10	68.0		
#20	56.3		
#40	38.8		
#60	25.3		
#100	19.5		
#200	15.3		

**Material Description**

Gray Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 7.4291      D<sub>85</sub>= 5.8380      D<sub>60</sub>= 1.0502  
D<sub>50</sub>= 0.6410      D<sub>30</sub>= 0.3093      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/7/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-013  
Sample Number: HMA#7514-22/S-5

Depth: 10'-11'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-013

Depth: 10'-11'

Sample Number: HMA#7514-22/S-5

Material Description: Gray Brown Silty Sand W/Gravel

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-1-b

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 399.00  
 Tare Wt. = 196.10  
 Minus #200 from wash = 15.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
435.20	196.10	3/4"	0.00	0.00	100.0
		1/2"	1423.10	1419.60	98.5
		3/8"	1492.90	1483.70	94.7
		#4	1390.20	1357.10	80.8
		#10	1545.30	1514.50	68.0
		#20	1095.10	1067.30	56.3
		#40	986.40	944.50	38.8
		#60	910.50	878.10	25.3
		#100	856.80	843.10	19.5
		#200	1029.70	1019.60	15.3

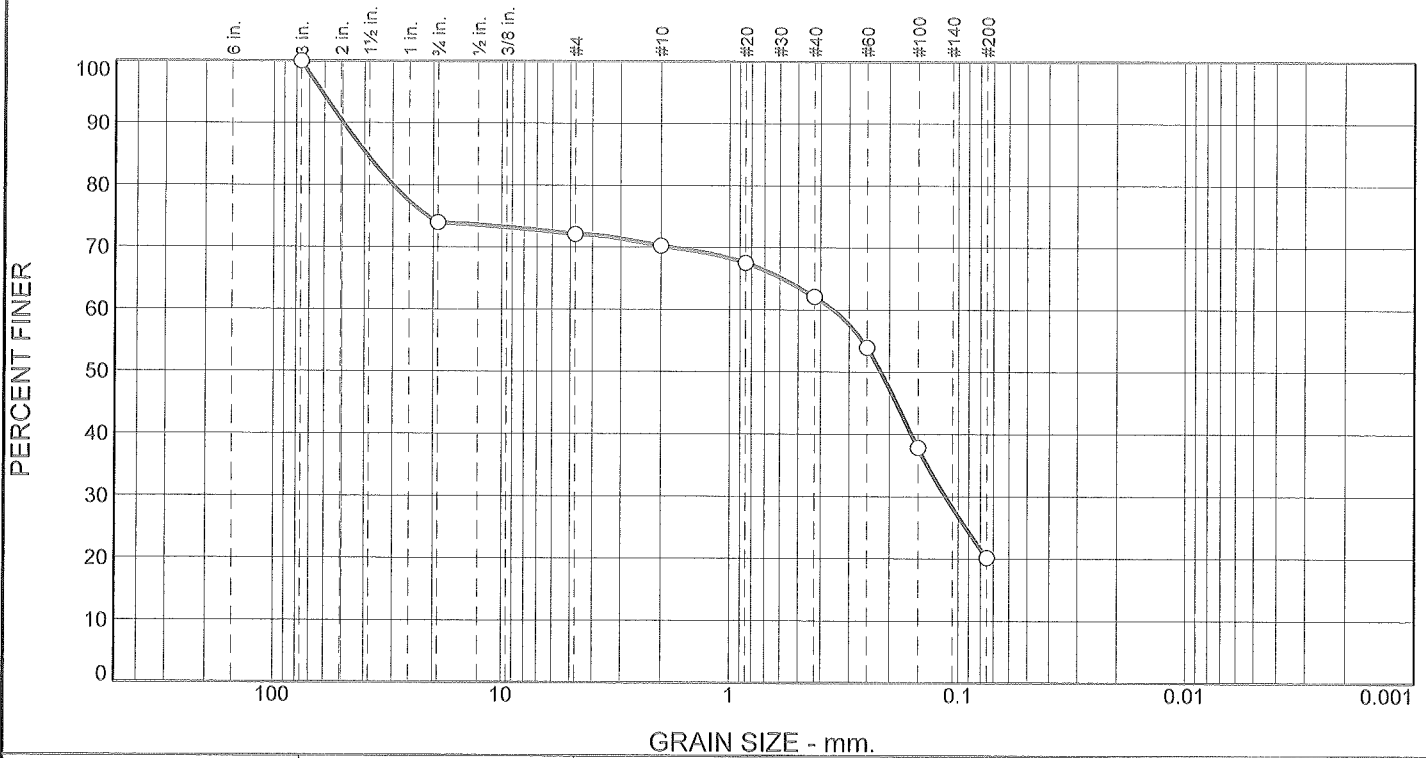
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	19.2	19.2	12.8	29.2	23.5	65.5			15.3

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
		0.1601	0.3093	0.6410	1.0502	4.5425	5.8380	7.4291	9.7030

<b>Fineness Modulus</b>
2.96

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	26.0	1.9	1.8	8.2	41.9	20.2	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
3/4"	74.0		
#4	72.1		
#10	70.3		
#20	67.5		
#40	62.1		
#60	53.9		
#100	37.8		
#200	20.2		

**Material Description**

Gray Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 49.4600      D<sub>85</sub>= 39.1113      D<sub>60</sub>= 0.3515  
D<sub>50</sub>= 0.2174      D<sub>30</sub>= 0.1138      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/7/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-013  
Sample Number: HMA#7514-23/S-9

Depth: 25'-25.9'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-013

Depth: 25'-25.9'

Sample Number: HMA#7514-23/S-9

Material Description: Gray Silty Sand W/Gravel

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 341.10  
 Tare Wt. = 164.90  
 Minus #200 from wash = 19.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
383.00	164.90	3"	0.00	0.00	100.0
		3/4"	1561.70	1504.90	74.0
		#4	1360.90	1356.90	72.1
		#10	1518.40	1514.40	70.3
		#20	1073.20	1067.20	67.5
		#40	956.40	944.50	62.1
		#60	896.00	878.20	53.9
		#100	878.30	843.20	37.8
		#200	1058.10	1019.60	20.2

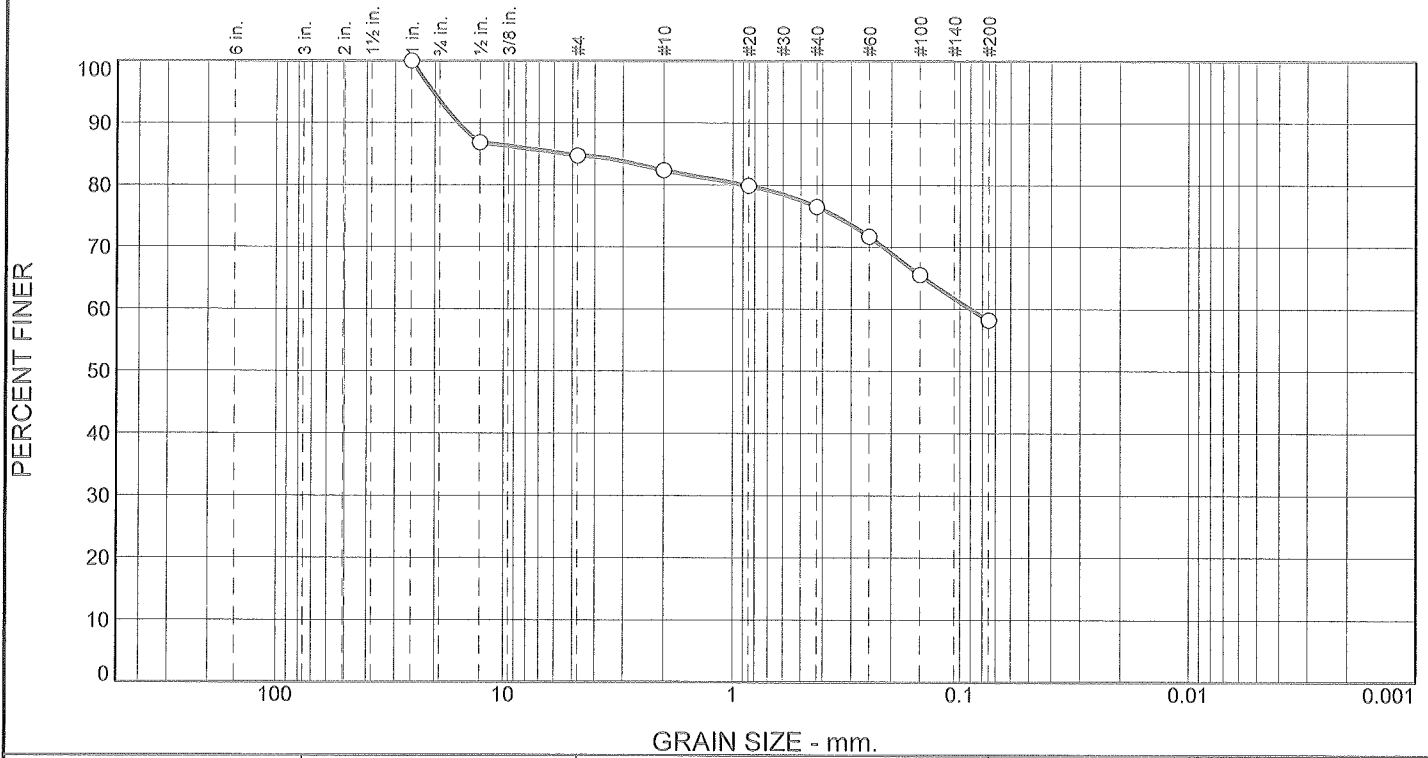
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	26.0	1.9	27.9	1.8	8.2	41.9	51.9			20.2

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1138	0.2174	0.3515	29.9530	39.1113	49.4600	61.5917

<b>Fineness Modulus</b>
2.96

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	8.9	2.3	5.9	18.3	58.2	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
1/2"	86.8		
#4	84.7		
#10	82.4		
#20	79.9		
#40	76.5		
#60	71.7		
#100	65.5		
#200	58.2		

\* (no specification provided)

**Material Description**

Gray Sandy Silt W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= ML      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 15.8043      D<sub>85</sub>= 5.3683      D<sub>60</sub>= 0.0896  
D<sub>50</sub>= \_\_\_\_\_      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/7/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-013  
Sample Number: HMA#7514-24/S-12

Depth: 40'-41.3'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-013

Depth: 40'-41.3'

Sample Number: HMA#7514-24/S-12

Material Description: Gray Sandy Silt W/Gravel

Date Received: 5/30/13

USCS Classification: ML

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 380.80

Tare Wt. = 190.20

Minus #200 from wash = 57.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
642.00	190.20	1"	0.00	0.00	100.0
		1/2"	1479.20	1419.60	86.8
		#4	1366.50	1357.00	84.7
		#10	1524.90	1514.30	82.4
		#20	1078.50	1067.20	79.9
		#40	959.60	944.40	76.5
		#60	899.80	878.10	71.7
		#100	871.00	843.20	65.5
		#200	1052.60	1019.60	58.2

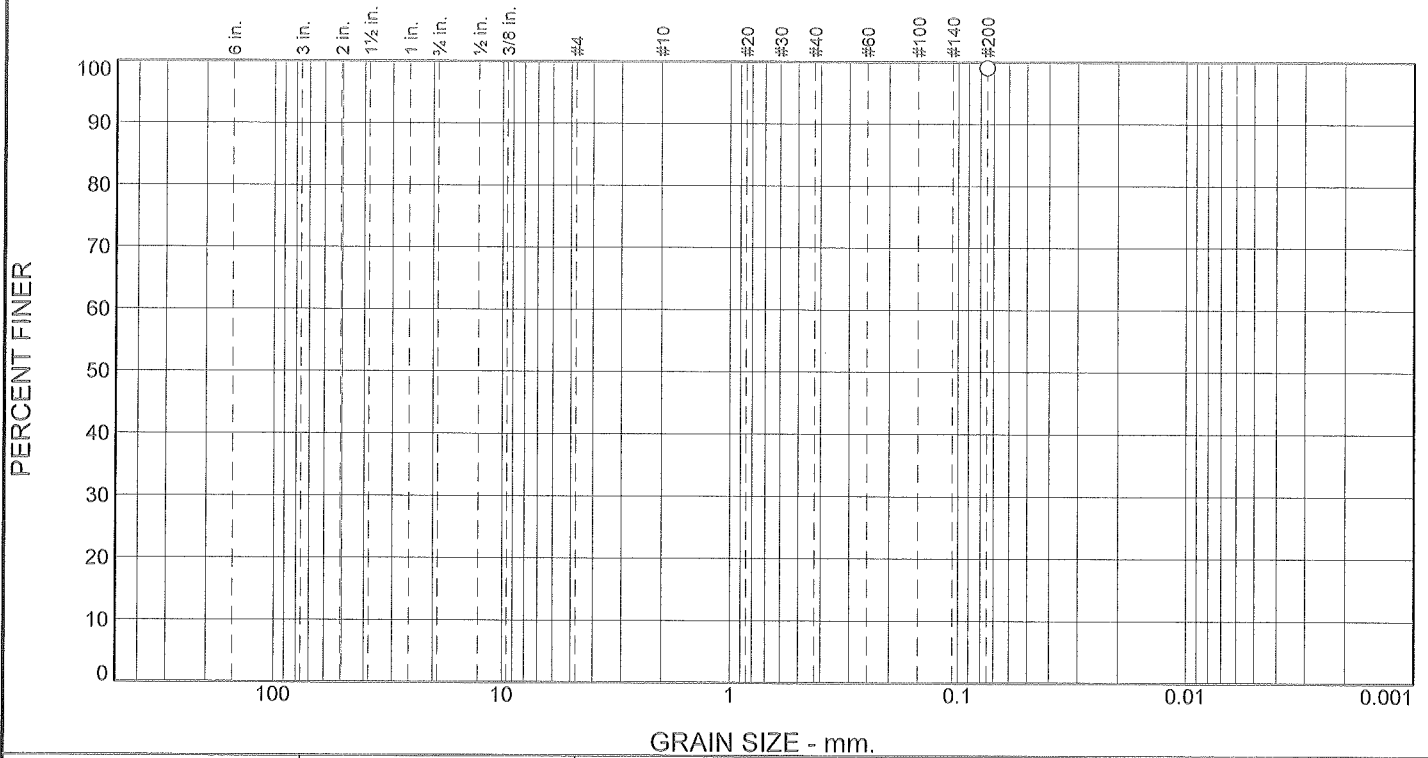
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	6.4	8.9	15.3	2.3	5.9	18.3	26.5			58.2

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
					0.0896	0.8879	5.3683	15.8043	20.3353

<b>Fineness Modulus</b>
1.54

# Particle Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
							99.1

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	99.1		

\* (no specification provided)

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 23                      LL= 38                      PI= 15

**Classification**

USCS (D 2487)= CL or OL    AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/7/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-013  
Sample Number: HMA#7514-25/S-18

Depth: 70'-71'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
  
Project No: 12-450

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-013

Depth: 70'-71'

Sample Number: HMA#7514-25/S-18

Material Description: Gray Clay

Date Received: 5/30/13      PL: 23

LL: 38

PI: 15

USCS Classification: CL or OL

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/7/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 163.10  
 Tare Wt. = 162.00  
 Minus #200 from wash = 99.1%

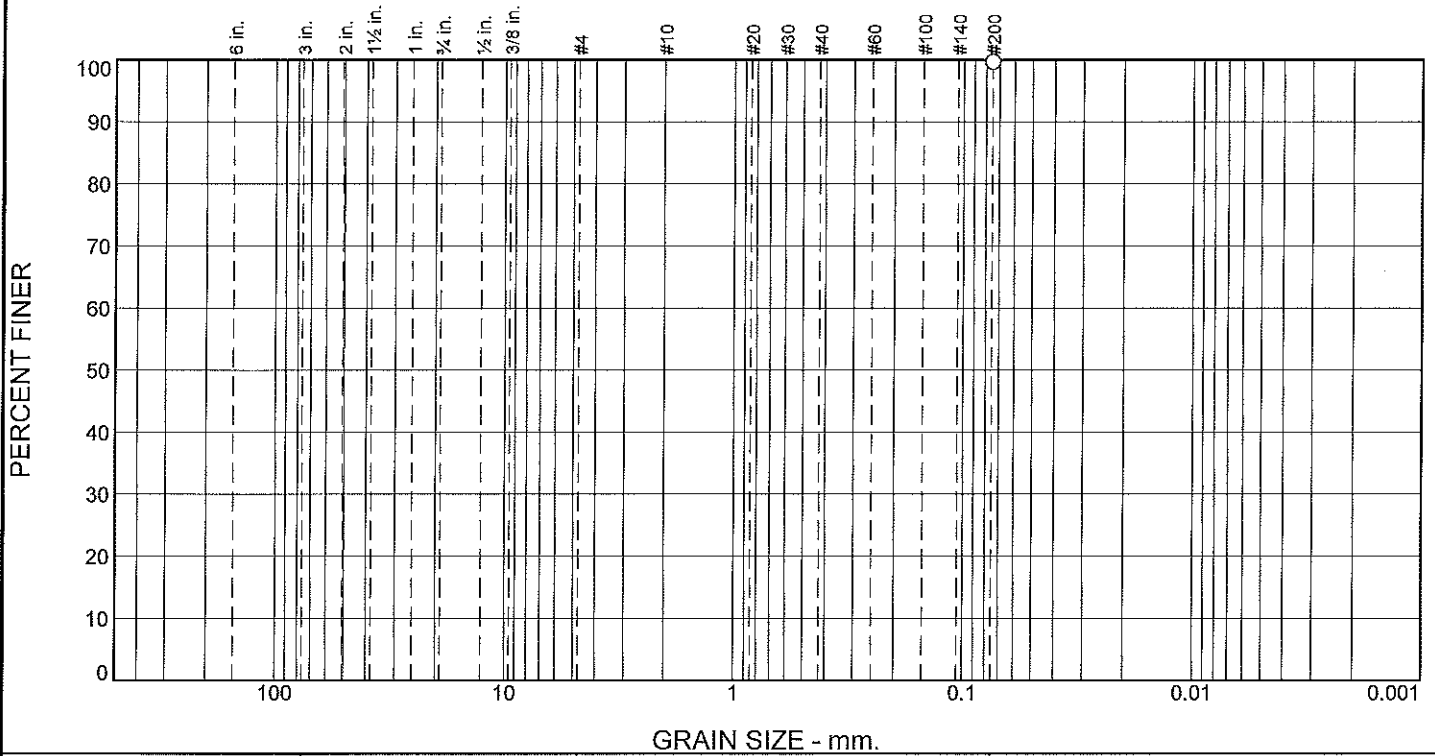
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
283.20	162.00	#200			99.1

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										99.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						99.7	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	99.7		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
 D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
 D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/7/13  
 Tested By: JF/TP  
 Checked By: JAM  
 Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-013  
 Sample Number: HMA#7514-26/S-21

Depth: 85'-85.4'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

11/13/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-013  
 Depth: 85'-85.4'  
 Material Description: Gray Silt  
 Date Received: 5/30/13  
 USCS Classification: ML  
 #200 Wash Method: ASTM D1140  
 Tested By: JF/TP  
 Checked By: JAM

Sample Number: HMA#7514-26/S-21

AASHTO Classification: A-4(0)

Test Date: 6/7/13

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 158.00  
 Tare Wt. = 157.50  
 Minus #200 from wash = 99.7%

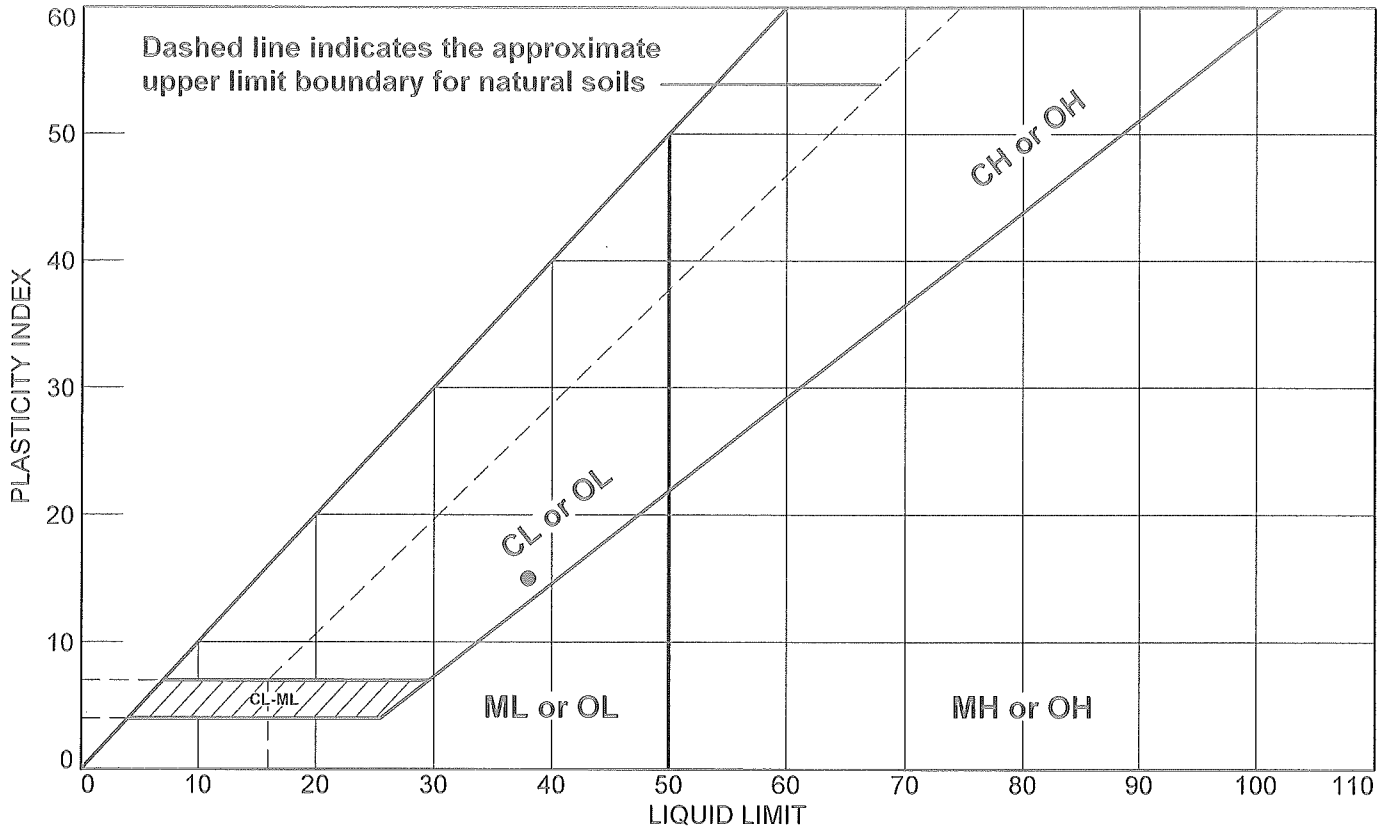
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
325.60	157.50	#200			99.7

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										99.7

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
● Boring E330-B-013	HMA#7514-25/S-18	70'-71'	28.3	23	38	15	CL or OL
■ Boring E330-B-013	HMA#7514-26/S-21	85'-85.4'	28.3	NP	NP	NP	ML

**Hayre McElroy & Associates, LLC**

Redmond, WA

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/20/2013

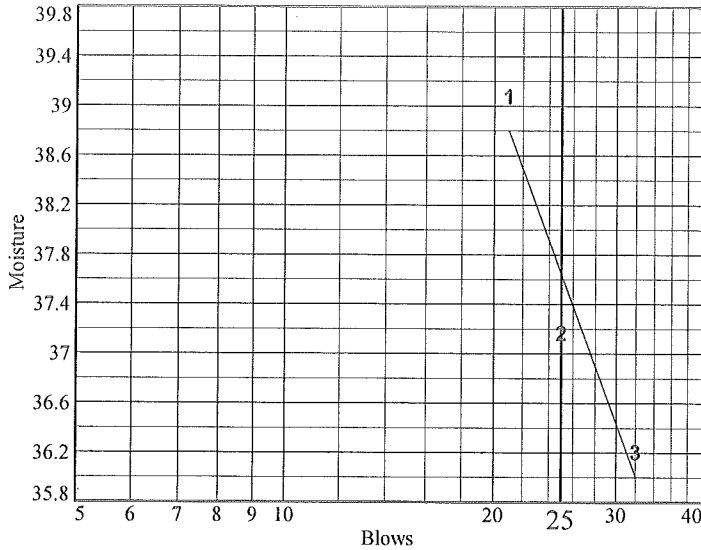
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-013  
 Depth: 70'-71'  
 Material Description: Gray Clay  
 USCS: CL or OL  
 Tested by: JF/TP

Sample Number: HMA#7514-25/S-18

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	25.7	29.1	29.4			
Dry+Tare	22.3	24.9	25.2			
Tare	13.6	13.6	13.6			
# Blows	21	25	32			
Moisture	39.1	37.2	36.2			



Liquid Limit= 38  
 Plastic Limit= 23  
 Plasticity Index= 15  
 Natural Moisture= 28.3  
 Liquidity Index= 0.4

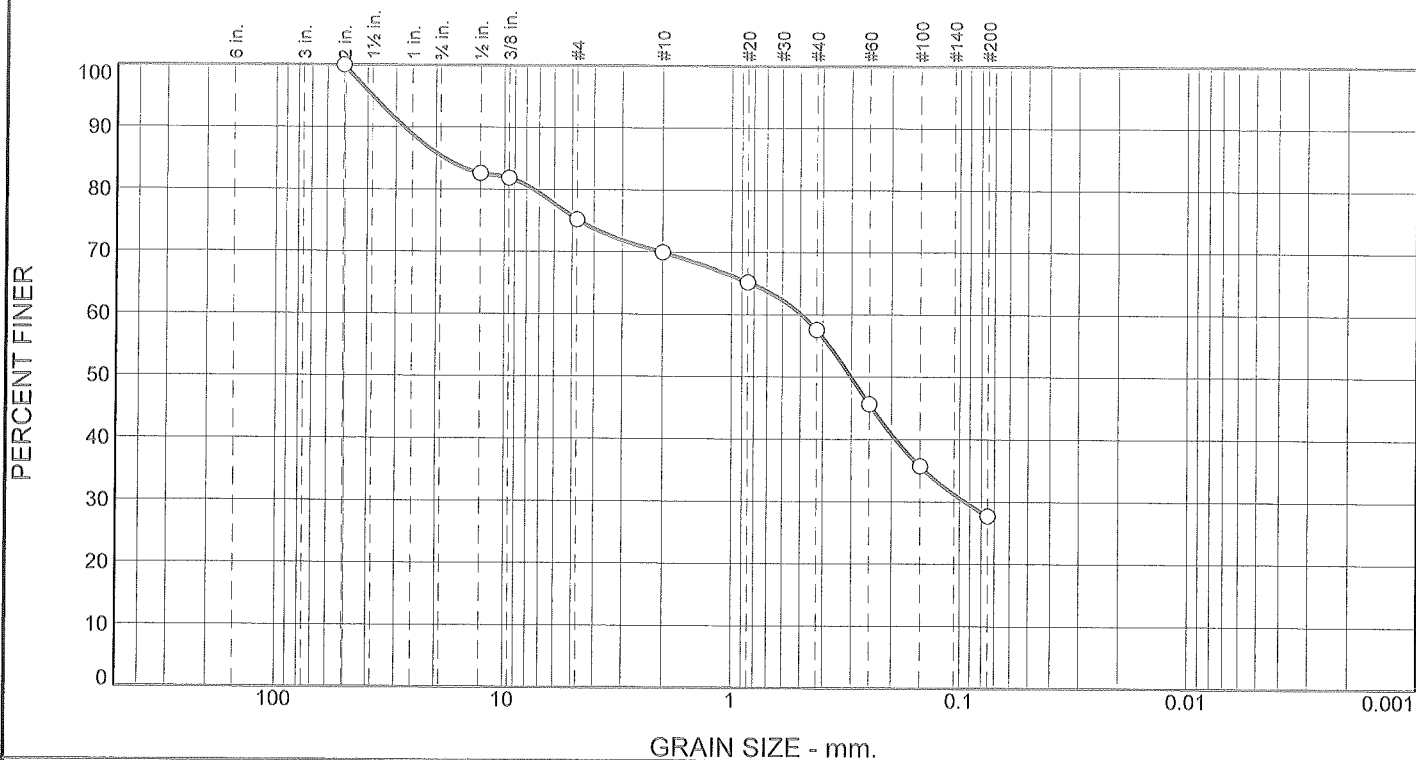
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	22.5	21.1	22	
Dry+Tare	20.4	19.2	20	
Tare	11.1	11.1	11.2	
Moisture	22.6	23.5	22.7	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
317.5	283.2	162	28.3

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.6	10.2	5.2	12.4	29.9	27.7	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2"	100.0		
1 1/2"	82.6		
3/8"	81.9		
#4	75.2		
#10	70.0		
#20	65.2		
#40	57.6		
#60	45.6		
#100	35.7		
#200	27.7		

**Material Description**

Dark Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 27.5513      D<sub>85</sub>= 18.3224      D<sub>60</sub>= 0.4944  
D<sub>50</sub>= 0.3007      D<sub>30</sub>= 0.0947      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/10/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-014      Depth: 5'-6.5'      Date Sampled: \_\_\_\_\_  
Sample Number: HMA#7514-27/S-3

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450 <b>Figure</b>
---	--

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-014

Depth: 5'-6.5'

Sample Number: HMA#7514-27/S-3

Material Description: Dark Brown Silty Sand W/Gravel

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 341.40  
 Tare Wt. = 230.90  
 Minus #200 from wash = 26.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
381.00	230.90	2"	0.00	0.00	100.0
		1/2"	1445.70	1419.60	82.6
		3/8"	1484.90	1483.80	81.9
		#4	1367.10	1357.10	75.2
		#10	1522.40	1514.50	70.0
		#20	1074.50	1067.30	65.2
		#40	956.30	944.90	57.6
		#60	896.30	878.40	45.6
		#100	858.40	843.50	35.7
		#200	1031.90	1019.90	27.7

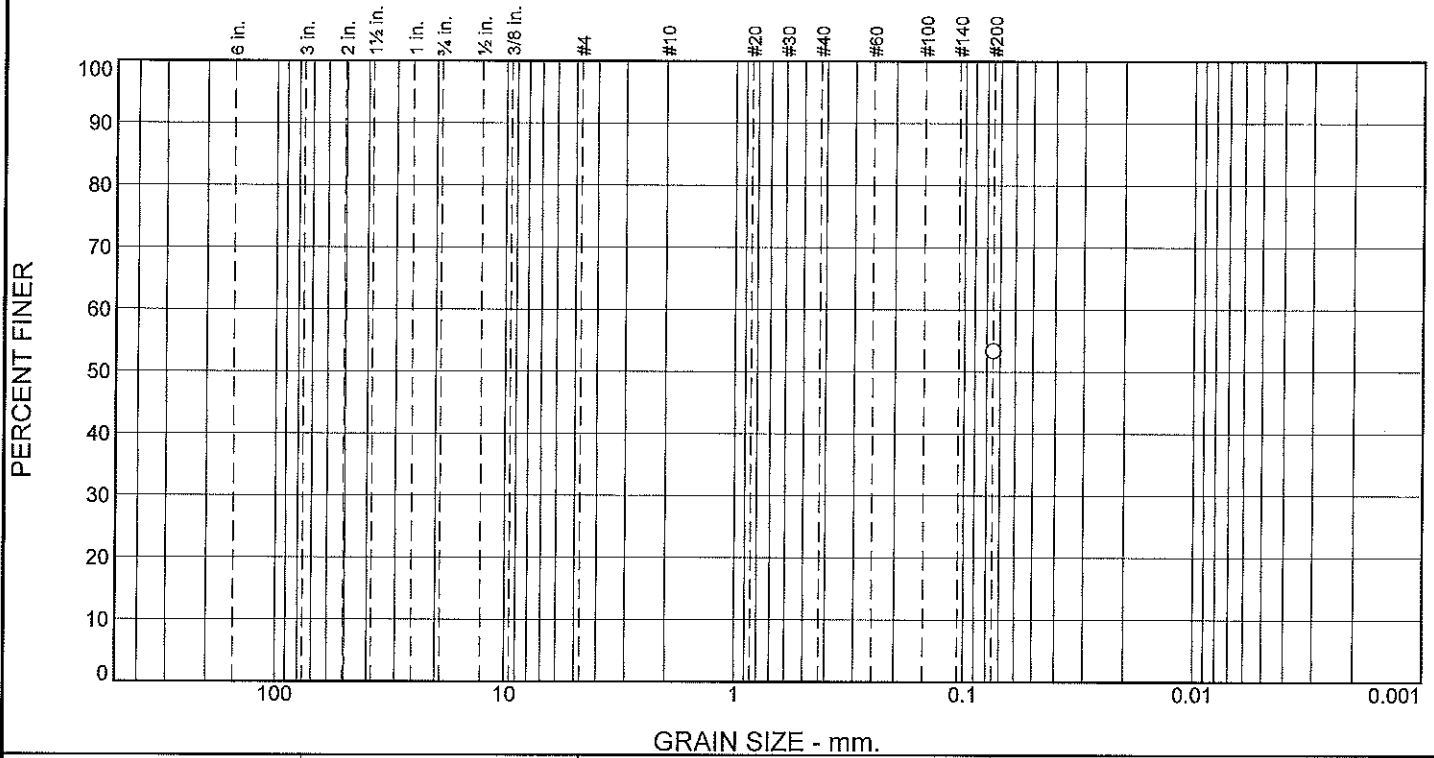
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	14.6	10.2	24.8	5.2	12.4	29.9	47.5			27.7

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.0947	0.3007	0.4944	7.3951	18.3224	27.5513	37.8898

<b>Fineness Modulus</b>
2.77

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						53.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	53.4		

**Material Description**

Olive Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL=                                  LL=                                  PI=

**Classification**

USCS (D 2487)= ML                                  AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                                  D<sub>85</sub>=                                  D<sub>60</sub>=  
D<sub>50</sub>=                                  D<sub>30</sub>=                                  D<sub>15</sub>=  
D<sub>10</sub>=                                  C<sub>u</sub>=                                  C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                                  Date Tested: 6/10/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-014  
Sample Number: HMA#7514-28/S-4

Depth: 7.5'-9'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	Client: Golder Associates Project: Sound Transit East Link  Project No: 12-450
---	---

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

11/13/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-014  
 Depth: 7.5'-9'

Sample Number: HMA#7514-28/S-4

Material Description: Olive Gray Silt  
 Date Received: 5/30/13  
 USCS Classification: ML

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 280.40  
 Tare Wt. = 194.20  
 Minus #200 from wash = 53.4%

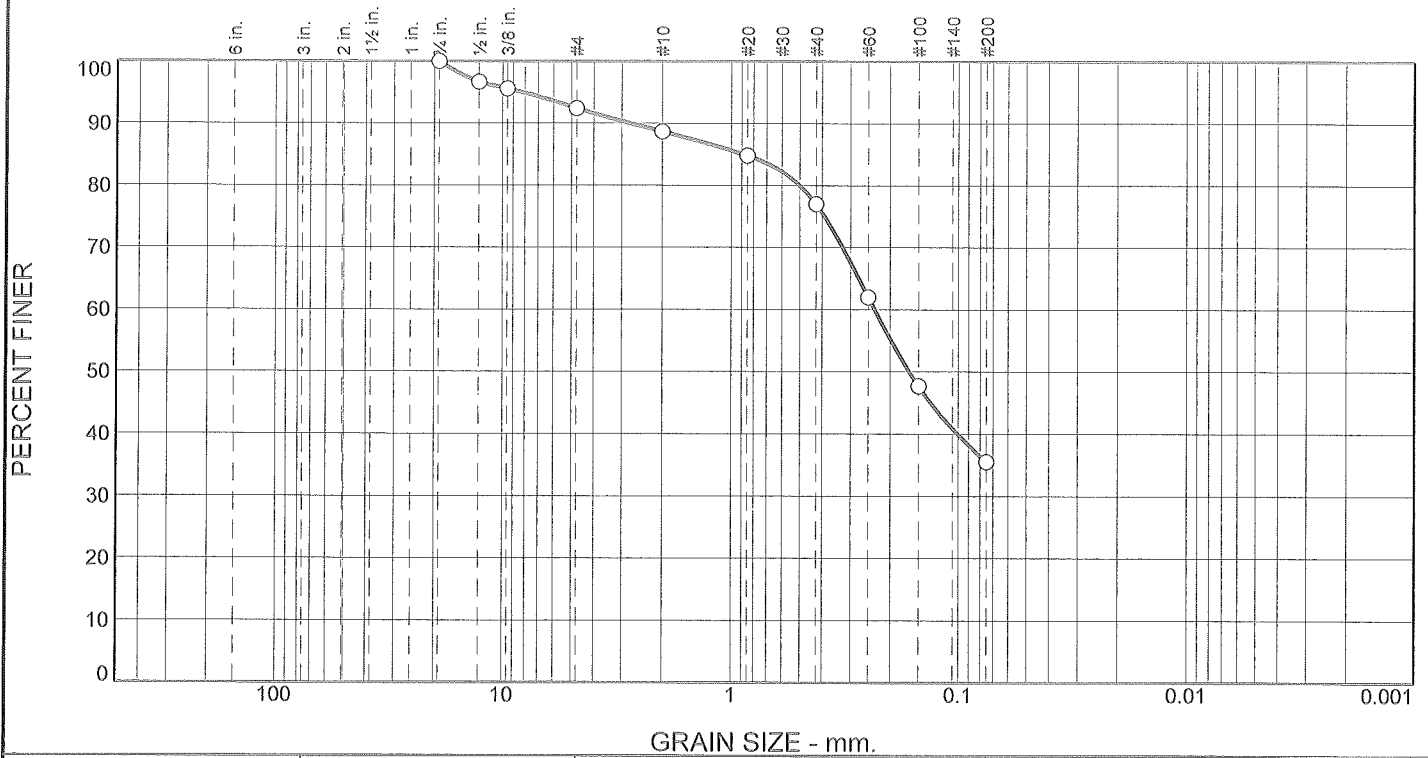
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
379.20	194.20	#200			53.4

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										53.4

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.6	3.7	11.7	41.5	35.5	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	96.7		
3/8"	95.6		
#4	92.4		
#10	88.7		
#20	84.8		
#40	77.0		
#60	62.0		
#100	47.7		
#200	35.5		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 2.7591      D<sub>85</sub>= 0.8819      D<sub>60</sub>= 0.2341  
D<sub>50</sub>= 0.1646      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


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Date Received: 5/30/13      Date Tested: 6/10/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-014  
Sample Number: HMA#7514-29/S-8

Depth: 20'-20.4'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-014

Depth: 20'-20.4'

Sample Number: HMA#7514-29/S-8

Material Description: Gray Silty Sand

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 363.90  
 Tare Wt. = 234.70  
 Minus #200 from wash = 34.7%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
432.70	234.70	3/4"	0.00	0.00	100.0
		1/2"	1426.20	1419.60	96.7
		3/8"	1485.80	1483.70	95.6
		#4	1363.20	1356.90	92.4
		#10	1521.80	1514.40	88.7
		#20	1074.80	1067.10	84.8
		#40	960.00	944.60	77.0
		#60	907.80	878.10	62.0
		#100	871.40	843.10	47.7
		#200	1043.80	1019.60	35.5

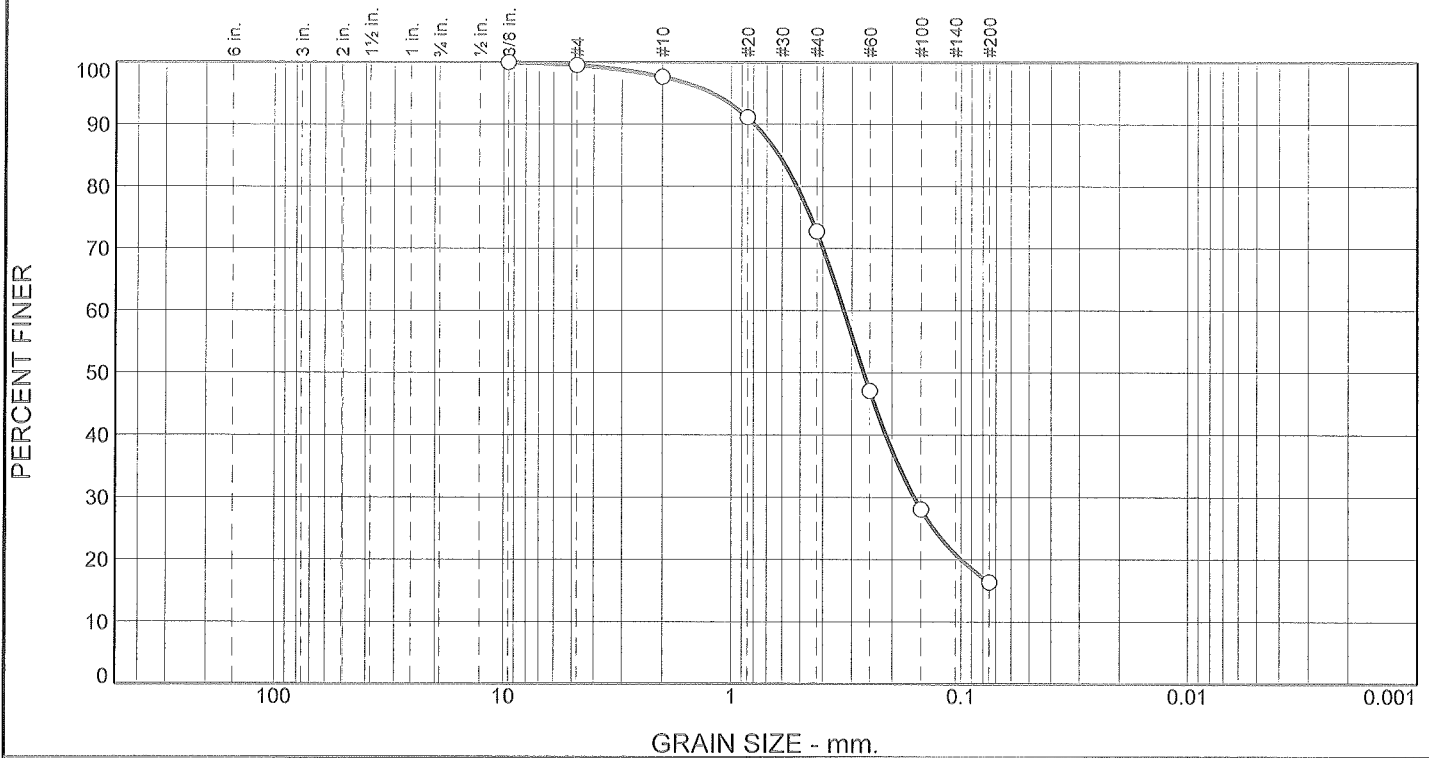
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	7.6	7.6	3.7	11.7	41.5	56.9			35.5

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1646	0.2341	0.5009	0.8819	2.7591	8.1095

<b>Fineness Modulus</b>
1.38

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.9	24.9	56.4	16.3	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.5		
#10	97.6		
#20	91.1		
#40	72.7		
#60	47.1		
#100	28.1		
#200	16.3		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.7910      D<sub>85</sub>= 0.6186      D<sub>60</sub>= 0.3242  
D<sub>50</sub>= 0.2656      D<sub>30</sub>= 0.1604      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/10/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-014  
Sample Number: HMA#7514-30/S-11

Depth: 35'-35.8'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-014

Depth: 35'-35.8'

Sample Number: HMA#7514-30/S-11

Material Description: Gray Silty Sand

Date Received: 5/30/13

AASHTO Classification: A-2-4(0)

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 355.70  
 Tare Wt. = 115.30  
 Minus #200 from wash = 15.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
399.30	115.30	3/8"	0.00	0.00	100.0
		#4	1358.30	1357.00	99.5
		#10	1519.70	1514.30	97.6
		#20	1085.70	1067.20	91.1
		#40	996.70	944.50	72.7
		#60	950.90	878.10	47.1
		#100	897.00	843.00	28.1
		#200	1053.10	1019.70	16.3

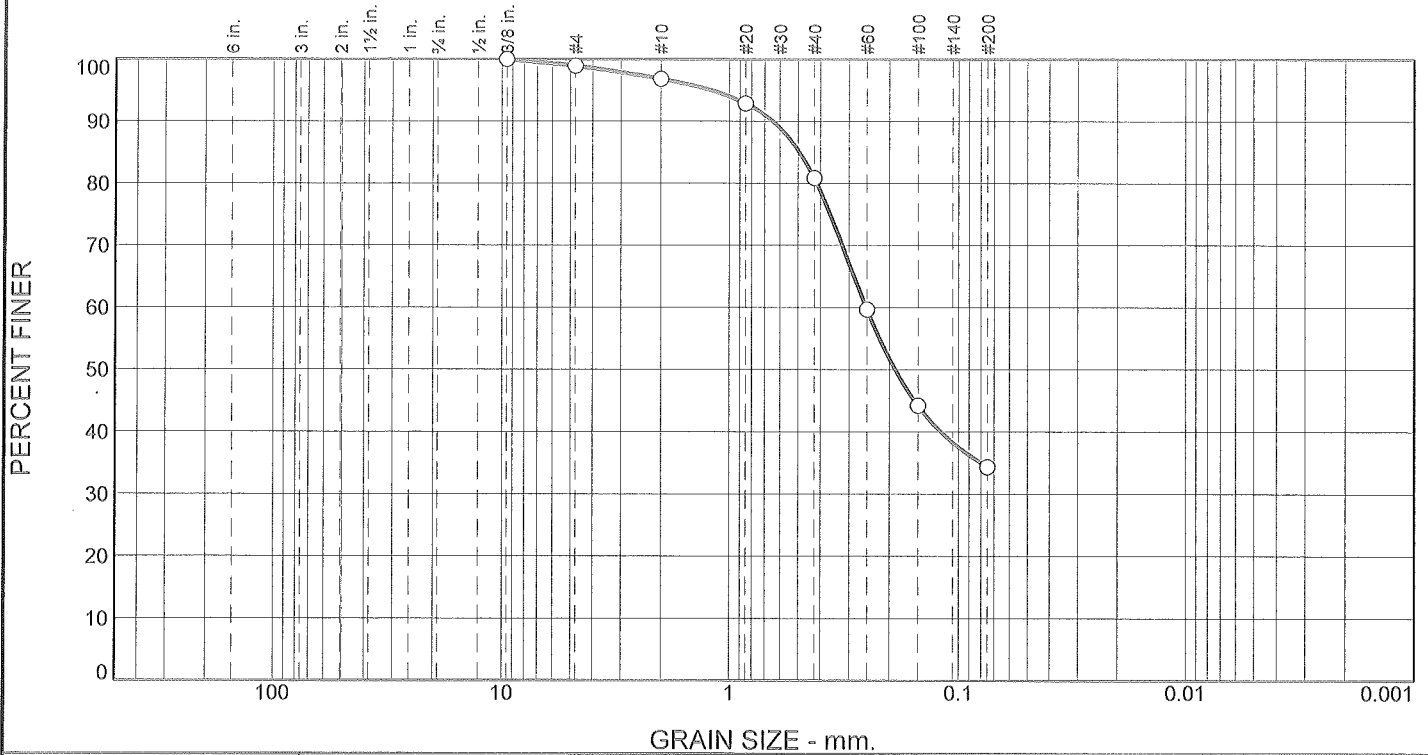
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.5	0.5	1.9	24.9	56.4	83.2			16.3

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
		0.0998	0.1604	0.2656	0.3242	0.5178	0.6186	0.7910	1.2024

<b>Fineness Modulus</b>
1.39

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	2.1	16.0	46.4	34.4	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	98.9		
#10	96.8		
#20	92.9		
#40	80.8		
#60	59.7		
#100	44.2		
#200	34.4		

\* (no specification provided)

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 0.6433      D<sub>85</sub>= 0.4921      D<sub>60</sub>= 0.2522  
D<sub>50</sub>= 0.1882      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


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Date Received: 5/30/13      Date Tested: 6/10/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-014  
Sample Number: HMA#7514-31/S-14

Depth: 50'-50.25'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-014

Sample Number: HMA#7514-31/S-14

Depth: 50'-50.25'  
 Material Description: Gray Silty Sand  
 Date Received: 5/30/13

AASHTO Classification: A-2-4(0)

USCS Classification: SM  
 Grain Size Test Method: ASTM C136  
 #200 Wash Method: ASTM D1140

Tested By: JF/TP  
 Checked By: JAM

Test Date: 6/10/13

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 198.30  
 Tare Wt. = 87.30  
 Minus #200 from wash = 33.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
254.40	87.30	3/8"	0.00	0.00	100.0
		#4	1358.60	1356.80	98.9
		#10	1517.60	1514.10	96.8
		#20	1073.50	1066.90	92.9
		#40	964.50	944.40	80.8
		#60	913.40	878.00	59.7
		#100	868.70	842.90	44.2
		#200	1036.00	1019.50	34.4

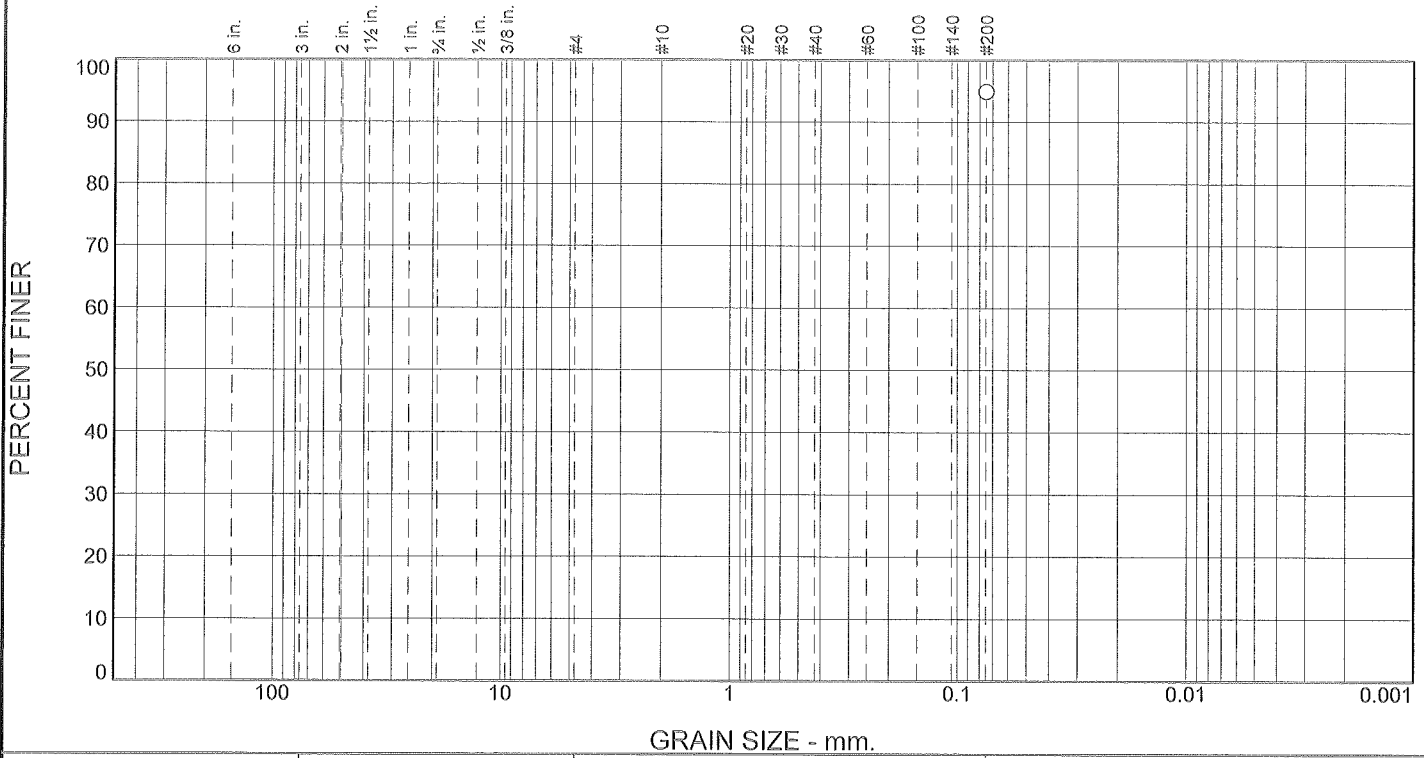
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.1	1.1	2.1	16.0	46.4	64.5			34.4

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
				0.1882	0.2522	0.4143	0.4921	0.6433	1.1953

<b>Fineness Modulus</b>
1.08

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						94.9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	94.9		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 22                      LL= 49                      PI= 27

**Classification**

USCS (D 2487)= CL or OL    AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/10/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-014  
Sample Number: HMA#7514-32/S-19

Depth: 75'-76.5'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
---	--

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-014

**Depth:** 75'-76.5'

**Sample Number:** HMA#7514-32/S-19

**Material Description:** Gray Clay

**Date Received:** 5/30/13      **PL:** 22

**LL:** 49

**PI:** 27

**USCS Classification:** CL or OL

**#200 Wash Method:** ASTM D1140

**Tested By:** JF/TP

**Test Date:** 6/10/13

**Checked By:** JAM

**Sieve Test Data**

**Post #200 Wash Test Weights (grams):** Dry Sample and Tare = 140.90  
 Tare Wt. = 136.10  
 Minus #200 from wash = 94.9%

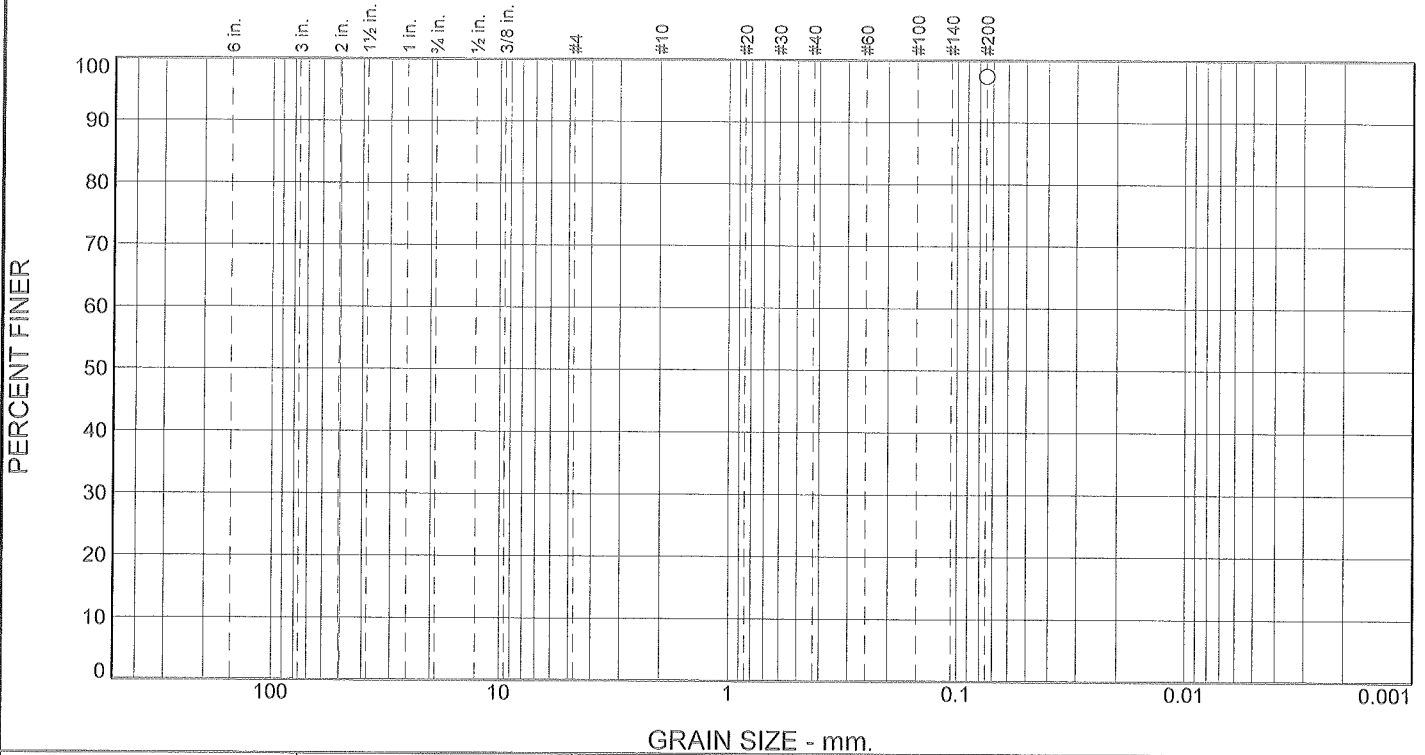
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
230.70	136.10	#200			94.9

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										94.9

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						97.5	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	97.5		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL= 29                      LL= 49                      PI= 20

**Classification**

USCS (D 2487)= ML or OL AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
 D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
 D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/2013      Date Tested: 6/10/2013  
 Tested By: JF/TP  
 Checked By: JAM  
 Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-014  
 Sample Number: HMA#7514-33/S-23

Depth: 95'-96.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-014

Depth: 95'-96.5'

Sample Number: HMA#7514-33/S-23

Material Description: Gray Silt

Date Received: 5/30/2013      PL: 29

LL: 49

PI: 20

USCS Classification: ML or OL

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/2013

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 32.80  
 Tare Wt. = 31.10  
 Minus #200 from wash = 97.5%

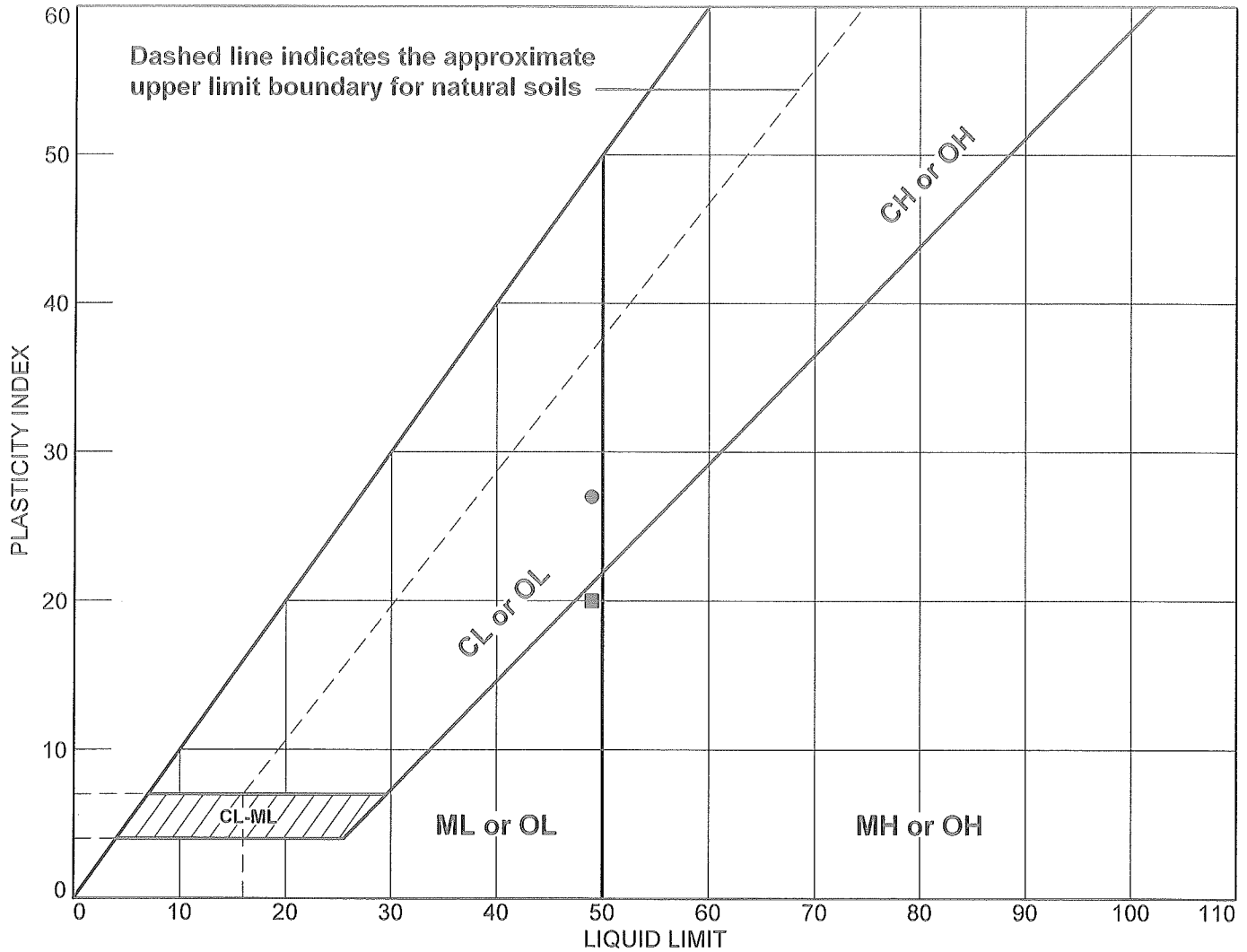
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
97.90	31.10	#200			97.5

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										97.5

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-014	HMA#7514-32/S-19	75'-76.5'	29.3	22	49	27	CL or OL
■	Boring E330-B-014	HMA#7514-33/S-23	95'-96.5'	28.1	29	49	20	ML or OL

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

**Tested By:** JF/TP

**Checked By:** JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/17/2013

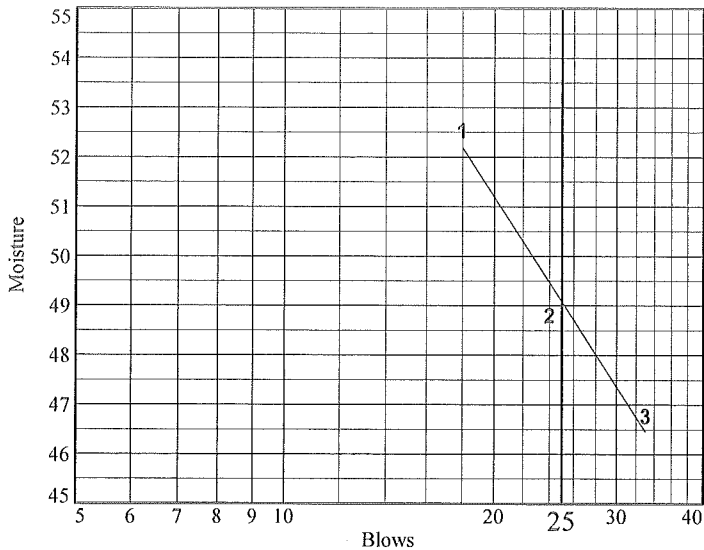
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-014  
 Depth: 75'-76.5'  
 Material Description: Gray Clay  
 USCS: CL or OL  
 Tested by: JF/TP

Sample Number: HMA#7514-32/S-19

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	31.6	26.2	31.8			
Dry+Tare	25.4	22.1	26			
Tare	13.6	13.7	13.6			
# Blows	18	24	33			
Moisture	52.5	48.8	46.8			



Liquid Limit= 49  
 Plastic Limit= 22  
 Plasticity Index= 27  
 Natural Moisture= 29.3  
 Liquidity Index= 0.3

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18.4	18.8	19	
Dry+Tare	17.1	17.5	17.6	
Tare	11.2	11.2	11.2	
Moisture	22.0	20.6	21.9	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
258.4	230.7	136.1	29.3

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/17/2013

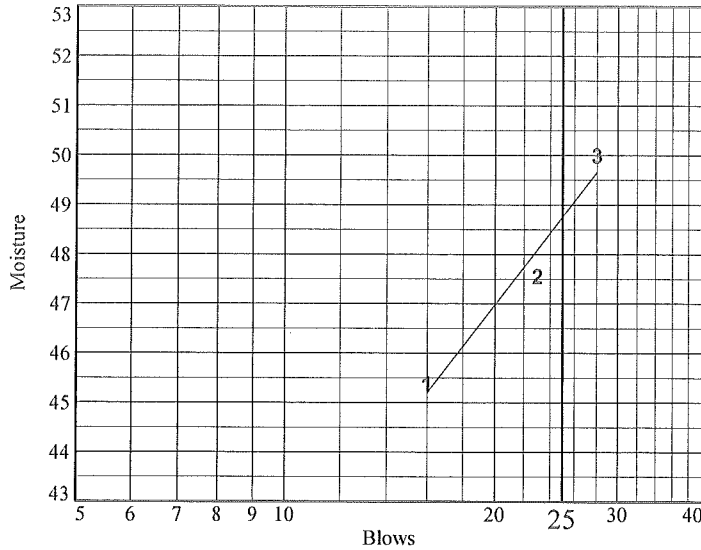
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-014  
 Depth: 95'-96.5'  
 Material Description: Gray Silt  
 USCS: ML or OL  
 Tested by: JF/TP

Sample Number: HMA#7514-33/S-23

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	32.4	25.7	30.1			
Dry+Tare	26.5	21.8	24.6			
Tare	13.5	13.6	13.6			
# Blows	16	23	28			
Moisture	45.4	47.6	50.0			



Liquid Limit = 49  
 Plastic Limit = 29  
 Plasticity Index = 20  
 Natural Moisture = 28.1  
 Liquidity Index = 0.0

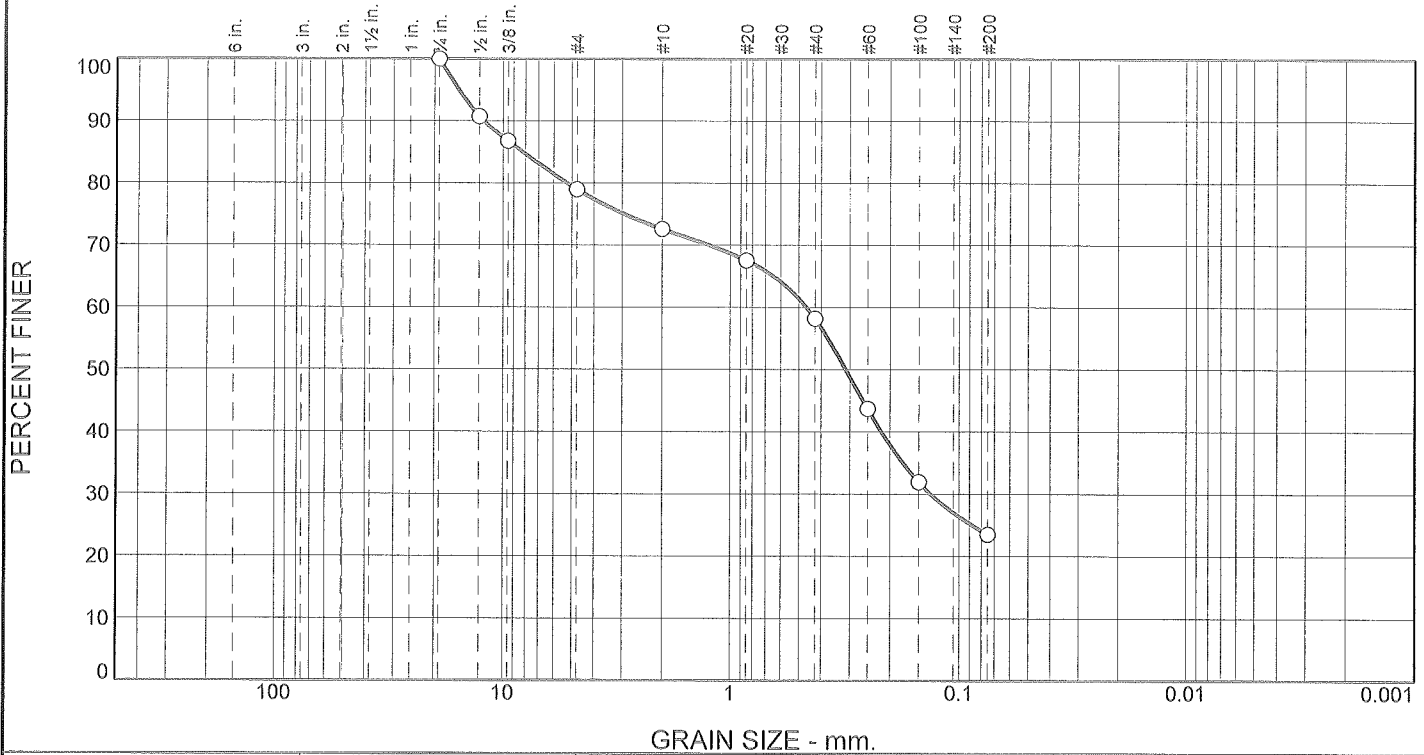
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	19.6	23.5	24.4	
Dry+Tare	17.7	21.2	22.0	
Tare	11.2	13.6	13.7	
Moisture	29.2	30.3	28.9	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
116.7	97.9	31.1	28.1

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.0	6.4	14.4	34.7	23.5	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	90.7		
3/8"	86.8		
#4	79.0		
#10	72.6		
#20	67.6		
#40	58.2		
#60	43.7		
#100	31.9		
#200	23.5		

**Material Description**

Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 12.1566      D<sub>85</sub>= 8.1995      D<sub>60</sub>= 0.4628  
D<sub>50</sub>= 0.3117      D<sub>30</sub>= 0.1331      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/10/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-014B <b>Sample Number:</b> HMA#7514-34/S-2	<b>Depth:</b> 2.5'-4'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b> Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link	Figure
<b>Project No:</b> 12-450		

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-014B

Depth: 2.5'-4'

Sample Number: HMA#7514-34/S-2

Material Description: Brown Silty Sand W/Gravel

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 449.90  
 Tare Wt. = 117.50  
 Minus #200 from wash = 22.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
547.90	117.50	3/4"	0.00	0.00	100.0
		1/2"	1459.10	1419.20	90.7
		3/8"	1500.40	1483.40	86.8
		#4	1390.30	1356.70	79.0
		#10	1541.60	1514.10	72.6
		#20	1088.40	1066.80	67.6
		#40	984.70	944.40	58.2
		#60	940.40	877.90	43.7
		#100	893.30	842.80	31.9
		#200	1055.60	1019.30	23.5

**Fractional Components**

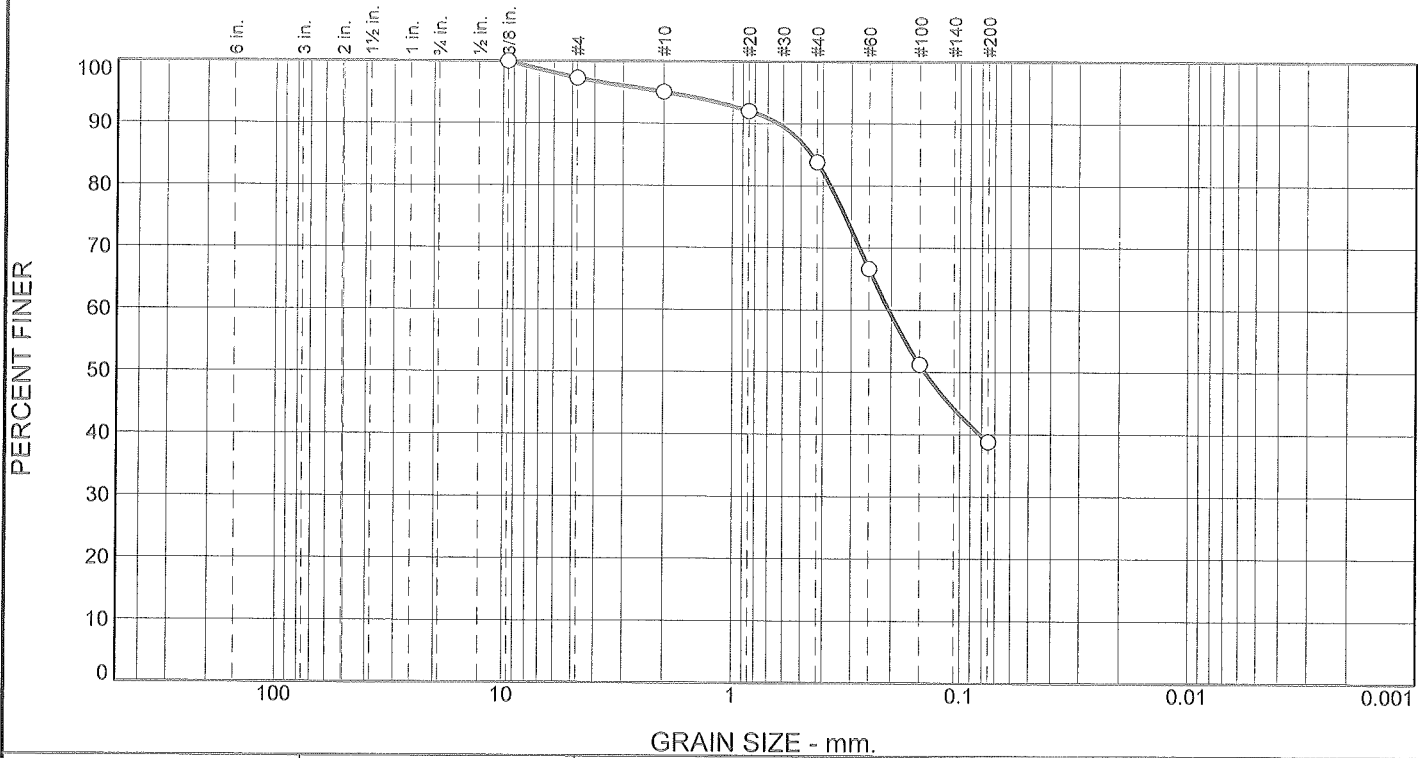
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	21.0	21.0	6.4	14.4	34.7	55.5			23.5

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1331	0.3117	0.4628	5.2609	8.1995	12.1566	15.5824

<b>Fineness Modulus</b>
2.46



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	2.2	11.3	45.0	38.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	97.3		
#10	95.1		
#20	92.0		
#40	83.8		
#60	66.6		
#100	51.2		
#200	38.8		

**Material Description**

Gray Brown Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.6276      D<sub>85</sub>= 0.4485      D<sub>60</sub>= 0.2048  
D<sub>50</sub>= 0.1423      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/10/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-014B  
Sample Number: HMA#7514-35/S-7

Depth: 15'-15.6'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-014B

Depth: 15'-15.6'

Sample Number: HMA#7514-35/S-7

Material Description: Gray Brown Silty Sand

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 244.60  
 Tare Wt. = 114.80  
 Minus #200 from wash = 38.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
324.20	114.80	3/8"	0.00	0.00	100.0
		#4	1362.40	1356.70	97.3
		#10	1518.80	1514.20	95.1
		#20	1073.40	1067.00	92.0
		#40	961.70	944.40	83.8
		#60	914.00	878.10	66.6
		#100	875.40	843.20	51.2
		#200	1045.50	1019.50	38.8

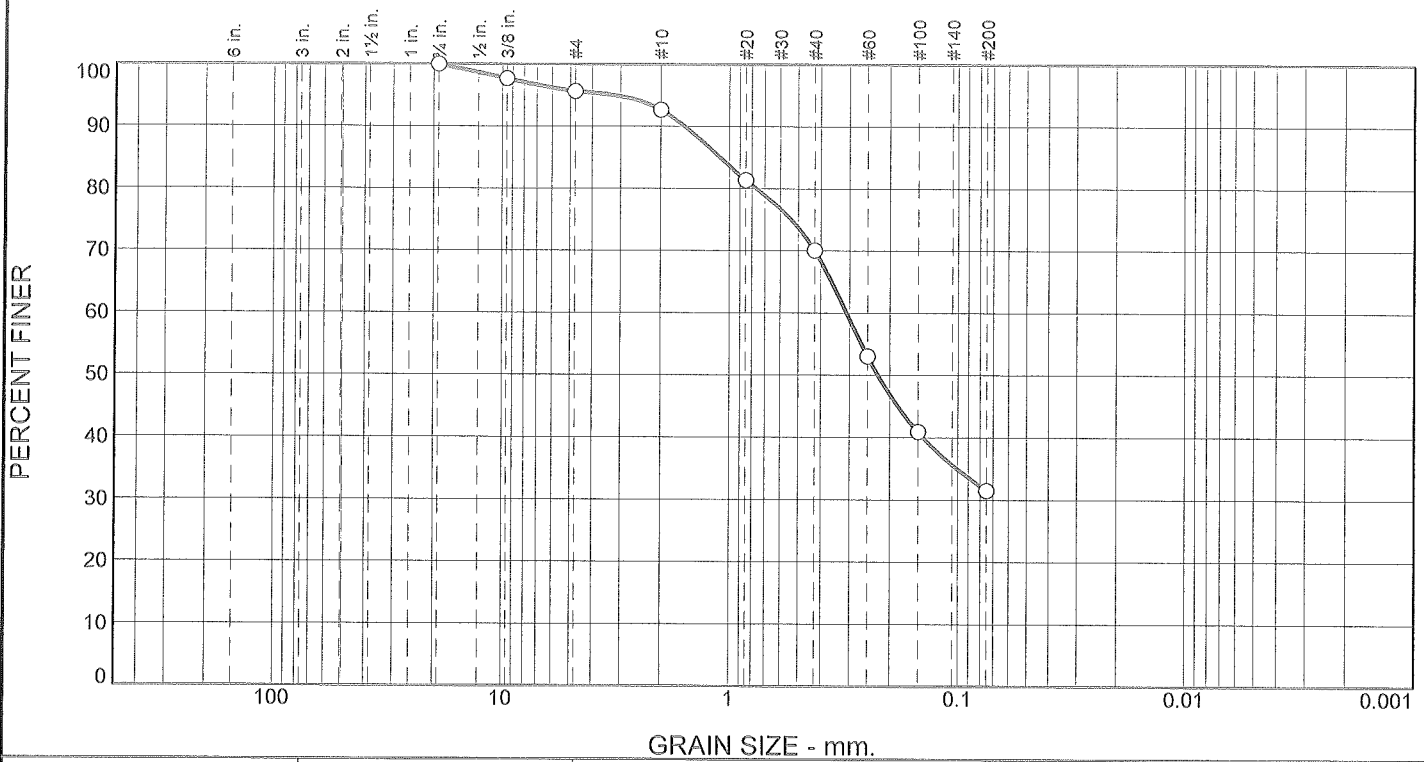
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.7	2.7	2.2	11.3	45.0	58.5			38.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1423	0.2048	0.3706	0.4485	0.6276	1.9376

<b>Fineness Modulus</b>
1.00

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.3	3.0	22.7	38.5	31.5	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
3/8"	97.7		
#4	95.7		
#10	92.7		
#20	81.4		
#40	70.0		
#60	53.1		
#100	40.9		
#200	31.5		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 1.5658      D<sub>85</sub>= 1.0992      D<sub>60</sub>= 0.3087  
D<sub>50</sub>= 0.2251      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/10/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-014B <b>Sample Number:</b> HMA#7514-36/S-10	<b>Depth:</b> 30'-30.25'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link	Project No: 12-450      Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-014B

Depth: 30'-30.25'

Sample Number: HMA#7514-36/S-10

Material Description: Gray Silty Sand

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 212.30  
 Tare Wt. = 114.20  
 Minus #200 from wash = 37.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
271.40	114.20	3/4"	0.00	0.00	100.0
		3/8"	1487.20	1483.60	97.7
		#4	1360.20	1357.00	95.7
		#10	1519.00	1514.30	92.7
		#20	962.20	944.40	81.4
		#40	962.20	944.40	70.0
		#60	904.60	877.90	53.1
		#100	862.20	843.10	40.9
		#200	1034.40	1019.60	31.5

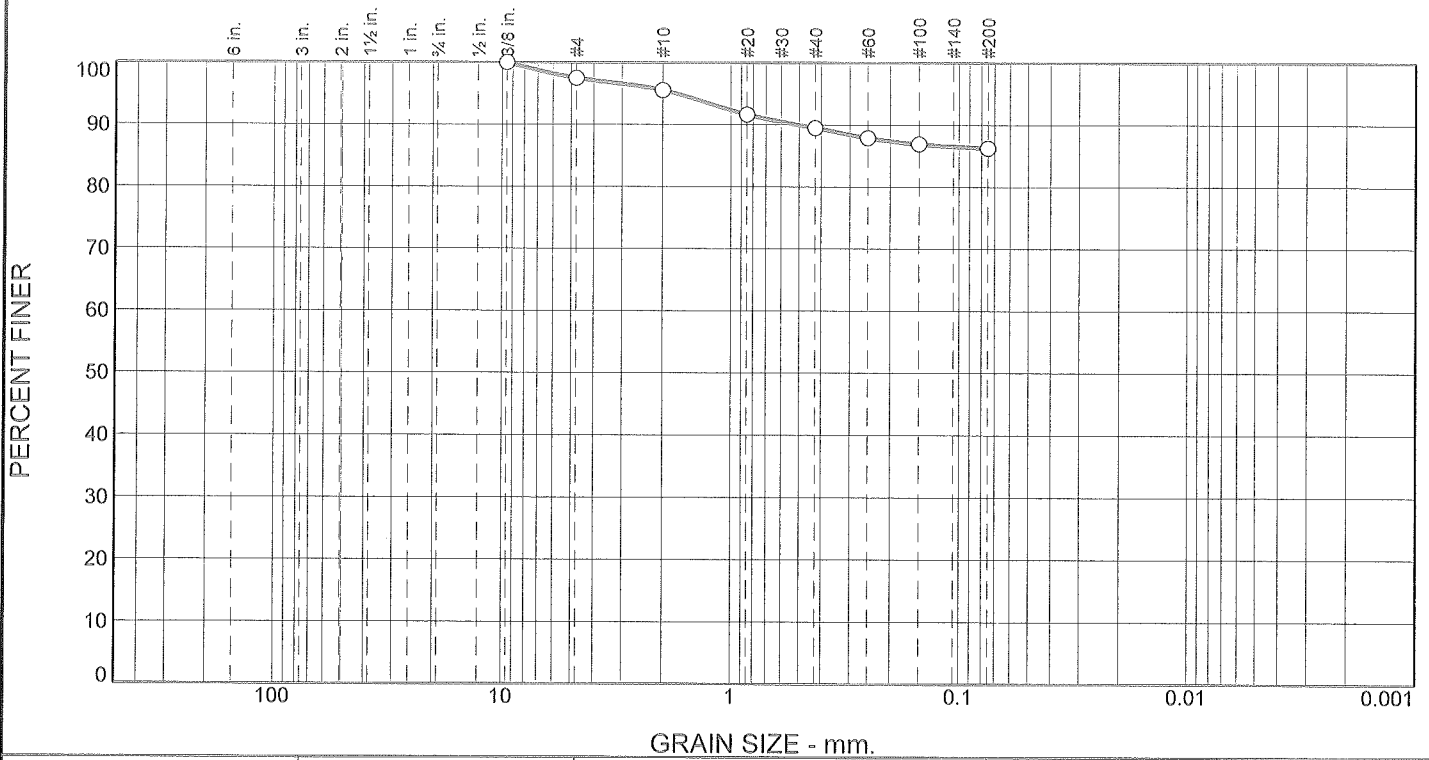
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	4.3	4.3	3.0	22.7	38.5	64.2			31.5

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
				0.2251	0.3087	0.7643	1.0992	1.5658	3.1740

<b>Fineness Modulus</b>
1.50

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	1.9	6.1	3.2	86.3	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	97.5		
#10	95.6		
#20	91.7		
#40	89.5		
#60	87.9		
#100	86.9		
#200	86.3		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= ML      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.5058      D<sub>85</sub>= \_\_\_\_\_      D<sub>60</sub>= \_\_\_\_\_  
D<sub>50</sub>= \_\_\_\_\_      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/11/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-014B <b>Sample Number:</b> HMA#7514-37/S-17	<b>Depth:</b> 65'-65.3'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link	Project No: 12-450 <span style="float: right;">Figure</span>

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-014B  
 Depth: 65'-65.3'

Sample Number: HMA#7514-37/S-17

Material Description: Gray Silt

Date Received: 5/30/13

AASHTO Classification: A-4(0)

USCS Classification: ML

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/11/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 146.70  
 Tare Wt. = 118.30  
 Minus #200 from wash = 85.8%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
318.40	118.30	3/8"	0.00	0.00	100.0
		#4	1362.00	1357.00	97.5
		#10	1518.20	1514.30	95.6
		#20	1074.80	1067.00	91.7
		#40	948.90	944.60	89.5
		#60	881.30	878.10	87.9
		#100	845.10	843.10	86.9
		#200	1020.90	1019.60	86.3

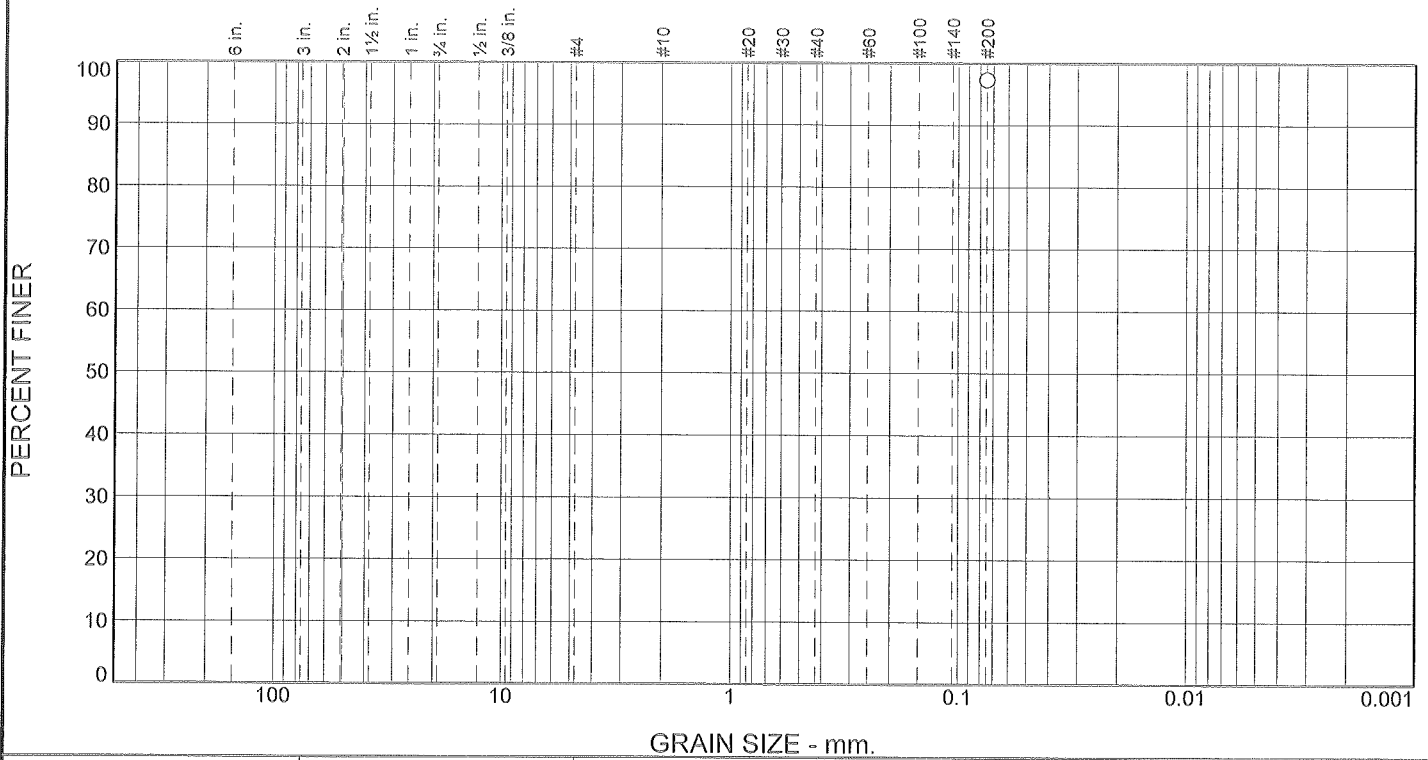
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.5	2.5	1.9	6.1	3.2	11.2			86.3

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
								0.5058	1.7338

<b>Fineness Modulus</b>
0.47

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						97.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	97.4		

\* (no specification provided)

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= ML AASHTO (M 145)= \_\_\_\_\_

**Coefficients**

D<sub>90</sub>= \_\_\_\_\_ D<sub>85</sub>= \_\_\_\_\_ D<sub>60</sub>= \_\_\_\_\_  
 D<sub>50</sub>= \_\_\_\_\_ D<sub>30</sub>= \_\_\_\_\_ D<sub>15</sub>= \_\_\_\_\_  
 D<sub>10</sub>= \_\_\_\_\_ C<sub>u</sub>= \_\_\_\_\_ C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/11/13  
 Tested By: JF/TP  
 Checked By: JAM  
 Title: \_\_\_\_\_

Source of Sample: Boring E330-B-014B  
 Sample Number: HMA#7514-38/S-20

Depth: 80'-80.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates

Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-014B  
 Depth: 80'-80.5'  
 Material Description: Gray Silt  
 Date Received: 5/30/13  
 USCS Classification: ML  
 #200 Wash Method: ASTM D1140  
 Tested By: JF/TP  
 Checked By: JAM

Sample Number: HMA#7514-38/S-20

Test Date: 6/11/13

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 32.90  
 Tare Wt. = 31.20  
 Minus #200 from wash = 97.4%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
95.90	31.20	#200			97.4

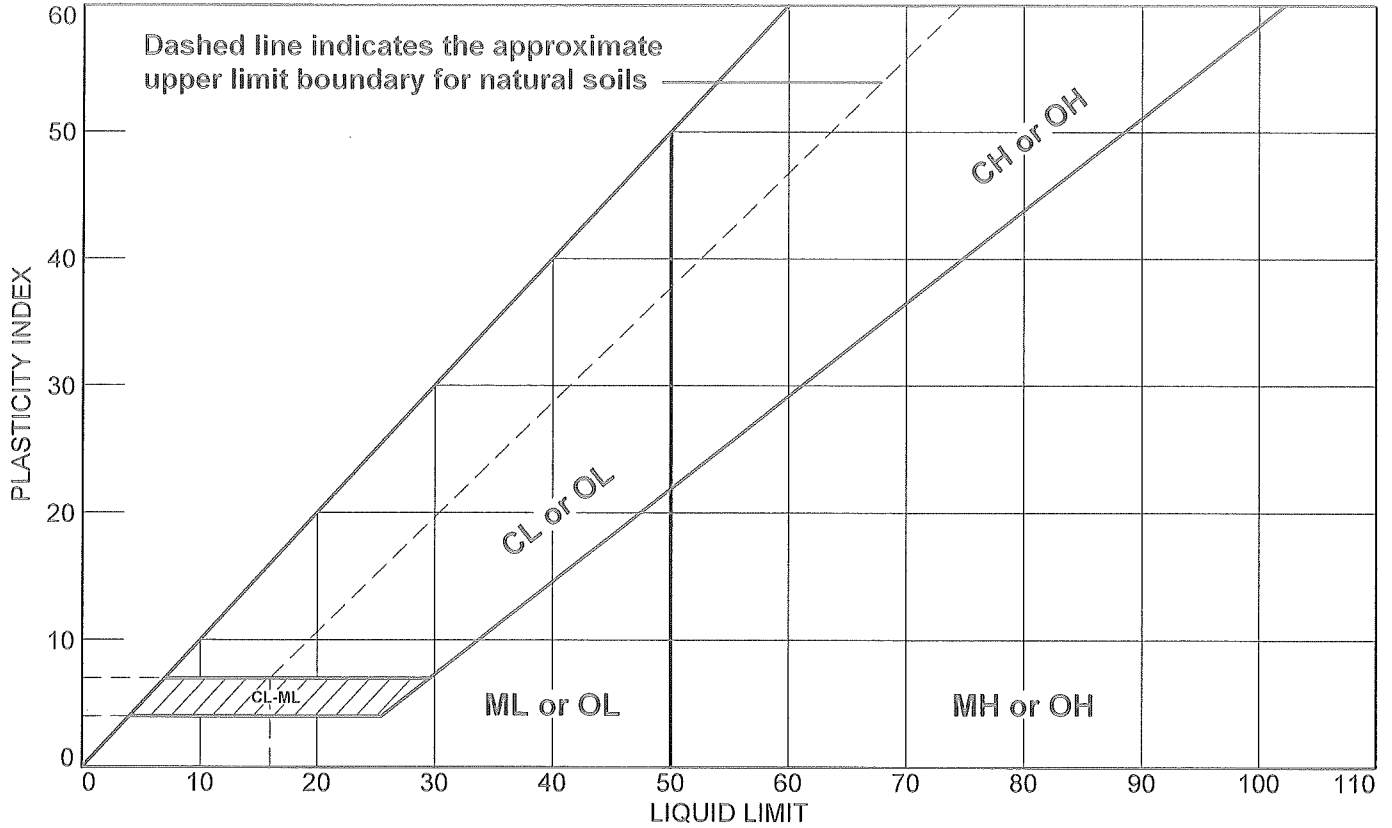
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										97.4

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95



# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-014B	HMA#7514-34/S-2	2.5'-4'	12.8	NP	NP	NP	SM
■	Boring E330-B-014B	HMA#7514-38/S-20	80'-80.5'	26.9	NP	NP	NP	ML

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

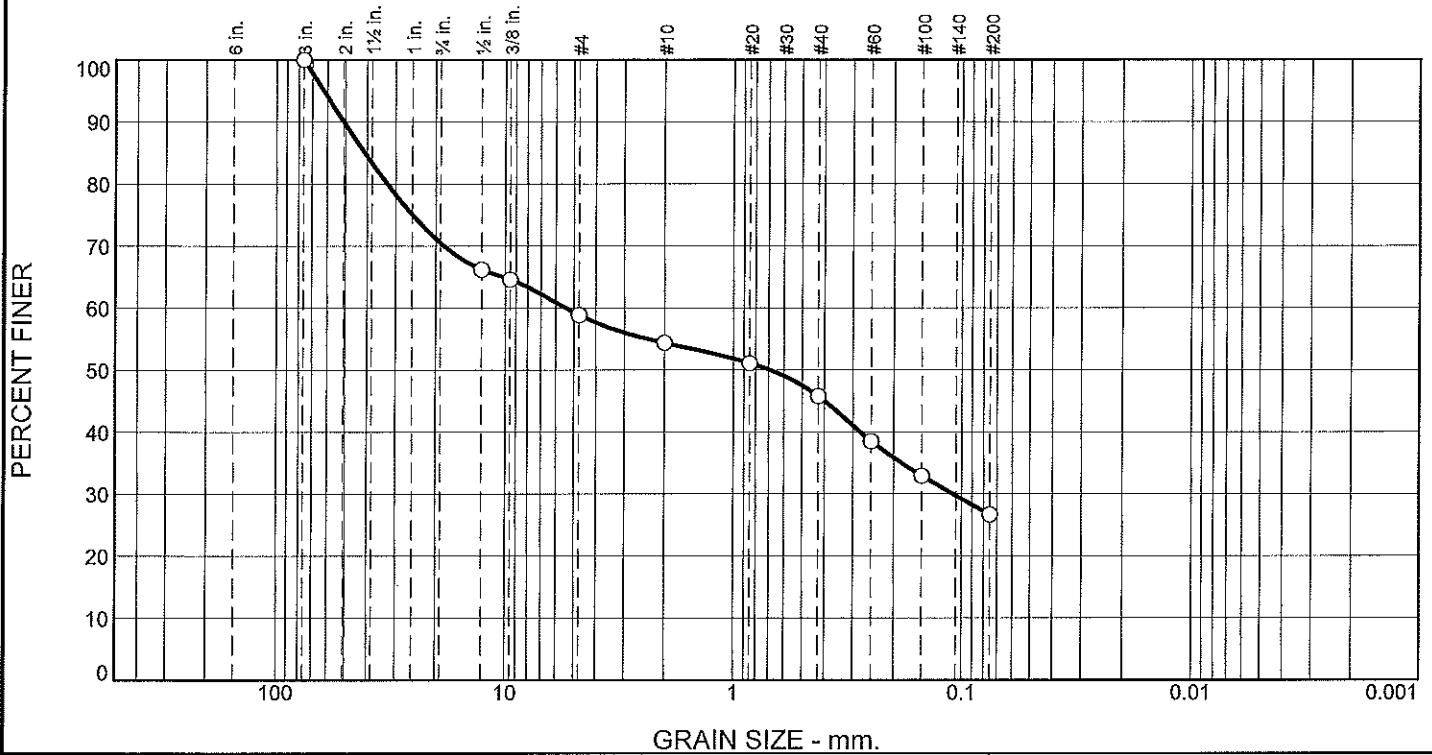
**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	29.5	11.6	4.6	8.6	19.1	26.6	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
1/2"	66.2		
3/8"	64.6		
#4	58.9		
#10	54.3		
#20	51.1		
#40	45.7		
#60	38.5		
#100	32.9		
#200	26.6		

\* (no specification provided)

**Material Description**

Olive Gray Silty Gravel with Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= GM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 50.7671      D<sub>85</sub>= 41.0097      D<sub>60</sub>= 5.4417  
D<sub>50</sub>= 0.6962      D<sub>30</sub>= 0.1096      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 11/19/13      Date Tested: 12/6/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-015  
Sample Number: HMA#7567-22/S-1

Depth: 2.5'-4.0'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-015

Depth: 2.5'-4.0'

Sample Number: HMA#7567-22/S-1

Material Description: Olive Gray Silty Gravel with Sand

Date Received: 11/19/13

USCS Classification: GM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 454.90  
 Tare Wt. = 214.10  
 Minus #200 from wash = 27.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
548.10	214.10	3"	0.00	0.00	100.0
		1/2"	1532.20	1419.20	66.2
		3/8"	1488.40	1483.10	64.6
		#4	1375.30	1356.20	58.9
		#10	1528.60	1513.50	54.3
		#20	1077.10	1066.20	51.1
		#40	961.40	943.60	45.7
		#60	901.90	877.70	38.5
		#100	861.50	842.80	32.9
		#200	1039.80	1018.90	26.6

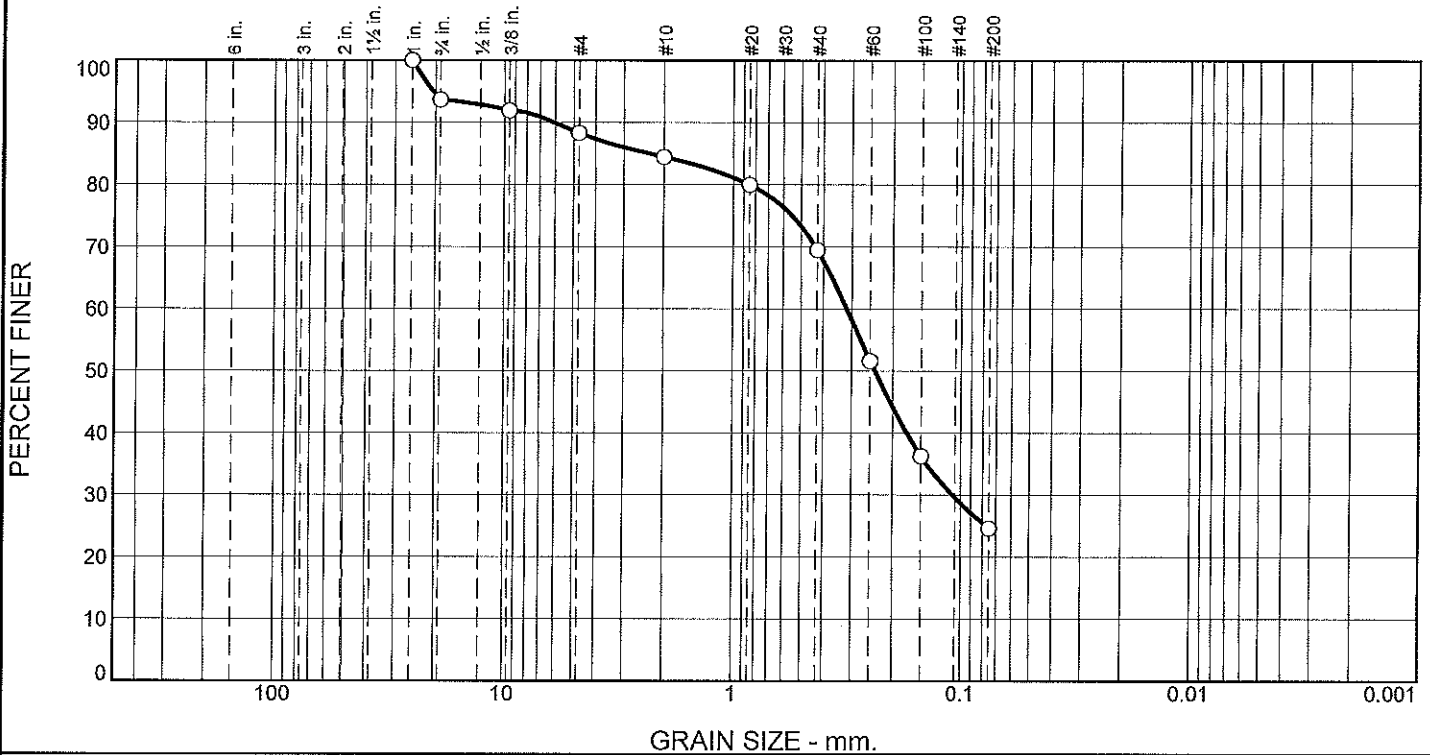
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	29.5	11.6	41.1	4.6	8.6	19.1	32.3			26.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1096	0.6962	5.4417	32.6264	41.0097	50.7671	62.3163

Fineness Modulus
3.92

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	5.3	3.8	15.0	44.9	24.6	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	93.6		
3/8"	91.9		
#4	88.3		
#10	84.5		
#20	80.0		
#40	69.5		
#60	51.6		
#100	36.2		
#200	24.6		

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 6.0927      D<sub>85</sub>= 2.3216      D<sub>60</sub>= 0.3163  
D<sub>50</sub>= 0.2390      D<sub>30</sub>= 0.1091      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 11/19/13      Date Tested: 12/6/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-015  
Sample Number: HMA#7567-23/S-8

Depth: 25'-25.5'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>	Client: Golder Associates Project: Sound Transit East Link Project No: 12-450	<b>Redmond, WA</b> Figure
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**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-015

Depth: 25'-25.5'

Sample Number: HMA#7567-23/S-8

Material Description: Olive Gray Silty Sand

Date Received: 11/19/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 322.70  
 Tare Wt. = 123.20  
 Minus #200 from wash = 24.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
385.60	123.20	1"	0.00	0.00	100.0
		3/4"	1521.50	1504.80	93.6
		3/8"	1487.70	1483.20	91.9
		#4	1365.70	1356.20	88.3
		#10	1523.60	1513.50	84.5
		#20	1077.80	1066.00	80.0
		#40	970.90	943.40	69.5
		#60	924.60	877.60	51.6
		#100	882.80	842.60	36.2
		#200	1049.40	1018.90	24.6

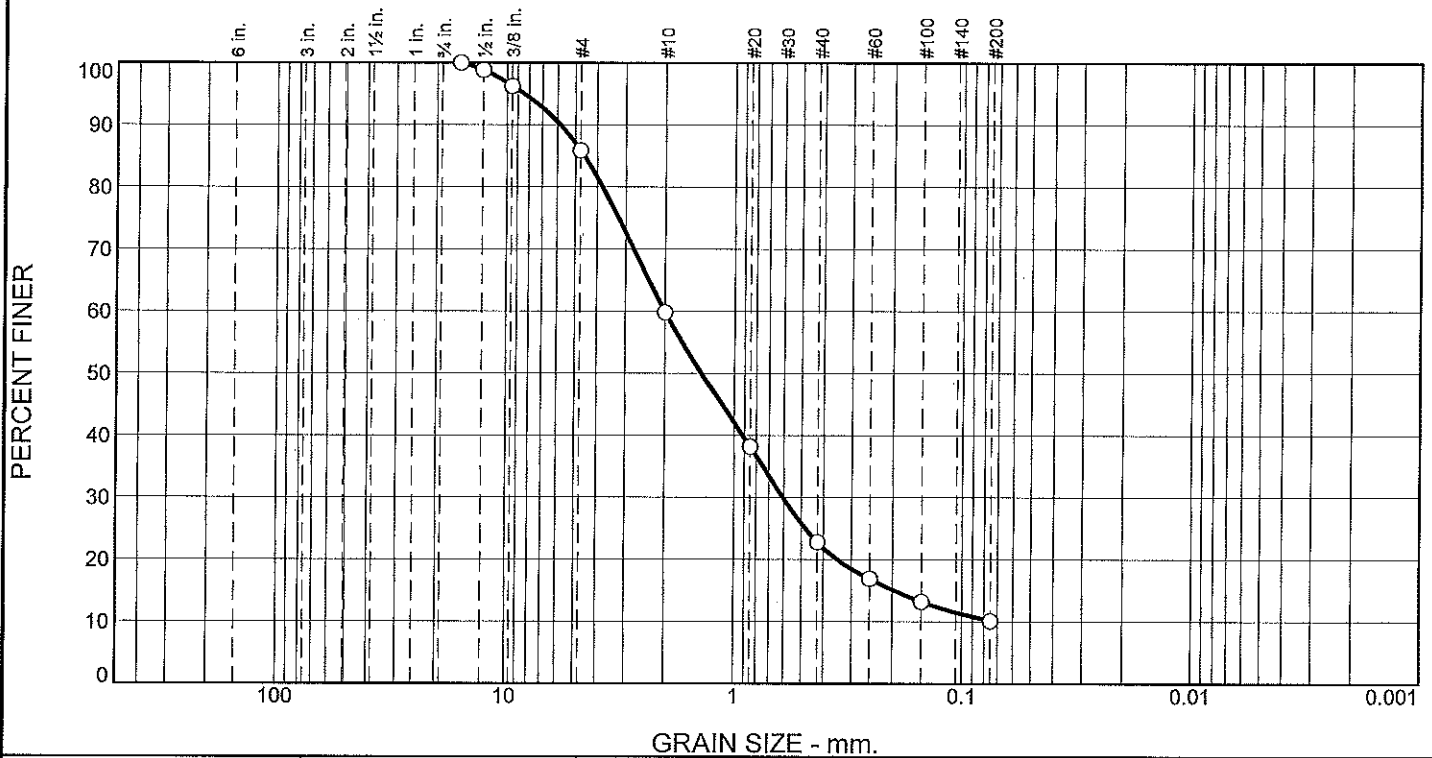
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	6.4	5.3	11.7	3.8	15.0	44.9	63.7			24.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
			0.1091	0.2390	0.3163	0.8550	2.3216	6.0927	20.5580

<b>Fineness Modulus</b>
1.88

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	14.1	26.1	37.0	12.7	10.1	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
5/8"	100.0		
1/2"	98.8		
3/8"	96.3		
#4	85.9		
#10	59.8		
#20	38.2		
#40	22.8		
#60	16.9		
#100	13.2		
#200	10.1		

**Material Description**

Gray Poorly Graded Sand with Silt

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SP-SM    AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 5.8366    D<sub>85</sub>= 4.5761    D<sub>60</sub>= 2.0134  
D<sub>50</sub>= 1.3920    D<sub>30</sub>= 0.6066    D<sub>15</sub>= 0.1958  
D<sub>10</sub>= \_\_\_\_\_    C<sub>u</sub>= \_\_\_\_\_    C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 11/19/13    Date Tested: 12/6/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-015  
Sample Number: HMA#7567-24/S-13

Depth: 50'-50.5'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>	Client: Golder Associates Project: Sound Transit East Link	
Redmond, WA	Project No: 12-450	Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-015

Depth: 50'-50.5'

Sample Number: HMA#7567-24/S-13

Material Description: Gray Poorly Graded Sand with Silt

Date Received: 11/19/13

USCS Classification: SP-SM

AASHTO Classification: A-1-b

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/6/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 394.50  
 Tare Wt. = 214.40  
 Minus #200 from wash = 10.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
414.90	214.40	5/8"	0.00	0.00	100.0
		1/2"	1421.60	1419.20	98.8
		3/8"	1488.30	1483.20	96.3
		#4	1376.90	1356.10	85.9
		#10	1565.90	1513.60	59.8
		#20	1109.40	1066.00	38.2
		#40	974.40	943.60	22.8
		#60	889.40	877.60	16.9
		#100	850.10	842.70	13.2
		#200	1025.10	1018.90	10.1

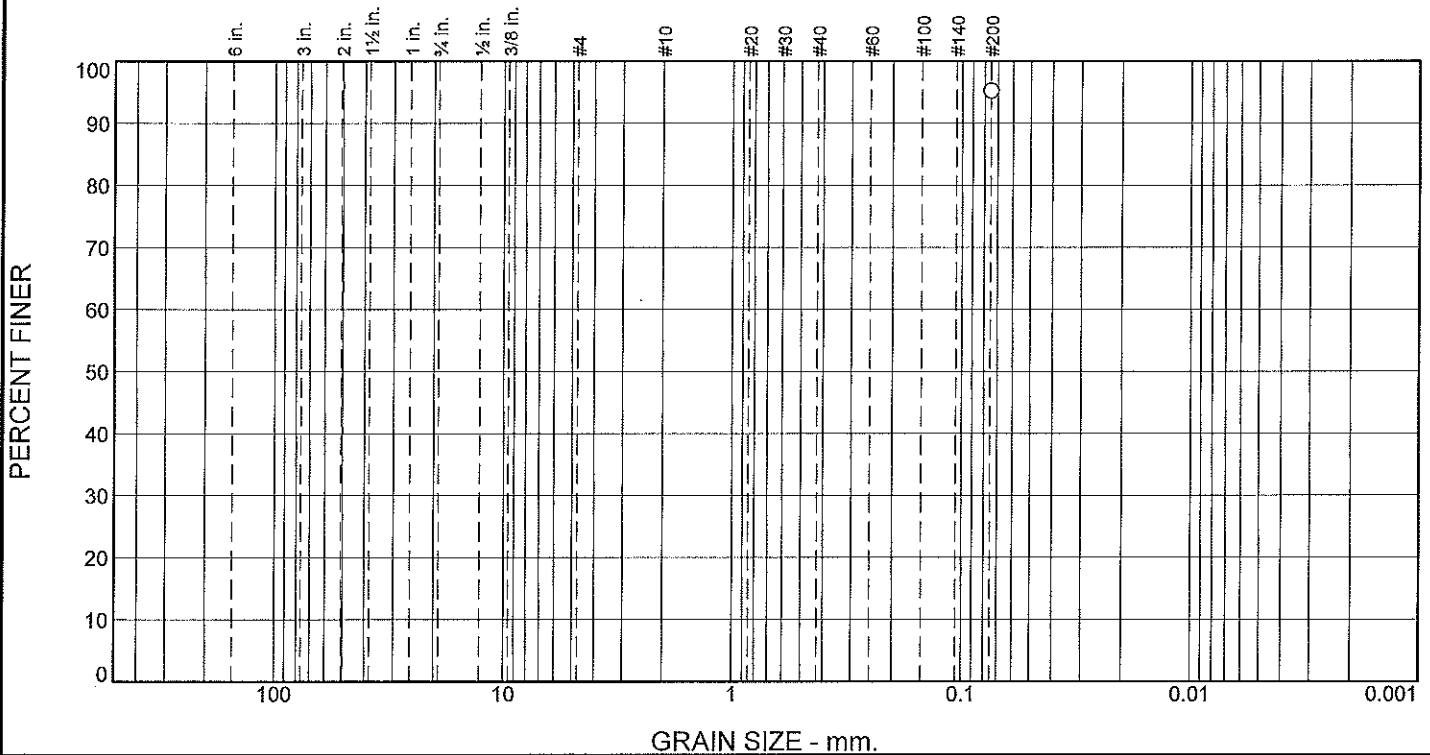
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	14.1	14.1	26.1	37.0	12.7	75.8			10.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
	0.1958	0.3469	0.6066	1.3920	2.0134	3.7997	4.5761	5.8366	8.4456

<b>Fineness Modulus</b>
3.46

# Particle Size Distribution Report



GRAIN SIZE - mm.

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						95.3	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	95.3		

\* (no specification provided)

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 23                      LL= 67                      PI= 44

**Classification**

USCS (D 2487)= CH                      AASHTO (M 145)=

**Coefficients**

D <sub>90</sub> =	D <sub>85</sub> =	D <sub>60</sub> =
D <sub>50</sub> =	D <sub>30</sub> =	D <sub>15</sub> =
D <sub>10</sub> =	C <sub>u</sub> =	C <sub>c</sub> =

Remarks

---

Date Received: 11/19/13                      Date Tested: 12/9/13

Tested By: TEP

Checked By: JAM

Title: \_\_\_\_\_

Source of Sample: Boring E330-B-015  
 Sample Number: HMA#7567-25/S-17

Depth: 70'-71.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
 Redmond, WA

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project No: 12-450

Figure



**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-015

Depth: 70'-71.5'

Sample Number: HMA#7567-25/S-17

Material Description: Gray Clay

Date Received: 11/19/13      PL: 23

LL: 67

PI: 44

USCS Classification: CH

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/9/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 218.80  
 Tare Wt. = 213.20  
 Minus #200 from wash = 95.3%

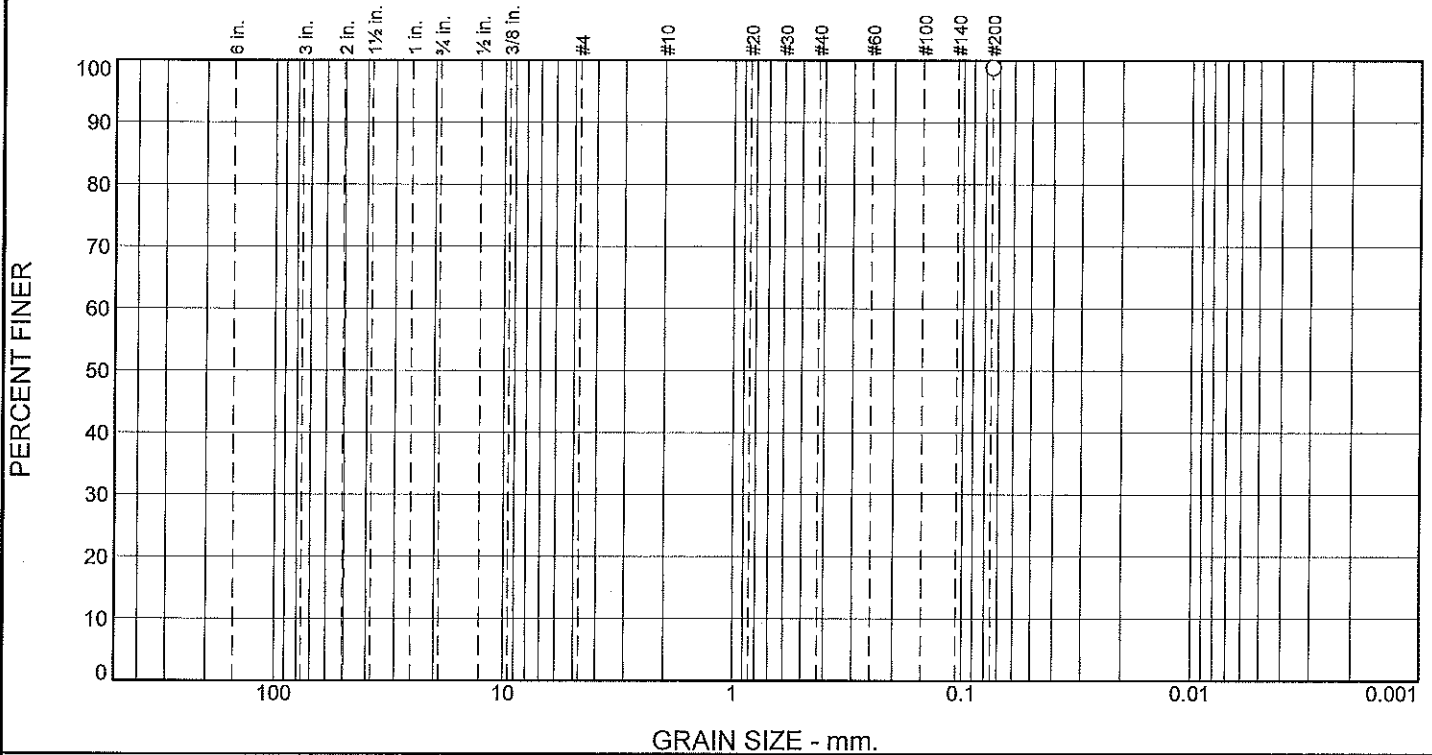
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
331.50	213.20	#200			95.3

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										95.3

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						98.8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	98.8		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 20                      LL= 57                      PI= 37

**Classification**

USCS (D 2487)= CH                      AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 11/19/13                      Date Tested: 12/9/13

Tested By: TEP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-015  
Sample Number: HMA#7567-26/S-21

Depth: 90'-91.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-015

Depth: 90'-91.5'

Sample Number: HMA#7567-26/S-21

Material Description: Gray Clay

Date Received: 11/19/13      PL: 20

LL: 57

PI: 37

USCS Classification: CH

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/9/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 166.10  
 Tare Wt. = 164.90  
 Minus #200 from wash = 98.8%

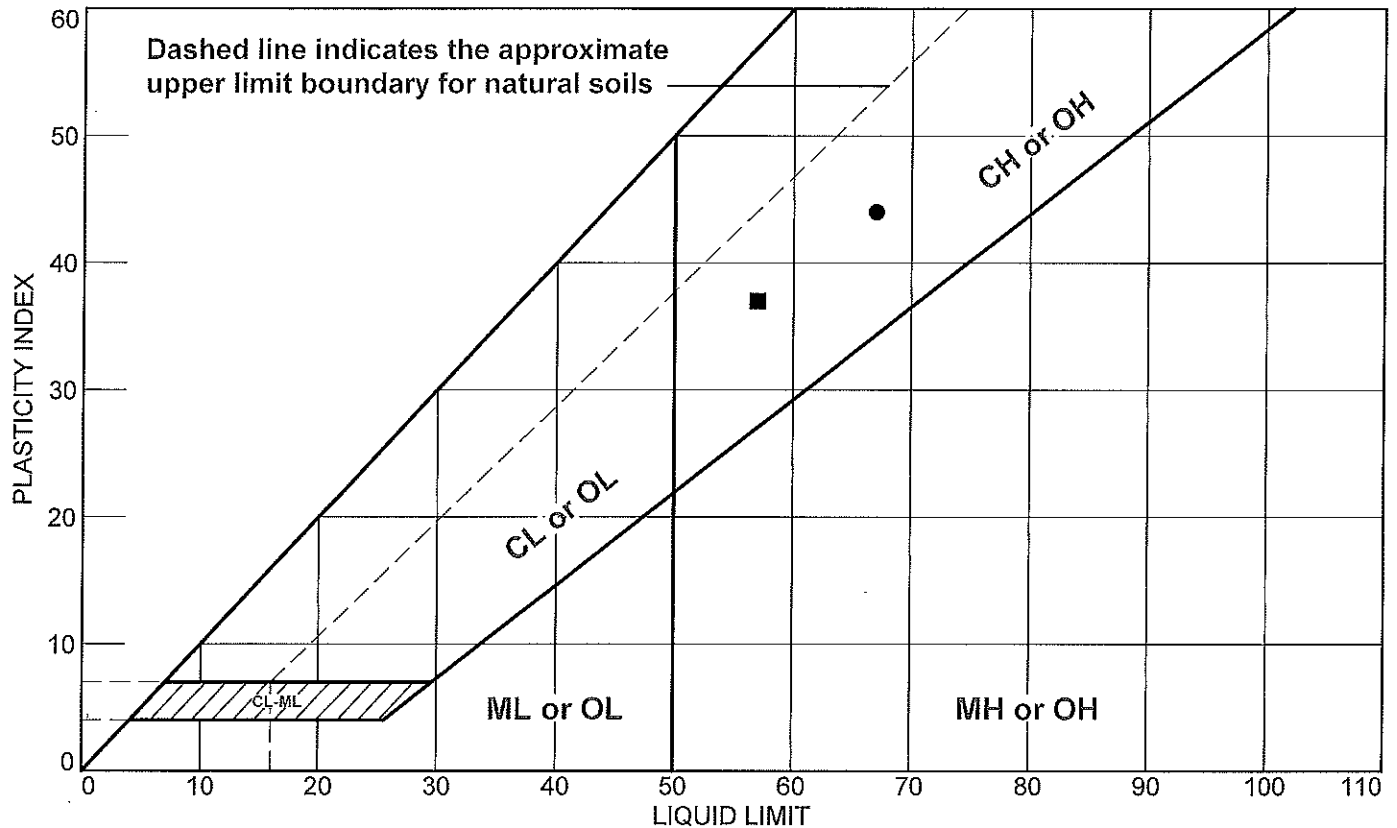
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
266.00	164.90	#200			98.8

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										98.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-015	HMA#7567-25/S-17	70'-71.5'	28.8	23	67	44	CH
■	Boring E330-B-015	HMA#7567-26/S-21	90'-91.5'	32.0	20	57	37	CH

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: ● SR ■ SR/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

12/10/2013

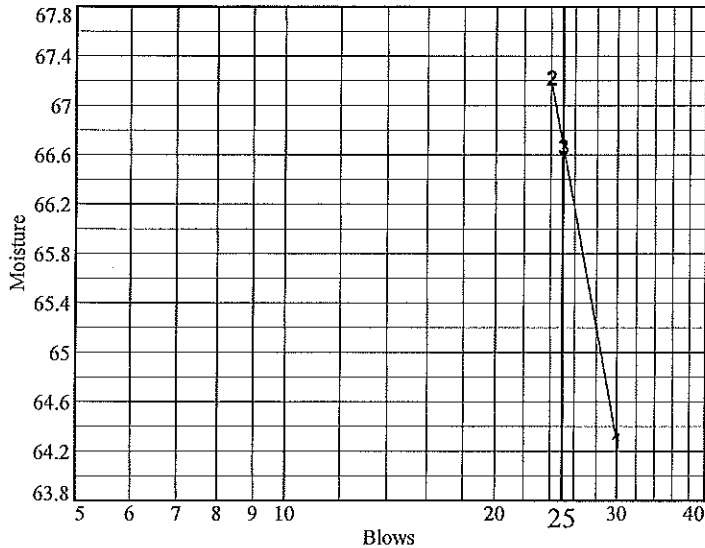
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-015  
 Depth: 70'-71.5'  
 Material Description: Gray Clay  
 USCS: CH  
 Tested by: SR

Sample Number: HMA#7567-25/S-17

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	31.9	31.0	30.7			
Dry+Tare	23.8	23.0	22.9			
Tare	11.2	11.1	11.2			
# Blows	30	24	25			
Moisture	64.3	67.2	66.7			



Liquid Limit= 67  
 Plastic Limit= 23  
 Plasticity Index= 44  
 Natural Moisture= 28.8  
 Liquidity Index= 0.1

**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	20.5	20.6	20.6	
Dry+Tare	19.2	19.3	19.3	
Tare	13.6	13.6	13.7	
Moisture	23.2	22.8	23.2	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
365.6	331.5	213.2	28.8

**LIQUID AND PLASTIC LIMIT TEST DATA**

12/10/2013

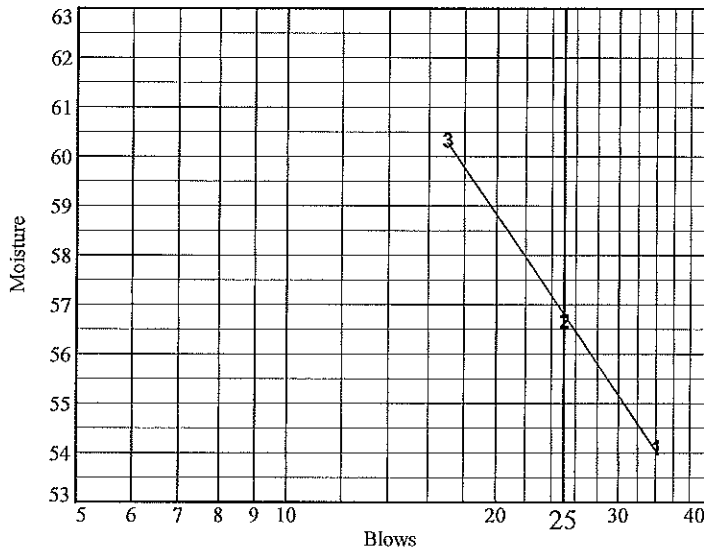
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-015  
 Depth: 90'-91.5'  
 Material Description: Gray Clay  
 USCS: CH  
 Tested by: SR/TP

Sample Number: HMA#7567-26/S-21

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	35.01	32.85	34.25			
Dry+Tare	26.6	25.0	25.5			
Tare	11.06	11.15	11.0			
# Blows	34	25	17			
Moisture	54.1	56.7	60.3			



Liquid Limit= 57  
 Plastic Limit= 20  
 Plasticity Index= 37  
 Natural Moisture= 32.0  
 Liquidity Index= 0.3

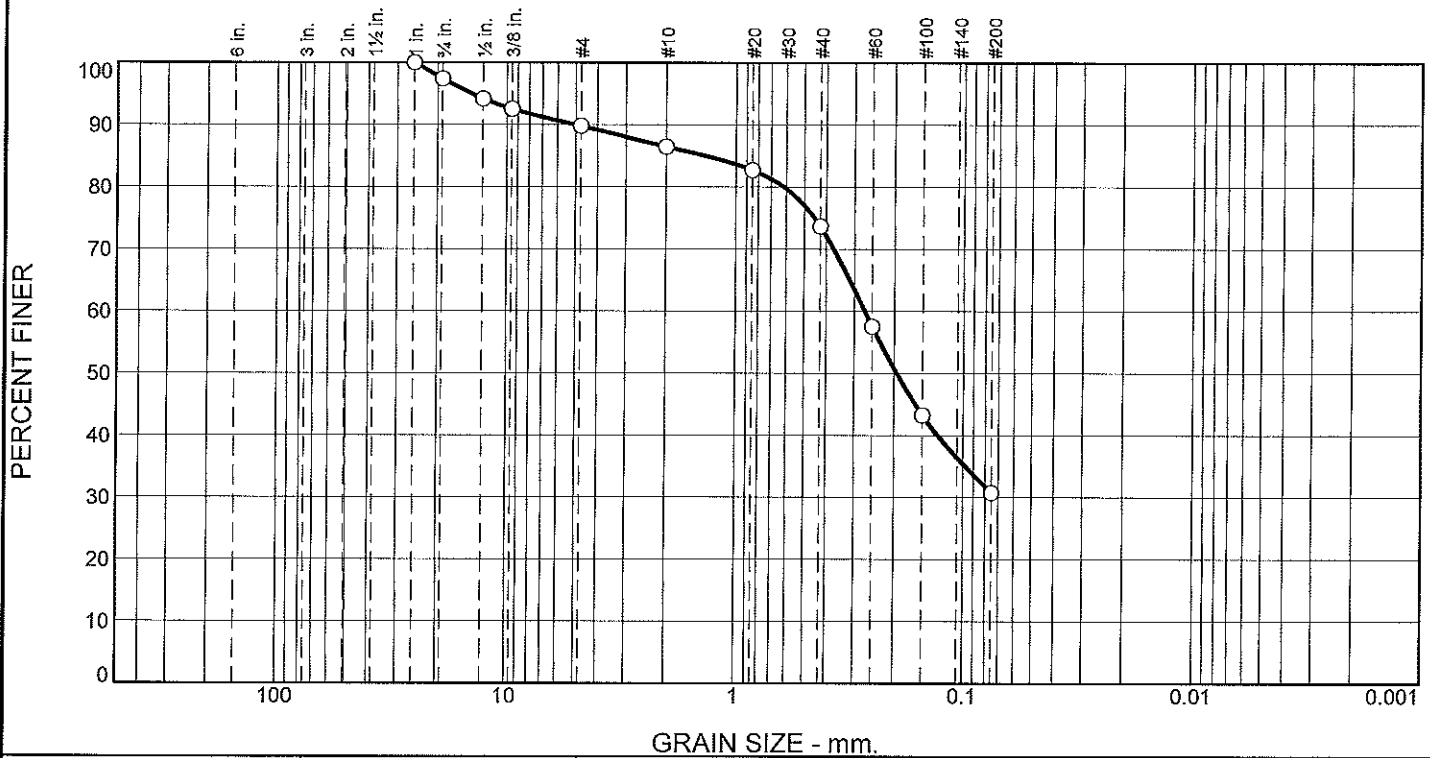
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18.1	18.3	19.0	
Dry+Tare	17.0	17.1	17.6	
Tare	11.2	11.2	11.2	
Moisture	19.0	20.3	21.9	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
298.4	266.0	164.9	32.0

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.6	7.6	3.4	12.7	42.9	30.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	97.4		
1/2"	94.2		
3/8"	92.5		
#4	89.8		
#10	86.4		
#20	82.7		
#40	73.7		
#60	57.5		
#100	43.2		
#200	30.8		

**Material Description**

Olive Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 5.0320                      D<sub>85</sub>= 1.3594                      D<sub>60</sub>= 0.2701  
D<sub>50</sub>= 0.1951                      D<sub>30</sub>=                                      D<sub>15</sub>=  
D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

Remarks

---

Date Received: 11/19/13                      Date Tested: 12/9/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-016  
Sample Number: HMA#7567-27/S-1

Depth: 2.5'-4.0'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-016

Depth: 2.5'-4.0'

Sample Number: HMA#7567-27/S-1

Material Description: Olive Gray Silty Sand

Date Received: 11/19/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/9/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 416.10  
 Tare Wt. = 118.00  
 Minus #200 from wash = 29.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
538.20	118.00	1"	0.00	0.00	100.0
		3/4"	1515.90	1505.00	97.4
		1/2"	1432.80	1419.30	94.2
		3/8"	1490.30	1483.30	92.5
		#4	1367.80	1356.30	89.8
		#10	1527.60	1513.50	86.4
		#20	1081.70	1065.90	82.7
		#40	981.50	943.60	73.7
		#60	945.50	877.60	57.5
		#100	902.70	842.70	43.2
		#200	1071.10	1018.80	30.8

**Fractional Components**

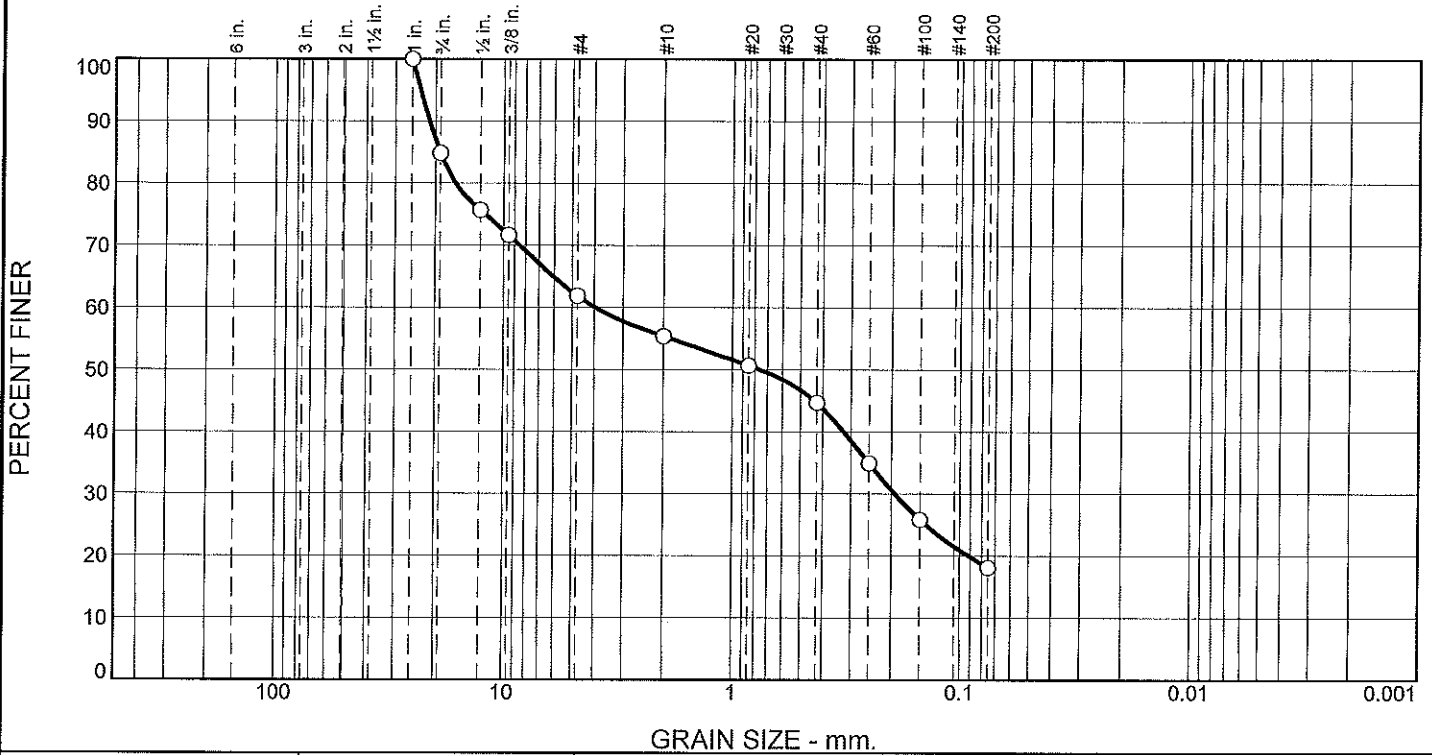
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	2.6	7.6	10.2	3.4	12.7	42.9	59.0			30.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1951	0.2701	0.6173	1.3594	5.0320	14.2191

<b>Fineness Modulus</b>
1.62



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.2	23.0	6.5	10.6	26.6	18.1	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	84.8		
1/2"	75.7		
3/8"	71.6		
#4	61.8		
#10	55.3		
#20	50.6		
#40	44.7		
#60	34.9		
#100	25.9		
#200	18.1		

**Material Description**

Olive Gray Silty Sand with Gravel

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 21.2860                      D<sub>85</sub>= 19.1279                      D<sub>60</sub>= 3.9847  
D<sub>50</sub>= 0.7614                      D<sub>30</sub>= 0.1930                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks


---

Date Received: 11/19/13                      Date Tested: 12/10/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-016  
Sample Number: HMA#7567-28/S-6

Depth: 15'-15.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-016

Depth: 15'-15.5'

Sample Number: HMA#7567-28/S-6

Material Description: Olive Gray Silty Sand with Gravel

Date Received: 11/19/13

USCS Classification: SM

AASHTO Classification: A-1-b

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 351.20  
 Tare Wt. = 115.90  
 Minus #200 from wash = 17.2%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
400.10	115.90	1"	0.00	0.00	100.0
		3/4"	1547.90	1504.80	84.8
		1/2"	1445.20	1419.10	75.7
		3/8"	1494.50	1483.10	71.6
		#4	1384.10	1356.20	61.8
		#10	1531.80	1513.40	55.3
		#20	1079.40	1066.00	50.6
		#40	960.50	943.50	44.7
		#60	905.40	877.70	34.9
		#100	868.40	842.70	25.9
		#200	1041.00	1018.90	18.1

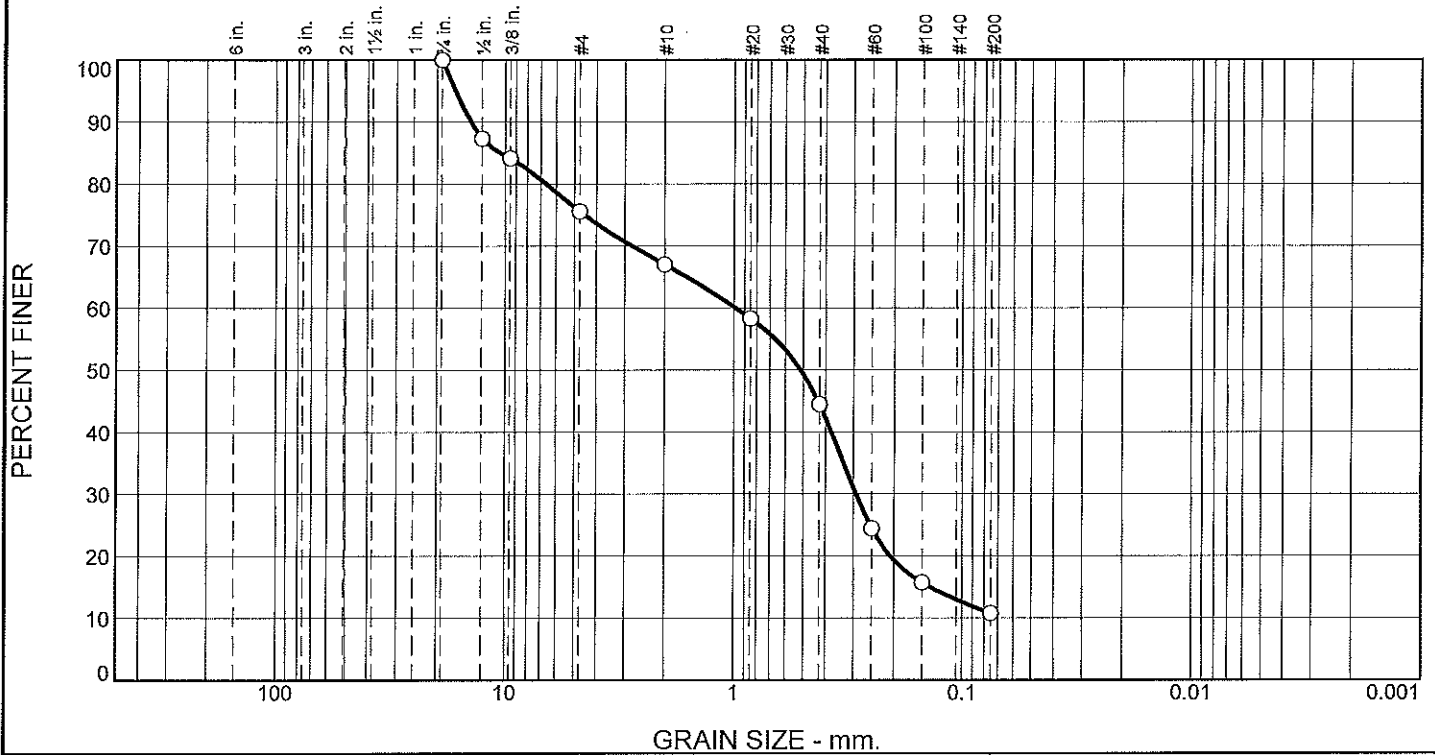
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	15.2	23.0	38.2	6.5	10.6	26.6	43.7			18.1

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
		0.0915	0.1930	0.7614	3.9847	16.3440	19.1279	21.2860	23.3155

<b>Fineness Modulus</b>
3.60

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	24.4	8.6	22.5	33.7	10.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	87.3		
3/8"	84.1		
#4	75.6		
#10	67.0		
#20	58.3		
#40	44.5		
#60	24.5		
#100	15.7		
#200	10.8		

\* (no specification provided)

**Material Description**

Olive Gray Poorly Graded Sand with Silt and Gravel

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SP-SM    AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 14.2223      D<sub>85</sub>= 10.6005      D<sub>60</sub>= 0.9877  
D<sub>50</sub>= 0.5149      D<sub>30</sub>= 0.2930      D<sub>15</sub>= 0.1384  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks


---

Date Received: 11/19/13      Date Tested: 12/10/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-016  
Sample Number: HMA#7567-29/S-14

Depth: 55'-55.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/10/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-016

Depth: 55'-55.5'

Sample Number: HMA#7567-29/S-14

Material Description: Olive Gray Poorly Graded Sand with Silt and Gravel

Date Received: 11/19/13

USCS Classification: SP-SM

AASHTO Classification: A-1-b

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 401.60  
 Tare Wt. = 198.00  
 Minus #200 from wash = 10.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
424.40	198.00	3/4"	0.00	0.00	100.0
		1/2"	1447.90	1419.20	87.3
		3/8"	1490.50	1483.20	84.1
		#4	1375.60	1356.30	75.6
		#10	1532.90	1513.50	67.0
		#20	1085.90	1066.10	58.3
		#40	974.80	943.60	44.5
		#60	922.80	877.50	24.5
		#100	862.40	842.60	15.7
		#200	1030.00	1018.80	10.8

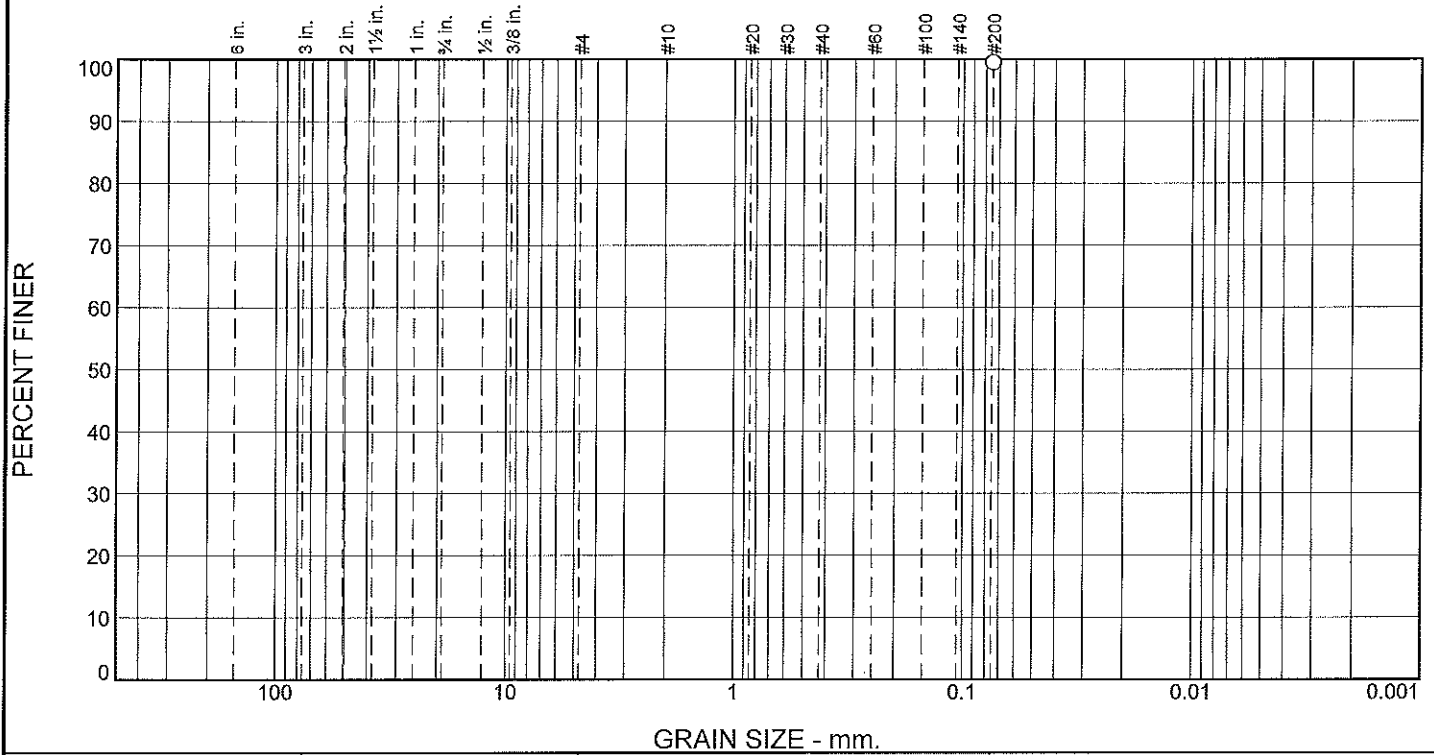
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	24.4	24.4	8.6	22.5	33.7	64.8			10.8

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
	0.1384	0.2079	0.2930	0.5149	0.9877	6.6487	10.6005	14.2223	16.6246

<b>Fineness Modulus</b>
3.10

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						99.5	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	99.5		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL= 27      LL= 35      PI= 8

**Classification**

USCS (D 2487)= ML      AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=      D<sub>85</sub>=      D<sub>60</sub>=  
D<sub>50</sub>=      D<sub>30</sub>=      D<sub>15</sub>=  
D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

Remarks

---

Date Received: 11/19/13      Date Tested: 12/10/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-016  
Sample Number: HMA#7567-30/S-18

Depth: 75'-76'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>	Client: Golder Associates	
Redmond, WA	Project: Sound Transit East Link	
	Project No: 12-450	Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/11/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450

Location: Boring E330-B-016

Depth: 75'-76'

Sample Number: HMA#7567-30/S-18

Material Description: Gray Silt

Date Received: 11/19/13      PL: 27

LL: 35

PI: 8

USCS Classification: ML

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 32.00

Tare Wt. = 31.50

Minus #200 from wash = 99.5%

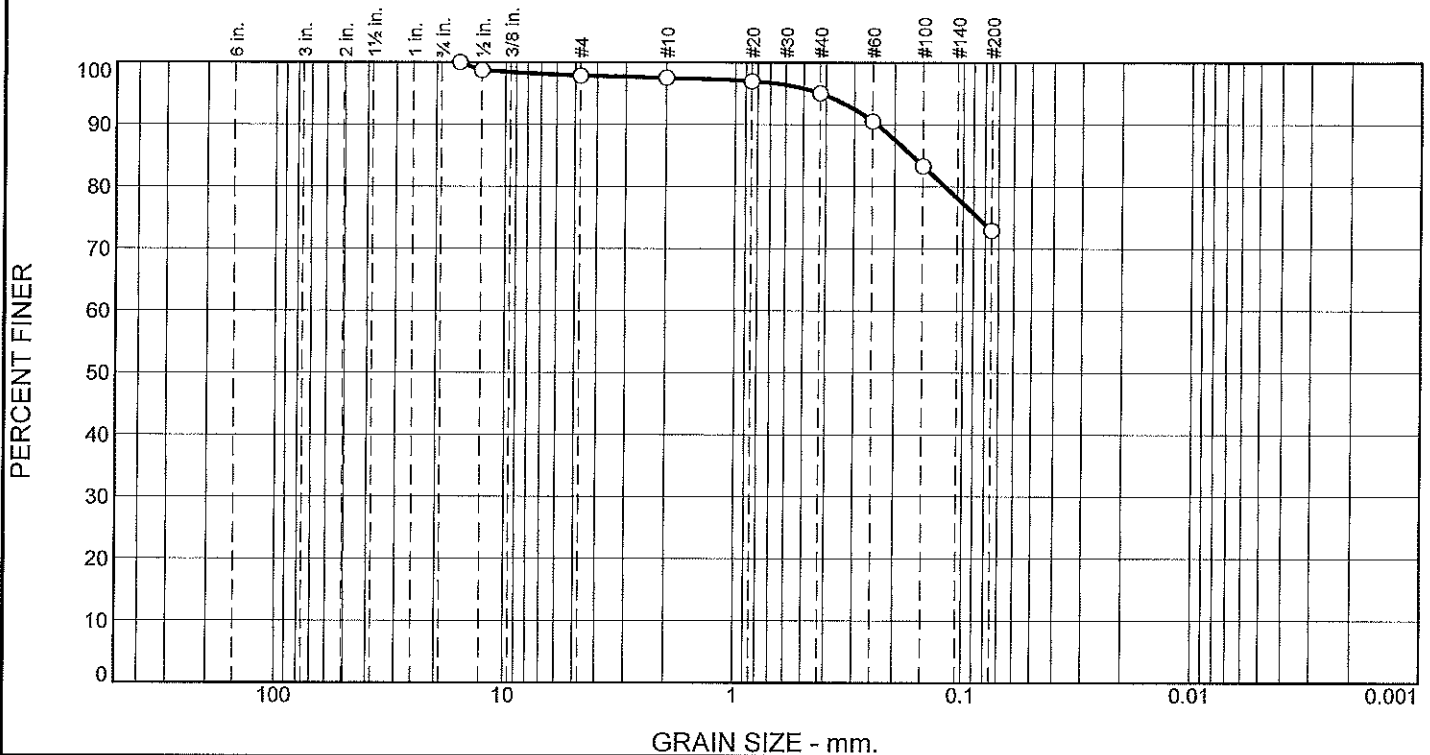
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
130.00	31.50	#200			99.5

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										99.5

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.2	0.3	2.5	22.1	72.9	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
5/8"	100.0		
1/2"	98.7		
#4	97.8		
#10	97.5		
#20	97.0		
#40	95.0		
#60	90.5		
#100	83.3		
#200	72.9		

\* (no specification provided)

**Material Description**

Gray Silt with Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= ML      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.2401      D<sub>85</sub>= 0.1681      D<sub>60</sub>= \_\_\_\_\_  
D<sub>50</sub>= \_\_\_\_\_      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

Date Received: 11/19/13      Date Tested: 12/10/13  
Tested By: TEP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-016  
Sample Number: HMA#7567-31/S-21

Depth: 90'-91'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

12/11/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-016

Depth: 90'-91'

Sample Number: HMA#7567-31/S-21

Material Description: Gray Silt with Sand

Date Received: 11/19/13

USCS Classification: ML

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: TEP

Test Date: 12/10/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 212.60  
 Tare Wt. = 113.80  
 Minus #200 from wash = 72.3%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
470.30	113.80	5/8"	0.00	0.00	100.0
		1/2"	1423.80	1419.20	98.7
		#4	1359.30	1356.20	97.8
		#10	1514.60	1513.40	97.5
		#20	1068.00	1066.10	97.0
		#40	950.50	943.60	95.0
		#60	893.90	877.70	90.5
		#100	868.50	842.80	83.3
		#200	1056.70	1019.80	72.9

**Fractional Components**

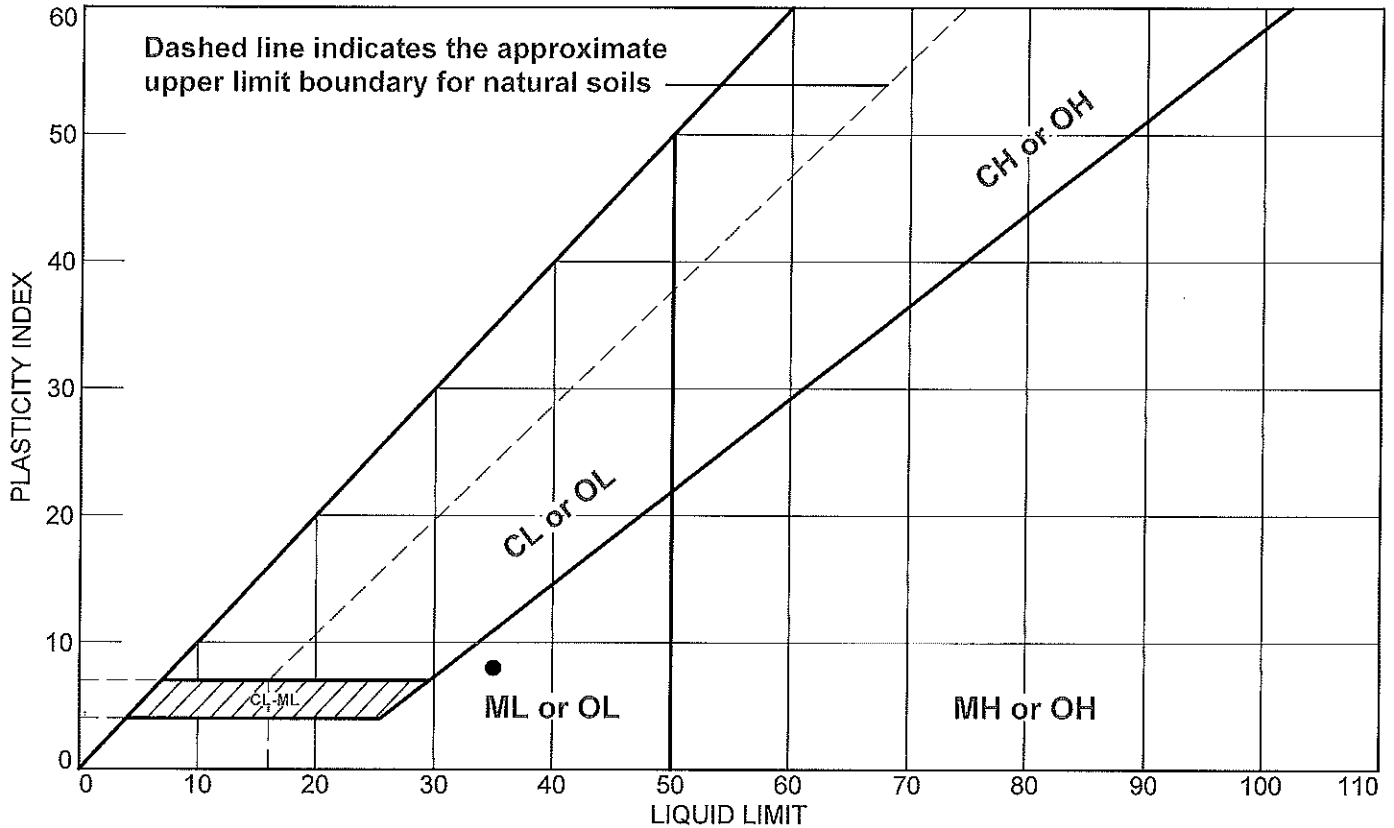
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.2	2.2	0.3	2.5	22.1	24.9			72.9

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
						0.1206	0.1681	0.2401	0.4223

Fineness Modulus
0.37



# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
• Boring E330-B-016	HMA#7567-30/S-18	75'-76'	23.7	27	35	8	ML

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: TEP

Checked By: JAM

## LIQUID AND PLASTIC LIMIT TEST DATA

12/11/2013

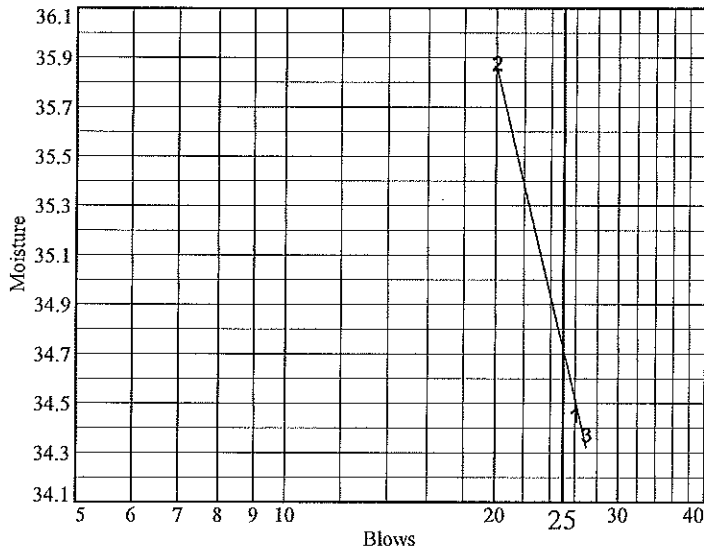
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-016  
 Depth: 75'-76'  
 Material Description: Gray Silt  
 USCS: ML  
 Tested by: TEP

Sample Number: HMA#7567-30/S-18

Checked by: JAM

### Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.2	29.0	26.5			
Dry+Tare	23.1	24.3	23.2			
Tare	11.2	11.2	13.6			
# Blows	26	20	27			
Moisture	34.5	35.9	34.4			



Liquid Limit= 35  
 Plastic Limit= 27  
 Plasticity Index= 8  
 Natural Moisture= 23.7  
 Liquidity Index= -0.4

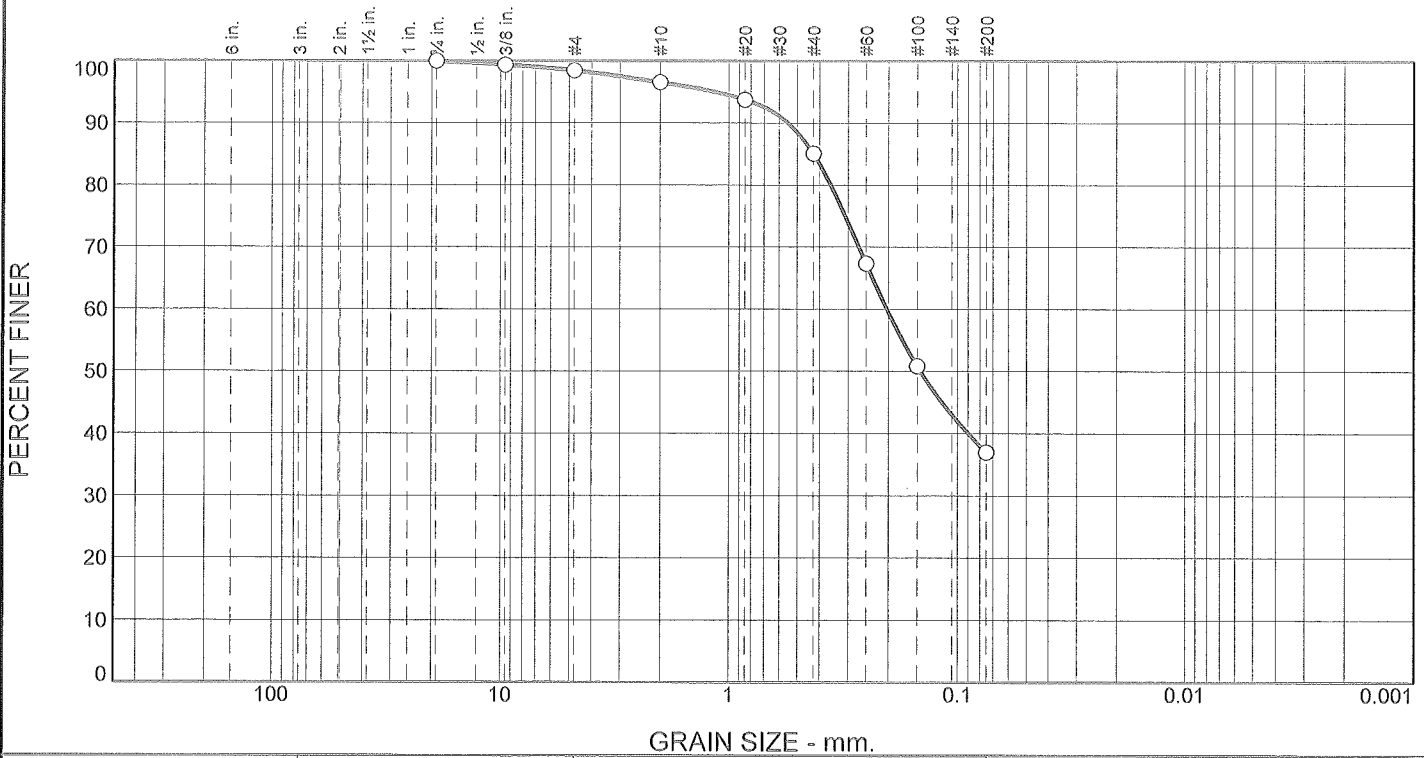
### Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	17.3	17.2	16.6	
Dry+Tare	16.0	16.0	15.4	
Tare	11.2	11.1	11.2	
Moisture	27.1	24.5	28.6	

### Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
153.3	130.0	31.5	23.7

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	1.9	11.5	48.1	37.0	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
3/8"	99.4		
#4	98.5		
#10	96.6		
#20	93.8		
#40	85.1		
#60	67.3		
#100	50.8		
#200	37.0		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.5482      D<sub>85</sub>= 0.4236      D<sub>60</sub>= 0.2029  
D<sub>50</sub>= 0.1453      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/11/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-17  
Sample Number: HMA#7514-39/S-2

Depth: 12.5'-13'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-17

Depth: 12.5'-13'

Sample Number: HMA#7514-39/S-2

Material Description: Gray Silty Sand

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/11/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 277.30  
 Tare Wt. = 113.20  
 Minus #200 from wash = 35.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
369.30	113.20	3/4"	0.00	0.00	100.0
		3/8"	1485.10	1483.60	99.4
		#4	1359.20	1356.80	98.5
		#10	1519.20	1514.30	96.6
		#20	1074.20	1067.00	93.8
		#40	966.70	944.50	85.1
		#60	923.70	878.20	67.3
		#100	885.30	843.10	50.8
		#200	1055.00	1019.50	37.0

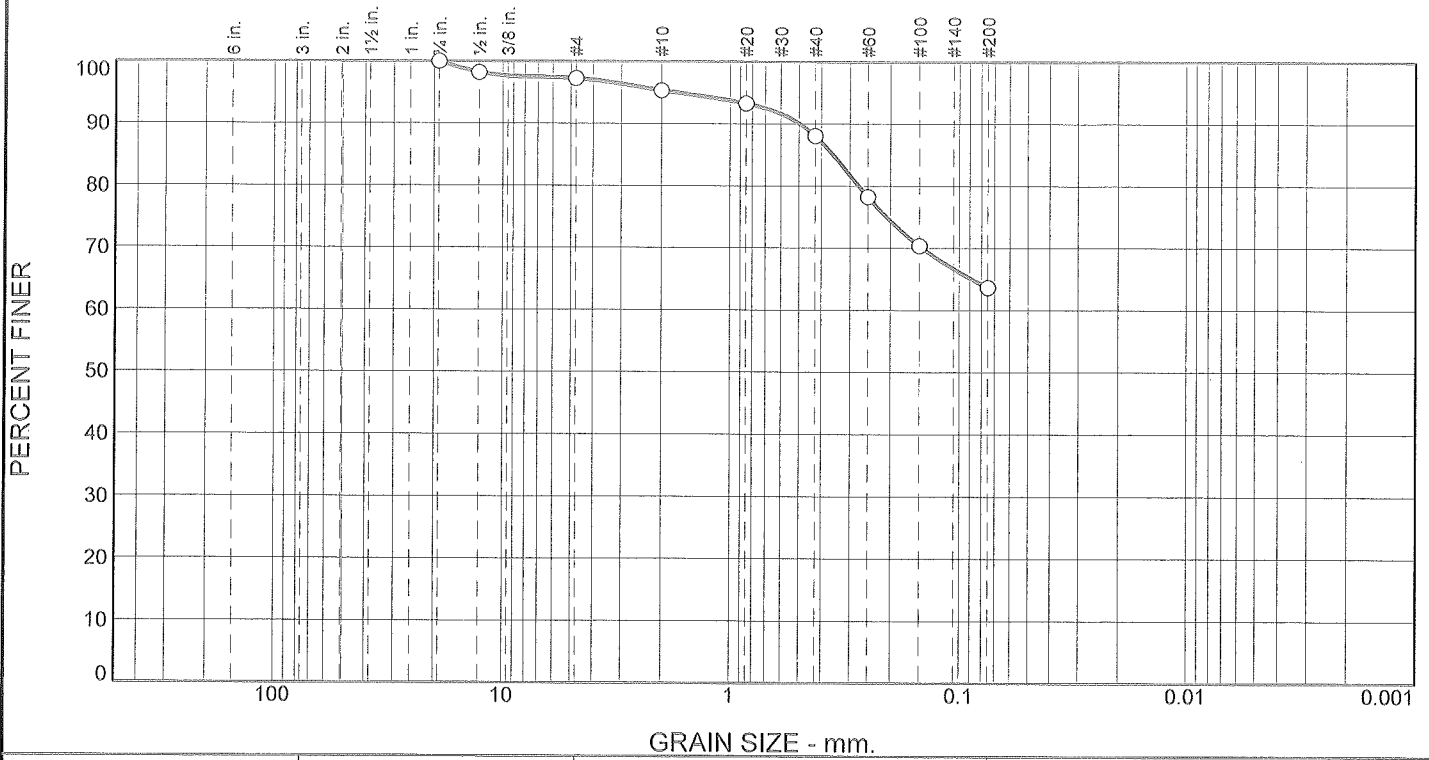
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.5	1.5	1.9	11.5	48.1	61.5			37.0

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1453	0.2029	0.3569	0.4236	0.5482	1.1396

<b>Fineness Modulus</b>
0.94

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	1.9	7.3	24.5	63.6	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	98.2		
#4	97.3		
#10	95.4		
#20	93.3		
#40	88.1		
#60	78.2		
#100	70.4		
#200	63.6		

**Material Description**

Gray Sandy Silt

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= ML      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.4963      D<sub>85</sub>= 0.3542      D<sub>60</sub>= \_\_\_\_\_  
D<sub>50</sub>= \_\_\_\_\_      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/11/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-17  
Sample Number: HMA#7514-40/S-4

Depth: 20'-20.4'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
---	--

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-17

Depth: 20'-20.4'

Sample Number: HMA#7514-40/S-4

Material Description: Gray Sandy Silt

Date Received: 5/30/13

USCS Classification: ML

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/11/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 676.00  
 Tare Wt. = 595.70  
 Minus #200 from wash = 61.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
806.70	595.70	3/4"	0.00	0.00	100.0
		1/2"	1423.20	1419.50	98.2
		#4	1359.00	1357.00	97.3
		#10	1518.50	1514.40	95.4
		#20	1071.60	1067.20	93.3
		#40	955.80	944.80	88.1
		#60	899.00	878.30	78.2
		#100	860.00	843.40	70.4
		#200	1033.90	1019.70	63.6

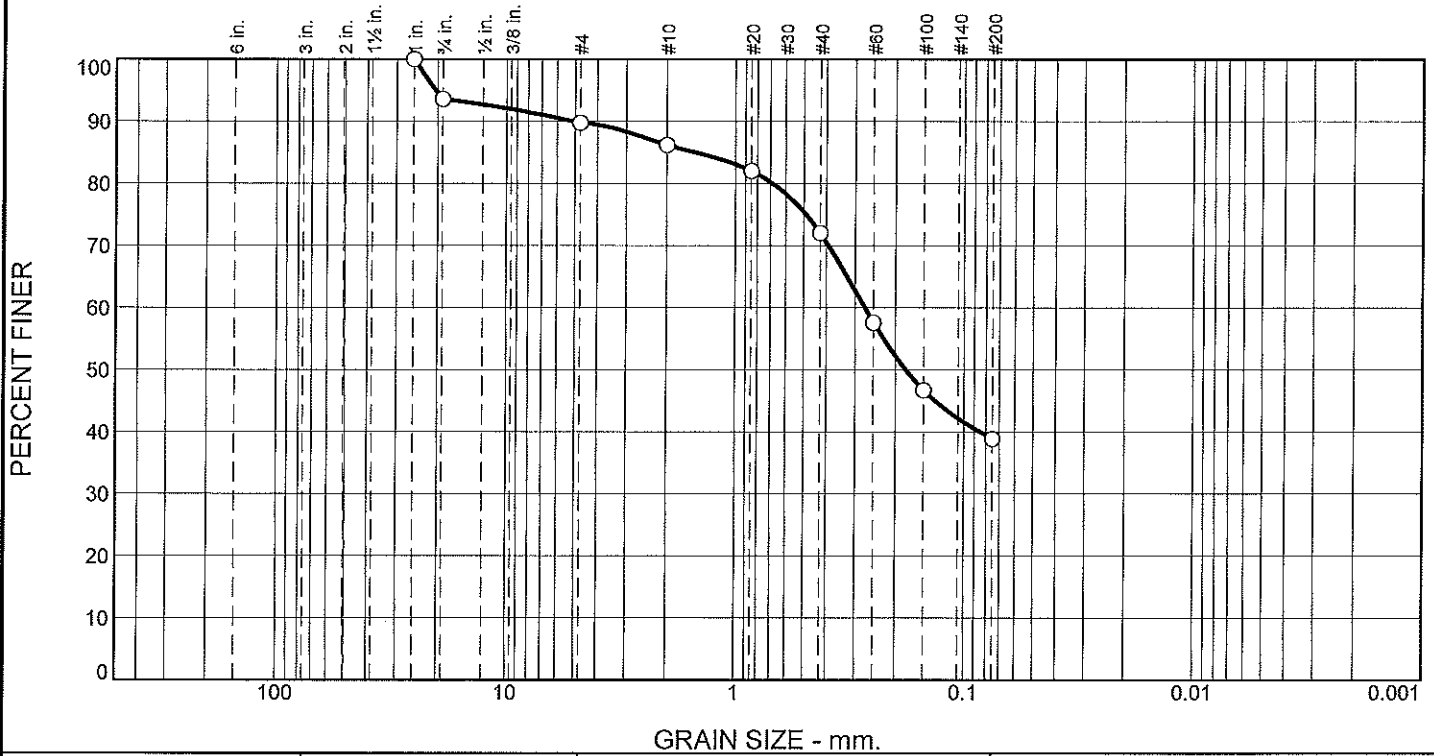
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.7	2.7	1.9	7.3	24.5	33.7			63.6

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
						0.2740	0.3542	0.4963	1.7128

<b>Fineness Modulus</b>
0.71

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	3.9	3.5	14.2	33.2	38.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
3/4"	93.6		
#4	89.7		
#10	86.2		
#20	82.0		
#40	72.0		
#60	57.6		
#100	46.7		
#200	38.8		

\* (no specification provided)

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 5.1177      D<sub>85</sub>= 1.5104      D<sub>60</sub>= 0.2733  
D<sub>50</sub>= 0.1804      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/11/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-017  
Sample Number: HMA#7514-41/S-9

Depth: 45'-45.4'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

11/13/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450

Location: Boring E330-B-017  
 Depth: 45'-45.4'

Sample Number: HMA#7514-41/S-9

Material Description: Gray Silty Sand  
 Date Received: 5/30/13

AASHTO Classification: A-4(0)

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/11/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 755.70  
 Tare Wt. = 621.40  
 Minus #200 from wash = 38.7%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
840.60	621.40	1"	0.00	0.00	100.0
		3/4"	1433.60	1419.50	93.6
		#4	1365.30	1356.90	89.7
		#10	1522.20	1514.40	86.2
		#20	1076.20	1067.00	82.0
		#40	966.30	944.40	72.0
		#60	909.80	878.20	57.6
		#100	867.00	843.10	46.7
		#200	1036.80	1019.60	38.8

**Fractional Components**

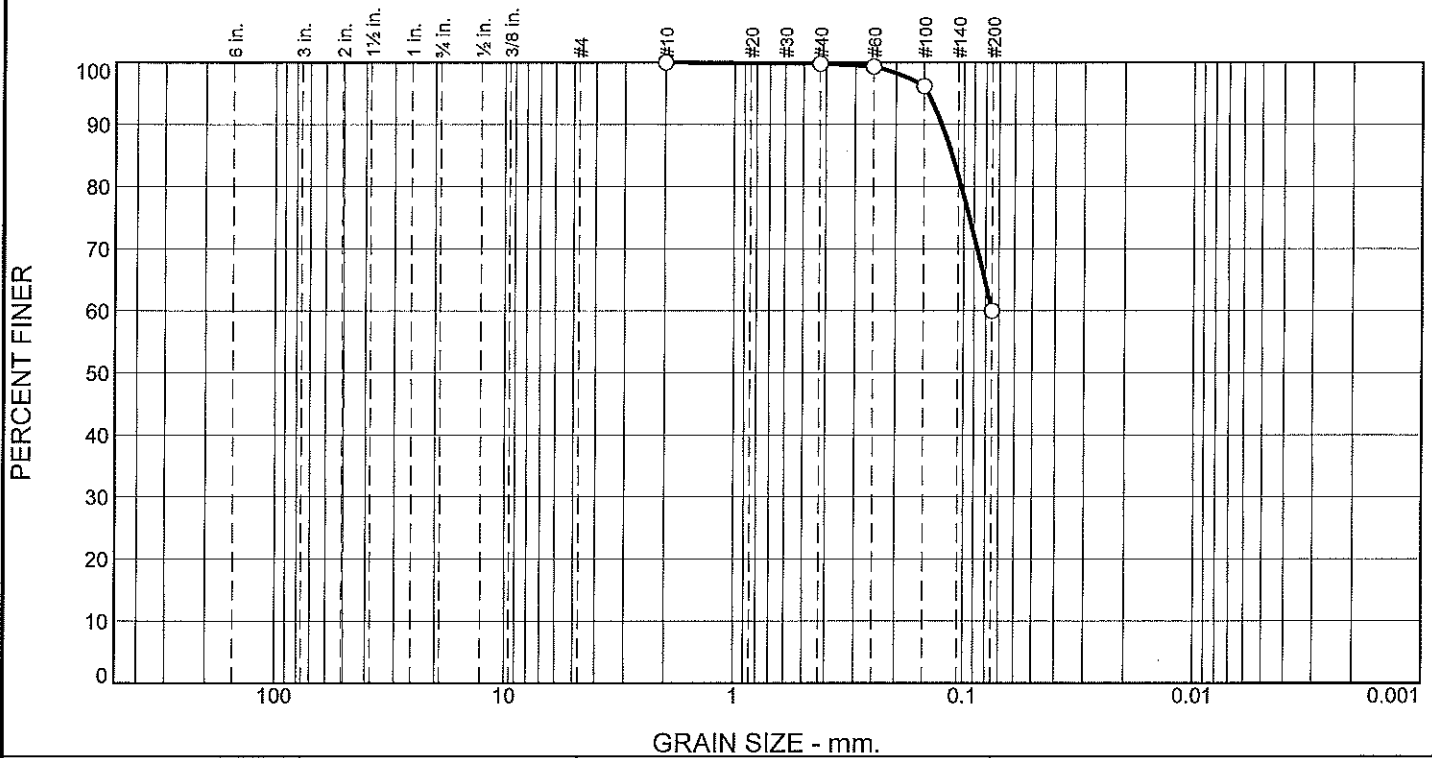
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	6.4	3.9	10.3	3.5	14.2	33.2	50.9			38.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1804	0.2733	0.6874	1.5104	5.1177	20.4828

Fineness Modulus
1.66



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	39.8	60.0	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#40	99.8		
#60	99.3		
#100	96.2		
#200	60.0		

**Material Description**

Gray Silt

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= ML                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.1254                      D<sub>85</sub>= 0.1129                      D<sub>60</sub>= 0.0750  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/11/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-017  
Sample Number: HMA#7514-42/S-14

Depth: 70'-71'

Date Sampled:

**Hayre McElroy & Associates, LLC**  
Redmond, WA

Client: Golder Associates  
Project: Sound Transit East Link  
Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

11/13/2013

Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450

Location: Boring E330-B-017  
 Depth: 70'-71'

Sample Number: HMA#7514-42/S-14

Material Description: Gray Silt

Date Received: 5/30/13

AASHTO Classification: A-4(0)

USCS Classification: ML

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/11/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 382.00  
 Tare Wt. = 213.10  
 Minus #200 from wash = 47.6%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
535.70	213.10	#10	0.00	0.00	100.0
		#40	945.10	944.50	99.8
		#60	879.60	878.00	99.3
		#100	853.20	843.10	96.2
		#200	1136.30	1019.50	60.0

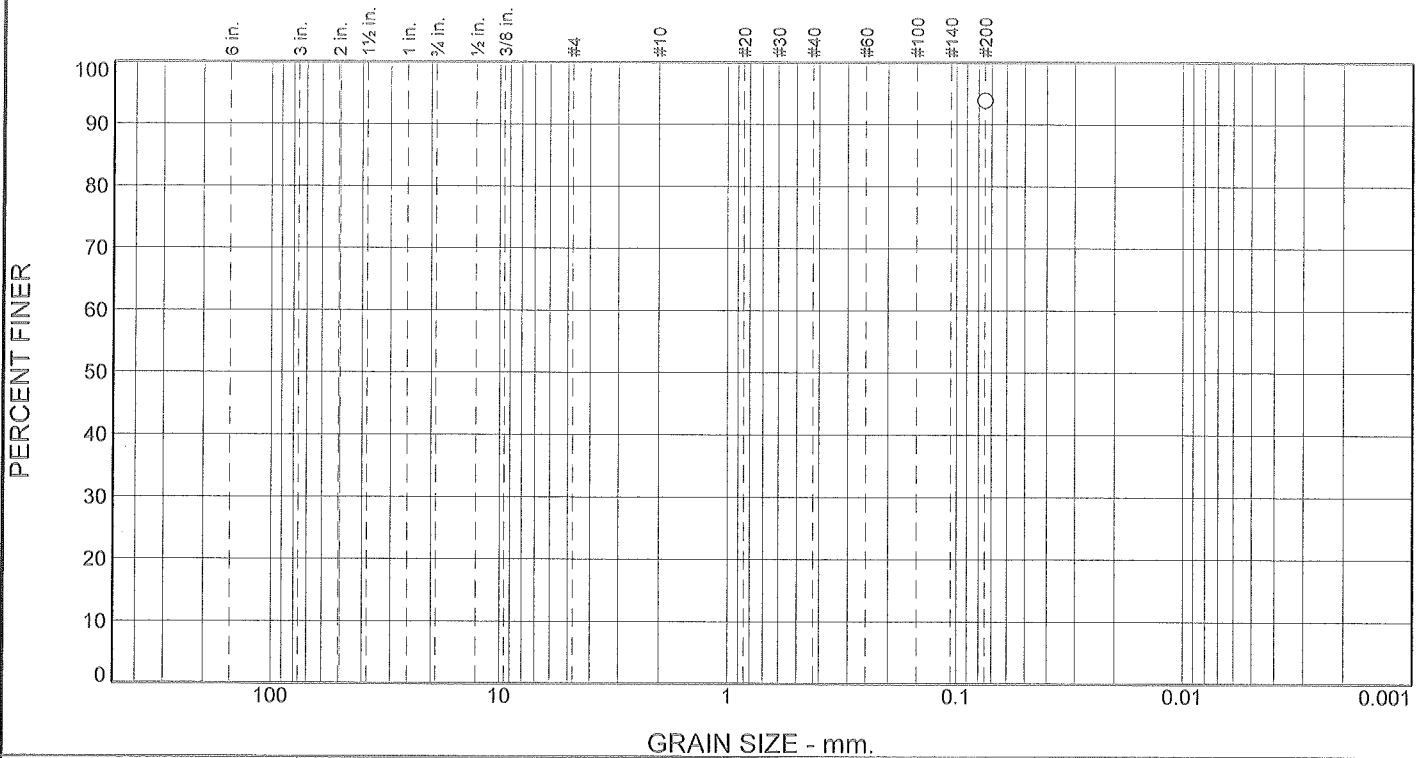
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.2	39.8	40.0			60.0

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
					0.0750	0.1031	0.1129	0.1254	0.1437

<b>Fineness Modulus</b>
0.05

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						93.9	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#200	93.9		

**Material Description**

Gray Clay

**Atterberg Limits (ASTM D 4318)**

PL= 25                      LL= 41                      PI= 16

**Classification**

USCS (D 2487)= CL or OL    AASHTO (M 145)=

**Coefficients**

D<sub>90</sub>=                      D<sub>85</sub>=                      D<sub>60</sub>=  
D<sub>50</sub>=                      D<sub>30</sub>=                      D<sub>15</sub>=  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/11/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-17                      Depth: 85'-85.8'                      Date Sampled:

Sample Number: HMA#7514-43/S-17

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	Client: Golder Associates Project: Sound Transit East Link  Project No: 12-450
---	---

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-17

Depth: 85'-85.8'

Sample Number: HMA#7514-43/S-17

Material Description: Gray Clay

Date Received: 5/30/13      PL: 25

LL: 41

PI: 16

USCS Classification: CL or OL

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/11/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 35.50

Tare Wt. = 31.20

Minus #200 from wash = 93.9%

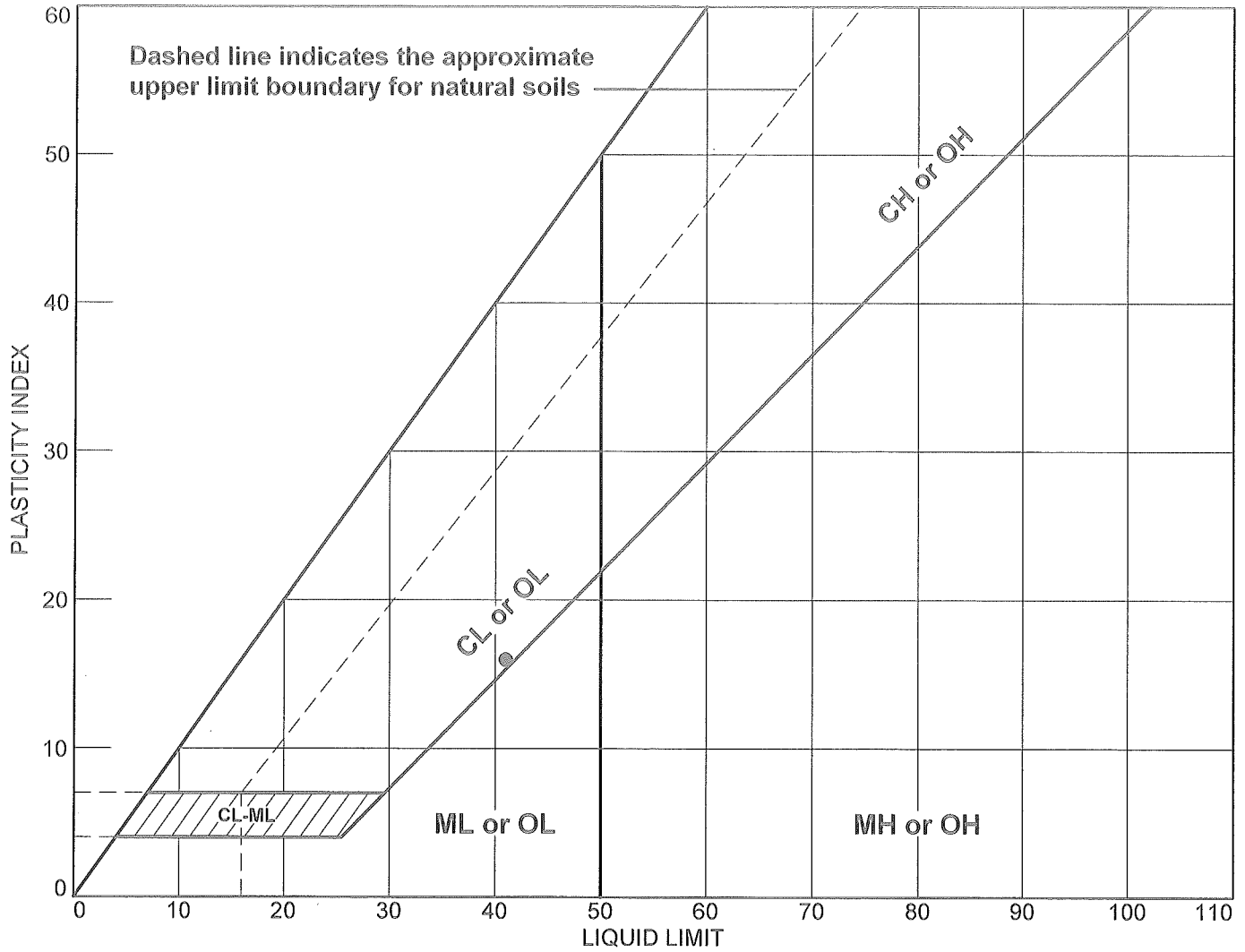
Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
101.90	31.20	#200			93.9

**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
										93.9

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring E330-B-17	HMA#7514-43/S-17	85'-85.8'	22.6	25	41	16	CL or OL

**Hayre McElroy & Associates, LLC**

**Redmond, WA**

**Client:** Golder Associates  
**Project:** Sound Transit East Link

**Project No.:** 12-450

**Figure**

Tested By: JF/TP

Checked By: JAM

**LIQUID AND PLASTIC LIMIT TEST DATA**

6/17/2013

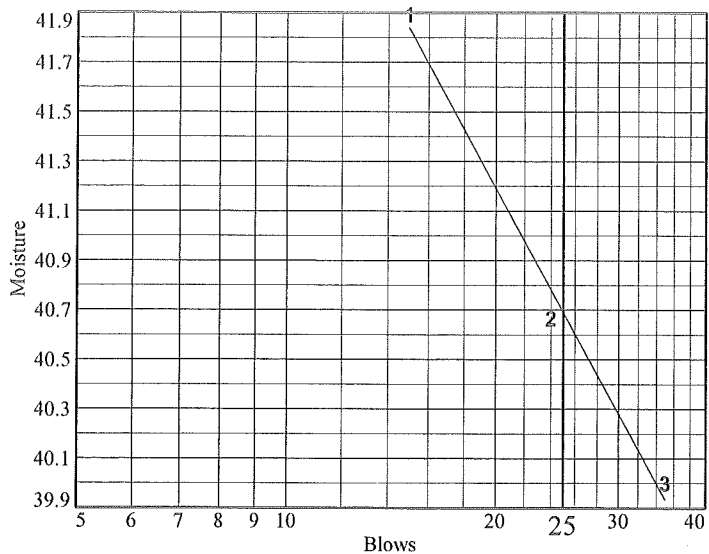
Client: Golder Associates  
 Project: Sound Transit East Link  
 Project Number: 12-450  
 Location: Boring E330-B-17  
 Depth: 85'-85.8'  
 Material Description: Gray Clay  
 USCS: CL or OL  
 Tested by: JF/TP

Sample Number: HMA#7514-43/S-17

Checked by: JAM

**Liquid Limit Data**

Run No.	1	2	3	4	5	6
Wet+Tare	34.8	34.8	35.9			
Dry+Tare	28.6	28.7	29.5			
Tare	13.8	13.7	13.5			
# Blows	15	24	35			
Moisture	41.9	40.7	40.0			



Liquid Limit= 41  
 Plastic Limit= 25  
 Plasticity Index= 16  
 Natural Moisture= 22.6  
 Liquidity Index= -0.1

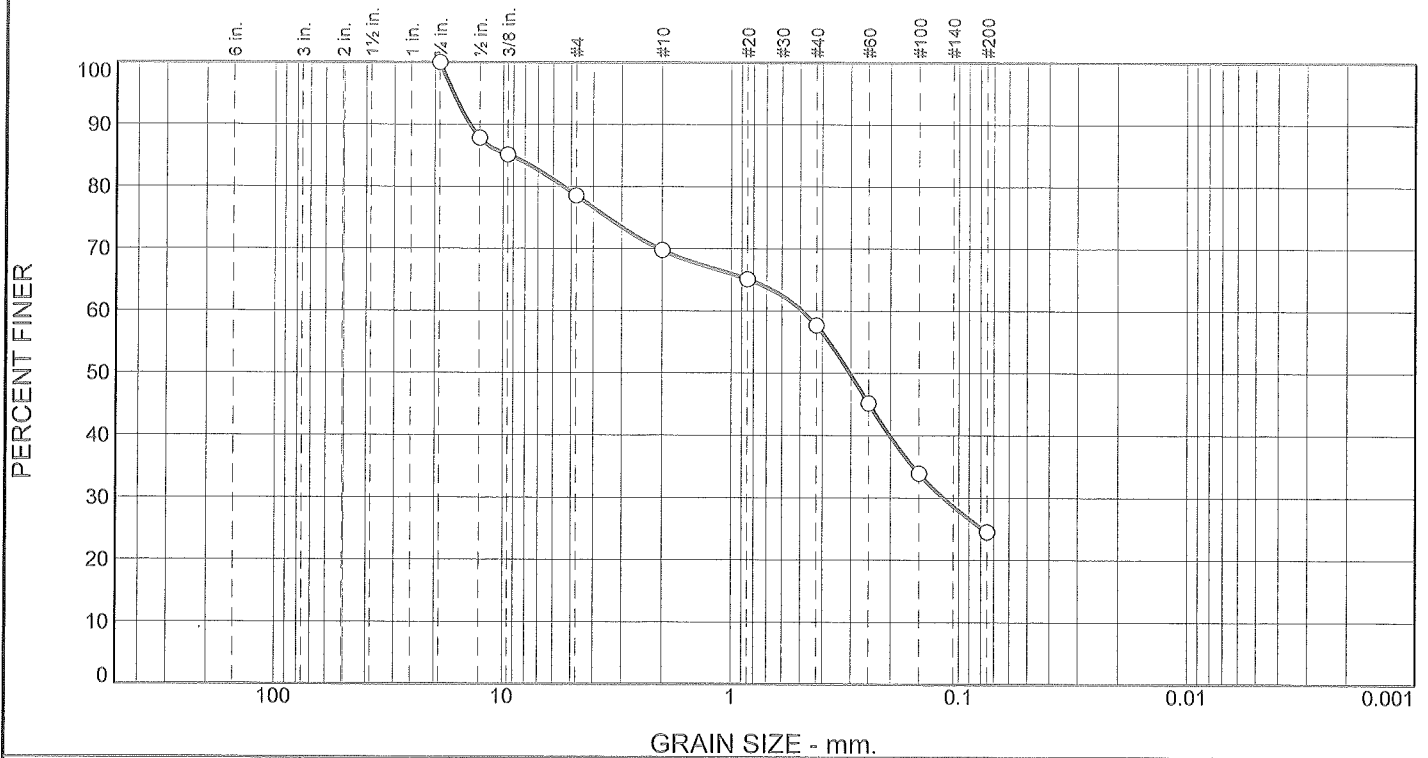
**Plastic Limit Data**

Run No.	1	2	3	4
Wet+Tare	18.4	18.1	19.2	
Dry+Tare	17	16.7	17.6	
Tare	11.3	11.3	11.2	
Moisture	24.6	25.9	25.0	

**Natural Moisture Data**

Wet+Tare	Dry+Tare	Tare	Moisture
117.9	101.9	31.2	22.6

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.4	8.9	12.0	33.2	24.5	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	87.8		
3/8"	85.1		
#4	78.6		
#10	69.7		
#20	65.1		
#40	57.7		
#60	45.2		
#100	34.0		
#200	24.5		

**Material Description**

Olive Brown Silty Sand W/Gravel

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 14.0286      D<sub>85</sub>= 9.3479      D<sub>60</sub>= 0.4894  
D<sub>50</sub>= 0.3027      D<sub>30</sub>= 0.1171      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks

---

Date Received: 5/30/13      Date Tested: 6/11/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-18  
Sample Number: HMA#7514-44/S-3

Depth: 5'-6.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

**Client:** Golder Associates

**Project:** Sound Transit East Link

**Project Number:** 12-450

**Location:** Boring E330-B-18

**Depth:** 5'-6.5'

**Sample Number:** HMA#7514-44/S-3

**Material Description:** Olive Brown Silty Sand W/Gravel

**Date Received:** 5/30/13

**USCS Classification:** SM

**AASHTO Classification:** A-2-4(0)

**Grain Size Test Method:** ASTM C136

**#200 Wash Method:** ASTM D1140

**Tested By:** JF/TP

**Test Date:** 6/11/13

**Checked By:** JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 360.90  
 Tare Wt. = 118.30  
 Minus #200 from wash = 23.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
435.50	118.30	3/4"	0.00	0.00	100.0
		1/2"	1458.10	1419.50	87.8
		3/8"	1492.20	1483.60	85.1
		#4	1377.70	1356.90	78.6
		#10	1542.40	1514.40	69.7
		#20	1081.80	1067.10	65.1
		#40	968.20	944.60	57.7
		#60	917.80	878.20	45.2
		#100	878.70	843.10	34.0
		#200	1049.60	1019.70	24.5

**Fractional Components**

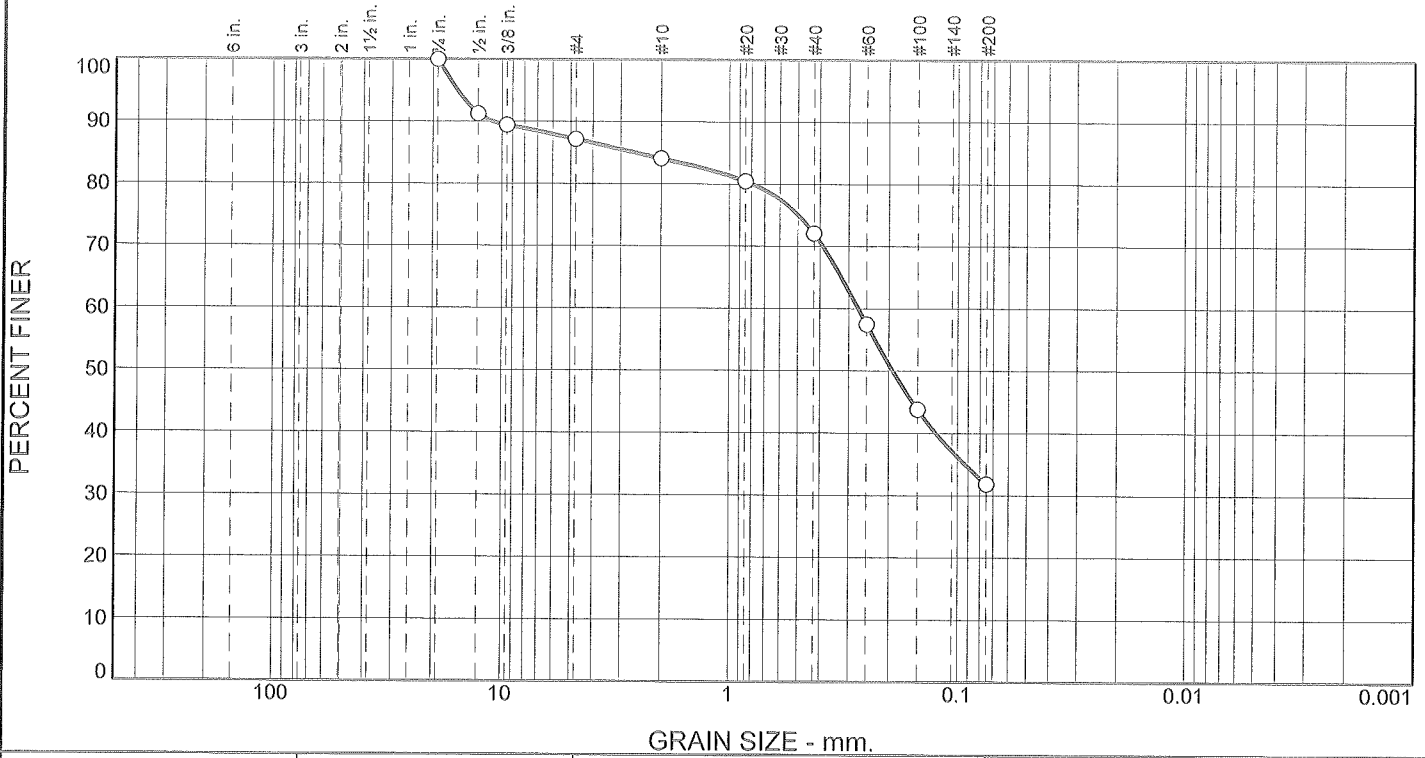
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	21.4	21.4	8.9	12.0	33.2	54.1			24.5

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
			0.1171	0.3027	0.4894	5.4055	9.3479	14.0286	16.5450

<b>Fineness Modulus</b>
2.52



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.8	3.1	12.0	40.3	31.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	91.2		
3/8"	89.4		
#4	87.2		
#10	84.1		
#20	80.4		
#40	72.1		
#60	57.5		
#100	43.8		
#200	31.8		

**Material Description**

Gray Brown Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D<sub>90</sub>= 10.9918      D<sub>85</sub>= 2.5968      D<sub>60</sub>= 0.2720  
D<sub>50</sub>= 0.1924      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


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Date Received: 5/30/13      Date Tested: 6/12/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-18  
Sample Number: HMA#7514-45/S-6

Depth: 12.5'-13.8'

Date Sampled:

<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450
---	--

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-18

Depth: 12.5'-13.8'

Sample Number: HMA#7514-45/S-6

Material Description: Gray Brown Silty Sand

Date Received: 5/30/13

AASHTO Classification: A-2-4(0)

USCS Classification: SM

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/12/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 438.70  
 Tare Wt. = 120.30  
 Minus #200 from wash = 31.3%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
583.80	120.30	3/4"	0.00	0.00	100.0
		1/2"	1459.90	1419.30	91.2
		3/8"	1491.80	1483.50	89.4
		#4	1367.40	1356.80	87.2
		#10	1528.30	1514.00	84.1
		#20	1084.00	1067.10	80.4
		#40	983.30	944.60	72.1
		#60	945.90	878.20	57.5
		#100	906.60	843.20	43.8
		#200	1075.00	1019.60	31.8

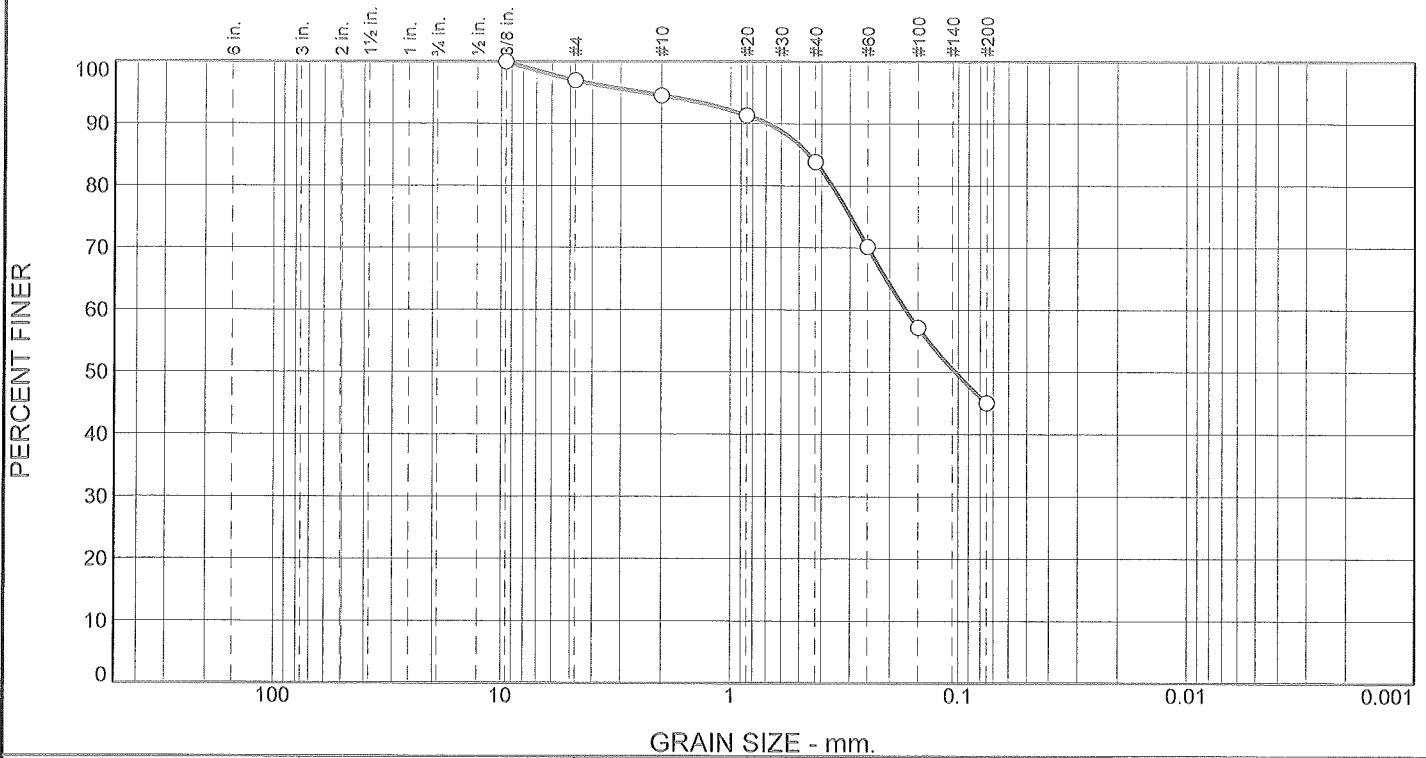
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	12.8	12.8	3.1	12.0	40.3	55.4			31.8

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1924	0.2720	0.7946	2.5968	10.9918	15.5986

<b>Fineness Modulus</b>
1.72

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.0	2.5	10.7	38.8	45.0	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	97.0		
#10	94.5		
#20	91.4		
#40	83.8		
#60	70.2		
#100	57.2		
#200	45.0		

**Material Description**

Gray Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SM                      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.6863                      D<sub>85</sub>= 0.4522                      D<sub>60</sub>= 0.1696  
D<sub>50</sub>= 0.1026                      D<sub>30</sub>=                                      D<sub>15</sub>=  
D<sub>10</sub>=                                      C<sub>u</sub>=                                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13                      Date Tested: 6/12/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-18  
Sample Number: HMA#7514-46/S-12

Depth: 40'-40.3'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-18

Depth: 40'-40.3'

Sample Number: HMA#7514-46/S-12

Material Description: Gray Silty Sand

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/12/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 302.50  
 Tare Wt. = 199.00  
 Minus #200 from wash = 44.1%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
384.00	199.00	3/8"	0.00	0.00	100.0
		#4	1362.60	1357.00	97.0
		#10	1518.90	1514.40	94.5
		#20	1072.90	1067.00	91.4
		#40	958.50	944.60	83.8
		#60	903.50	878.20	70.2
		#100	867.10	843.10	57.2
		#200	1042.10	1019.60	45.0

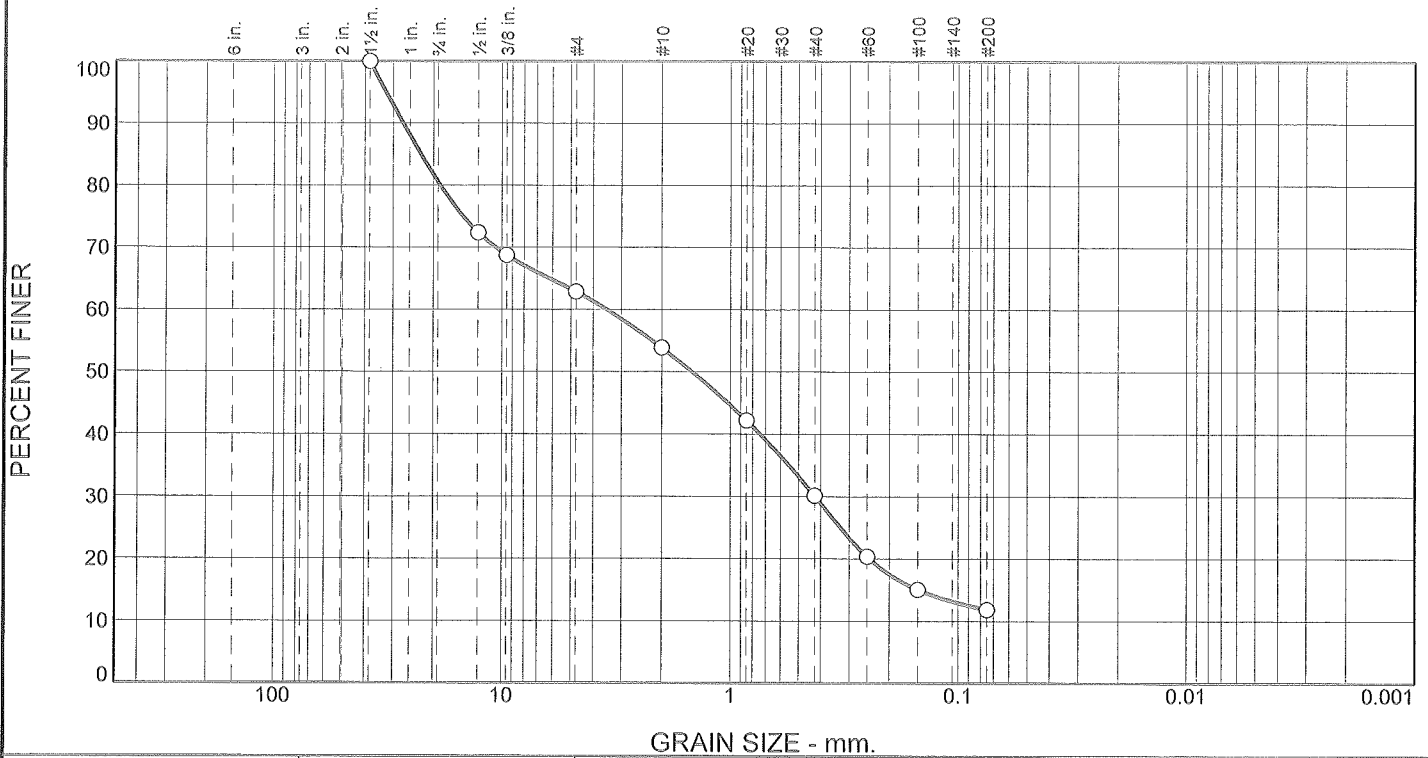
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.0	3.0	2.5	10.7	38.8	52.0			45.0

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
				0.1026	0.1696	0.3585	0.4522	0.6863	2.3889

<b>Fineness Modulus</b>
0.94

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.4	17.7	9.0	23.8	18.3	11.8	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1 1/2"	100.0		
1/2"	72.4		
3/8"	68.8		
#4	62.9		
#10	53.9		
#20	42.2		
#40	30.1		
#60	20.3		
#100	15.1		
#200	11.8		

\* (no specification provided)

**Material Description**

Gray Poorly Graded Sand W/Silt & Gravel

**Atterberg Limits (ASTM D 4318)**

PL=                      LL=                      PI=

**Classification**

USCS (D 2487)= SP-SM    AASHTO (M 145)= A-1-b

**Coefficients**

D<sub>90</sub>= 27.1412      D<sub>85</sub>= 22.6610      D<sub>60</sub>= 3.4824  
D<sub>50</sub>= 1.4694      D<sub>30</sub>= 0.4218      D<sub>15</sub>= 0.1484  
D<sub>10</sub>=                      C<sub>u</sub>=                      C<sub>c</sub>=

Remarks

---

Date Received: 5/30/13      Date Tested: 6/12/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

Source of Sample: Boring E330-B-18  
Sample Number: HMA#7514-47/S-17

Depth: 65'-65.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-18

Depth: 65'-65.5'

Sample Number: HMA#7514-47/S-17

Material Description: Gray Poorly Graded Sand W/Silt & Gravel

Date Received: 5/30/13

USCS Classification: SP-SM

AASHTO Classification: A-1-b

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/12/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 258.60  
 Tare Wt. = 114.10  
 Minus #200 from wash = 11.5%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
277.30	114.10	1 1/2"	0.00	0.00	100.0
		1/2"	1464.60	1419.50	72.4
		3/8"	1489.60	1483.70	68.8
		#4	1366.50	1356.90	62.9
		#10	1529.10	1514.40	53.9
		#20	1086.10	1067.10	42.2
		#40	964.20	944.50	30.1
		#60	894.10	878.10	20.3
		#100	851.70	843.10	15.1
		#200	1024.80	1019.50	11.8

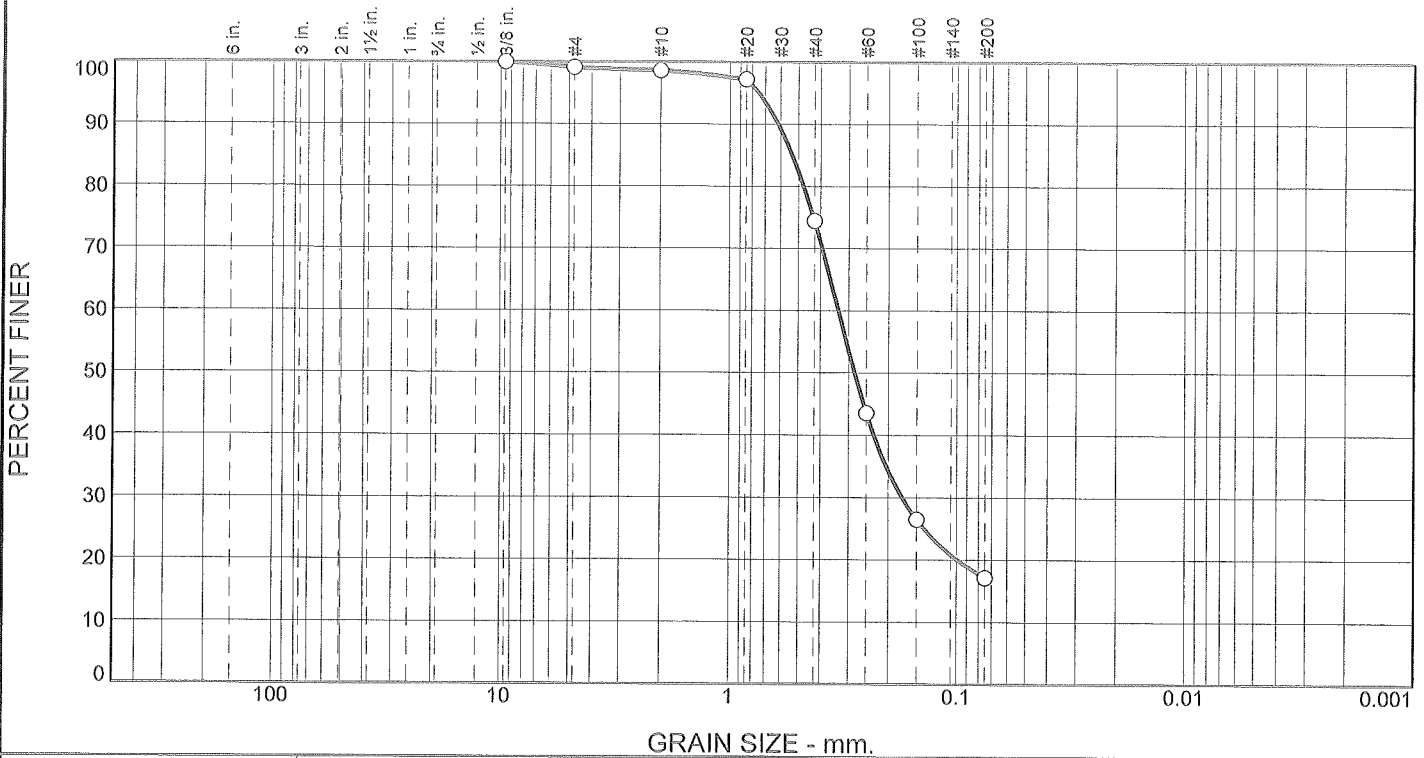
**Fractional Components**

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	19.4	17.7	37.1	9.0	23.8	18.3	51.1			11.8

D <sub>10</sub>	D <sub>15</sub>	D <sub>20</sub>	D <sub>30</sub>	D <sub>50</sub>	D <sub>60</sub>	D <sub>80</sub>	D <sub>85</sub>	D <sub>90</sub>	D <sub>95</sub>
	0.1484	0.2442	0.4218	1.4694	3.4824	18.6054	22.6610	27.1412	32.2202

<b>Fineness Modulus</b>
4.10

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	0.4	24.3	57.3	17.1	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.1		
#10	98.7		
#20	97.2		
#40	74.4		
#60	43.5		
#100	26.5		
#200	17.1		

**Material Description**

Gray Brown Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-2-4(0)

**Coefficients**

D <sub>90</sub> = 0.6149	D <sub>85</sub> = 0.5334	D <sub>60</sub> = 0.3327
D <sub>50</sub> = 0.2818	D <sub>30</sub> = 0.1738	D <sub>15</sub> = _____
D <sub>10</sub> = _____	C <sub>u</sub> = _____	C <sub>c</sub> = _____

Remarks

Date Received: 5/30/13      Date Tested: 6/12/13

Tested By: JF/TP

Checked By: JAM

Title: \_\_\_\_\_

\* (no specification provided)

<b>Source of Sample:</b> Boring E330-B-18 <b>Sample Number:</b> HMA#7514-48/S-21	<b>Depth:</b> 85'-85.5'	<b>Date Sampled:</b>
<b>Hayre McElroy &amp; Associates, LLC</b>  Redmond, WA	<b>Client:</b> Golder Associates <b>Project:</b> Sound Transit East Link  <b>Project No:</b> 12-450	<b>Figure</b>

**GRAIN SIZE DISTRIBUTION TEST DATA**

6/17/2013

Client: Golder Associates

Project: Sound Transit East Link

Project Number: 12-450

Location: Boring E330-B-18

Depth: 85'-85.5'

Sample Number: HMA#7514-48/S-21

Material Description: Gray Brown Silty Sand

Date Received: 5/30/13

USCS Classification: SM

AASHTO Classification: A-2-4(0)

Grain Size Test Method: ASTM C136

#200 Wash Method: ASTM D1140

Tested By: JF/TP

Test Date: 6/12/13

Checked By: JAM

**Sieve Test Data**

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 304.10  
 Tare Wt. = 217.30  
 Minus #200 from wash = 16.9%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
321.80	217.30	3/8"	0.00	0.00	100.0
		#4	1357.70	1356.80	99.1
		#10	1514.80	1514.30	98.7
		#20	1068.50	1067.00	97.2
		#40	968.20	944.40	74.4
		#60	910.40	878.10	43.5
		#100	860.90	843.10	26.5
		#200	1029.30	1019.50	17.1

**Fractional Components**

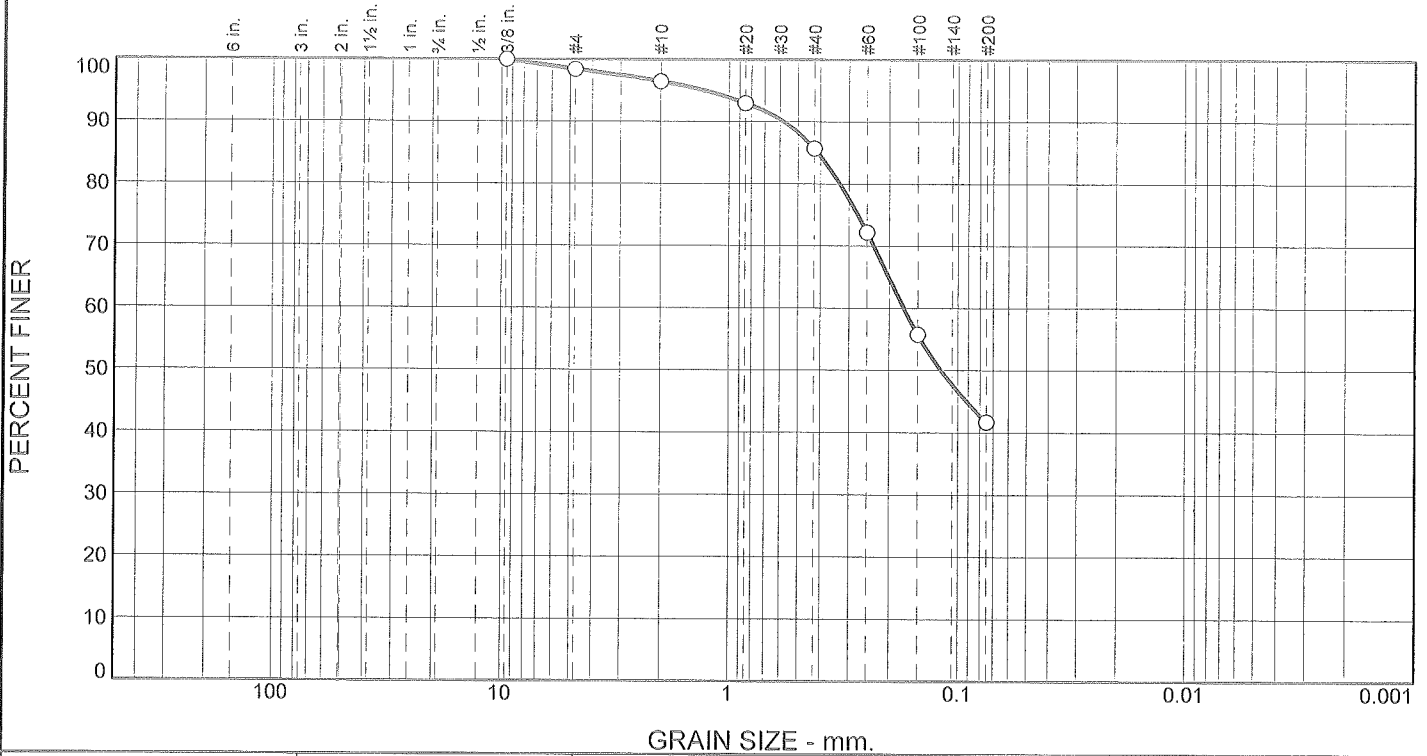
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.9	0.9	0.4	24.3	57.3	82.0			17.1

D10	D15	D20	D30	D50	D60	D80	D85	D90	D95
		0.0989	0.1738	0.2818	0.3327	0.4748	0.5334	0.6149	0.7470

<b>Fineness Modulus</b>
1.35



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	1.9	10.8	44.0	41.7	

Test Results (ASTM C136 & ASTM D1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	98.4		
#10	96.5		
#20	93.0		
#40	85.7		
#60	72.2		
#100	55.8		
#200	41.7		

**Material Description**

Olive Brown Silty Sand

**Atterberg Limits (ASTM D 4318)**

PL= \_\_\_\_\_ LL= \_\_\_\_\_ PI= \_\_\_\_\_

**Classification**

USCS (D 2487)= SM      AASHTO (M 145)= A-4(0)

**Coefficients**

D<sub>90</sub>= 0.5771      D<sub>85</sub>= 0.4101      D<sub>60</sub>= 0.1726  
D<sub>50</sub>= 0.1186      D<sub>30</sub>= \_\_\_\_\_      D<sub>15</sub>= \_\_\_\_\_  
D<sub>10</sub>= \_\_\_\_\_      C<sub>u</sub>= \_\_\_\_\_      C<sub>c</sub>= \_\_\_\_\_

Remarks


---

Date Received: 5/30/13      Date Tested: 6/12/13  
Tested By: JF/TP  
Checked By: JAM  
Title: \_\_\_\_\_

\* (no specification provided)

Source of Sample: Boring E330-B-019  
Sample Number: HMA#7514-49/S-3

Depth: 5'-6.5'

Date Sampled:

**Hayre McElroy & Associates, LLC**

Client: Golder Associates  
Project: Sound Transit East Link

Redmond, WA

Project No: 12-450

Figure

SAMPLE IDENTIFICATION	Depth (ft)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			% GRAVEL	% SAND	% FINES	pH	RESISTIVITY ( $\Omega$ - cm)	ORGANIC CONTENT (%)	ASTM CLASSIFICATION <sup>1</sup>	SAMPLE DESCRIPTION <sup>1</sup>
			LL	PL	PI								
B-C-BTC-3p, SS-1	10.0-11.5	10				13.7	42.5	43.7				SM	Olive brown, silty SAND
B-C-BTC-3p, SS-3	20.0-21.5	9				11.9	46.5	41.7				SM	Olive brown, silty SAND
B-C-BTC-3p, SS-5	30.0-31.5	8				29.5	53.7	16.8				SM	Olive brown, silty SAND with gravel

1. Soil classification and descriptions based on ASTM D 2487 or D 2488, as appropriate

Note: This table summarizes information presented elsewhere in the report and should be used in conjunction with the report text, other graphs and tables, and the exploration logs.



HWA GEOSCIENCES INC.

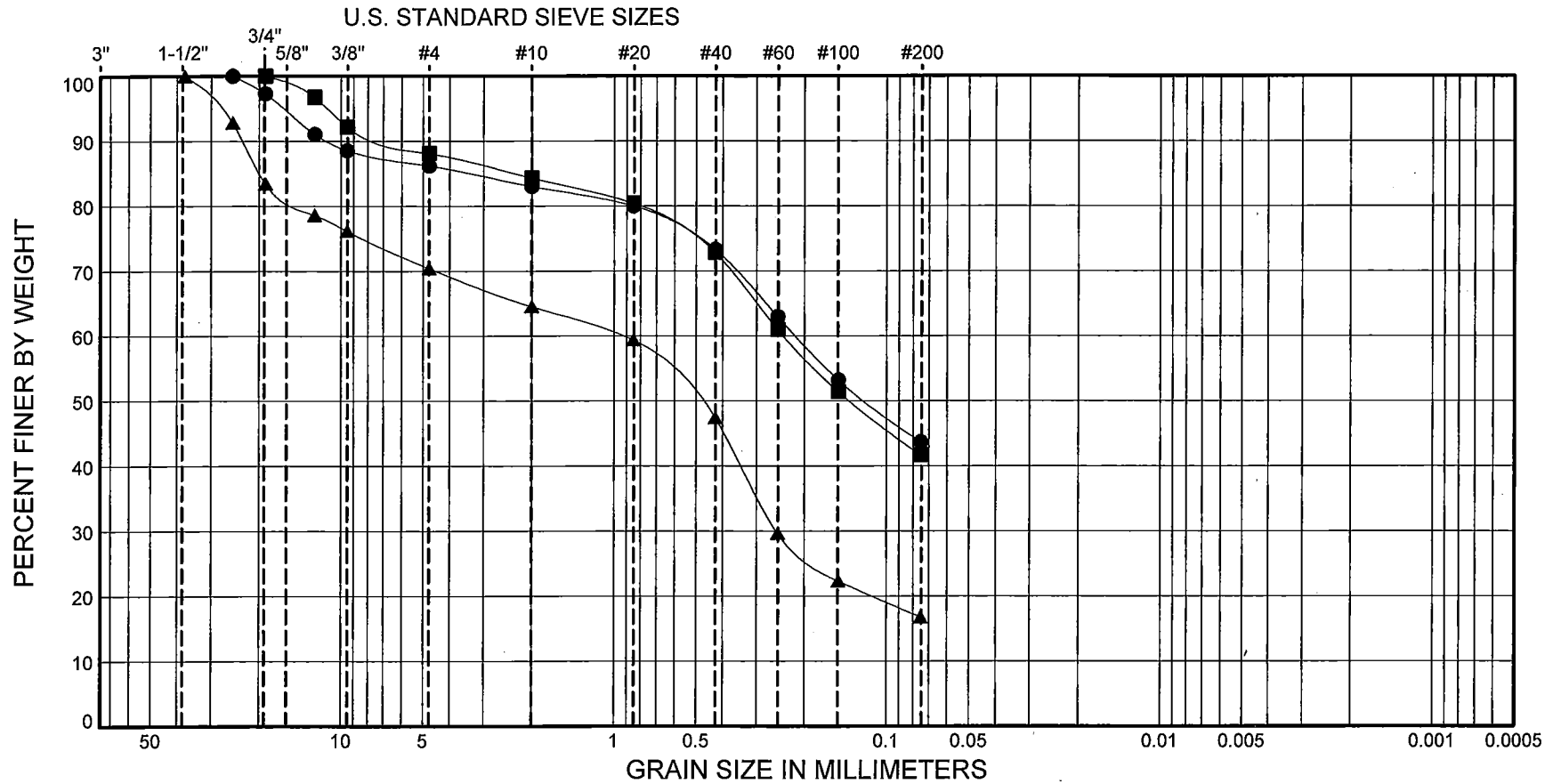
SUMMARY OF MATERIAL PROPERTIES

SOUND TRANSIT EASTLINK, PHASE 3  
KING COUNTY, WASHINGTON

BORING NAME  
B-C-BTC-3p

PROJECT NO.  
2009-142

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	B-C-BTC-3p SS-1	10.0 - 11.5	(SM) Olive brown, silty SAND	10				13.7	42.5	43.7
■	B-C-BTC-3p SS-3	20.0 - 21.5	(SM) Olive brown, silty SAND	9				11.9	46.5	41.7
▲	B-C-BTC-3p SS-5	30.0 - 31.5	(SM) Olive brown, silty SAND with gravel	8				29.5	53.7	16.8



SOUND TRANSIT EASTLINK, PHASE 3  
King County, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2009-142    BORING NAME: B-C-BTC-3p

SAMPLE IDENTIFICATION	Depth (ft)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			% GRAVEL	% SAND	% FINES	pH	RESISTIVITY ( $\Omega$ - cm)	ORGANIC CONTENT (%)	ASTM CLASSIFICATION <sup>1</sup>	SAMPLE DESCRIPTION <sup>1</sup>
			LL	PL	PI								
B-C-BTC-4p, SS-3	20.0-21.5	9				5.1	48.4	46.4				SM	Olive brown, silty SAND
B-C-BTC-4p, SS-5	30.0-31.5	7				19.9	56.8	23.3				SM	Dark gray, silty SAND with gravel
B-C-BTC-4p, SS-8	45.0-46.5	11				17.2	73.0	9.8				SW-SM	Dark olive brown, well graded SAND with silt and gravel
B-C-BTC-4p, SS-10	55.0-56.5	5				32.3	55.4	12.3				SM	Olive brown, silty SAND with gravel
B-C-BTC-4p, SS-11	60.0-61.5	7				39.6	50.9	9.5				SW-SM	Gray, well graded SAND with silt and gravel
B-C-BTC-4p, SS-12	65.0-66.5	27						40.3				SM	Dark gray, silty SAND
B-C-BTC-4p, SS-15	80.0-81.5	27						56.6				ML	Dark gray, sandy SILT
B-C-BTC-4p, SS-18	95.0-96.5	25						93.4				ML	Olive gray, SILT
B-C-BTC-4p, SS-20	105.0-106.5	31	41	24	17							CL	Gray, lean CLAY

1. Soil classification and descriptions based on ASTM D 2487 or D 2488, as appropriate

Note: This table summarizes information presented elsewhere in the report and should be used in conjunction with the report text, other graphs and tables, and the exploration logs.



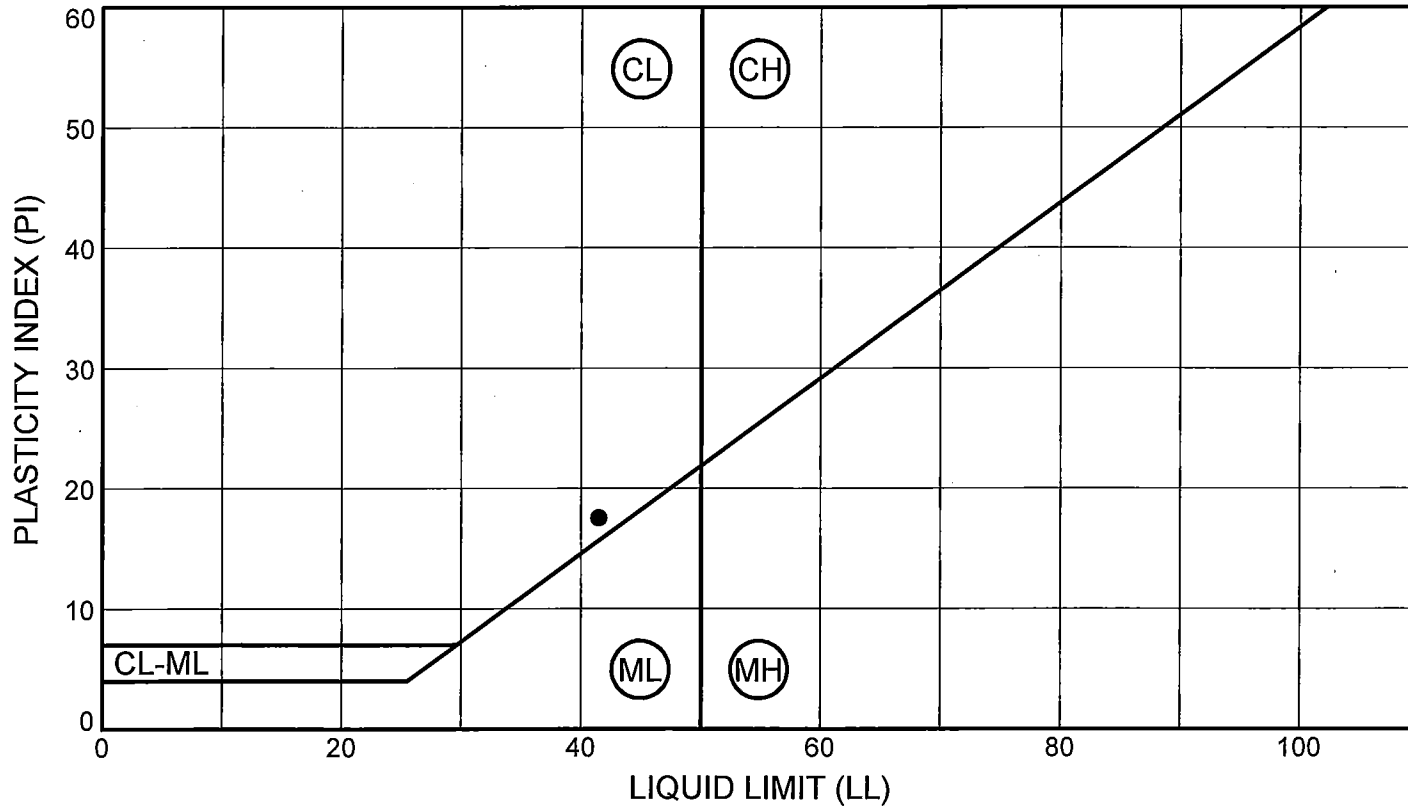
HWA GEOSCIENCES INC.

SUMMARY OF MATERIAL PROPERTIES

SOUND TRANSIT EASTLINK, PHASE 3  
KING COUNTY, WASHINGTON

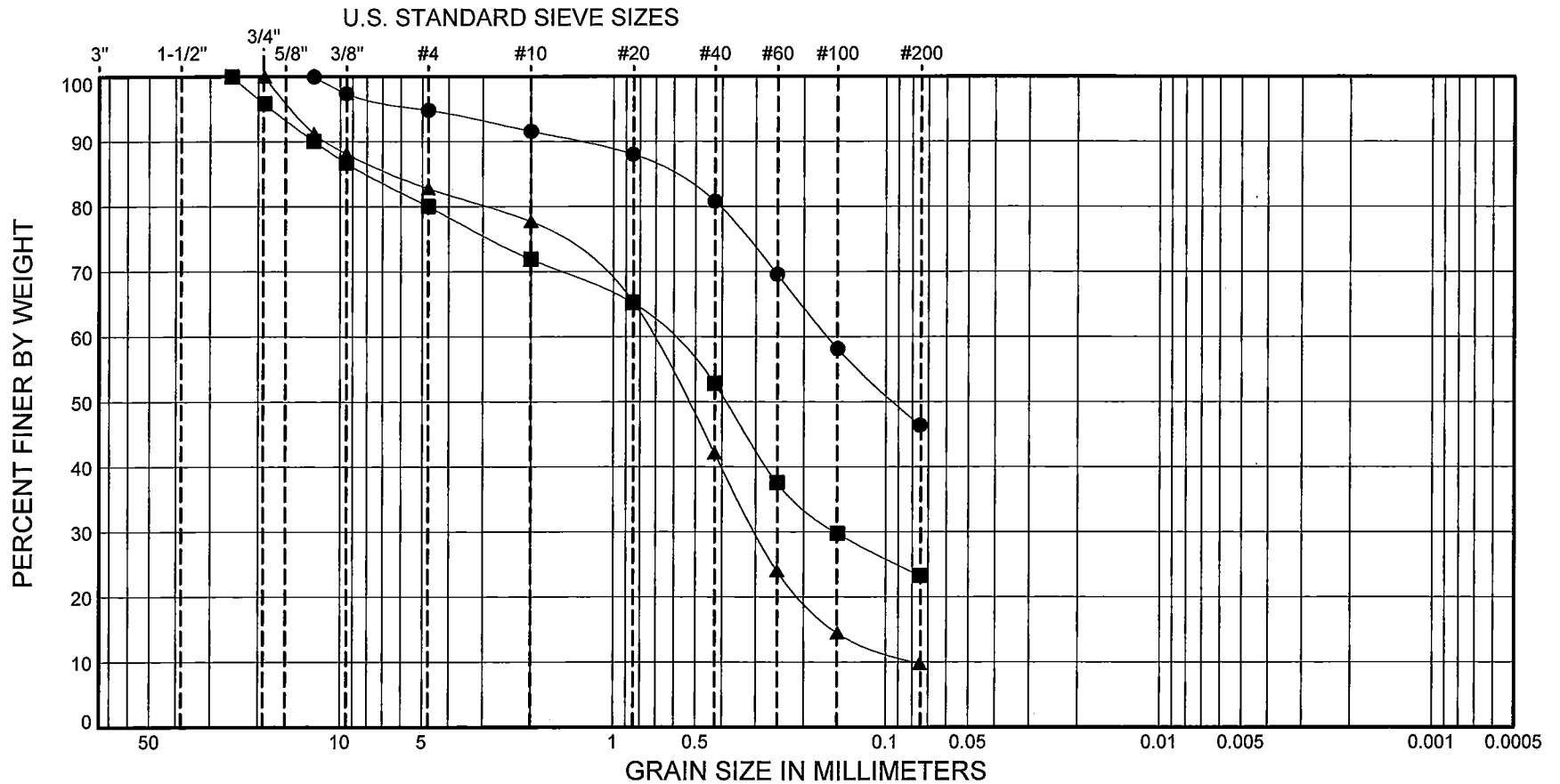
BORING NAME  
B-C-BTC-4p

PROJECT NO.  
2009-142



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION	% MC	LL	PL	PI	% Fines
●	B-C-BTC-4p SS-20	105.0 - 106.5	(CL) Gray, lean CLAY	31	41	24	17	

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	B-C-BTC-4p SS-3	20.0 - 21.5	(SM) Olive brown, silty SAND	9				5.1	48.4	46.4
■	B-C-BTC-4p SS-5	30.0 - 31.5	(SM) Dark gray, silty SAND with gravel	7				19.9	56.8	23.3
▲	B-C-BTC-4p SS-8	45.0 - 46.5	(SW-SM) Dark olive brown, well graded SAND with silt and gravel	11				17.2	73.0	9.8

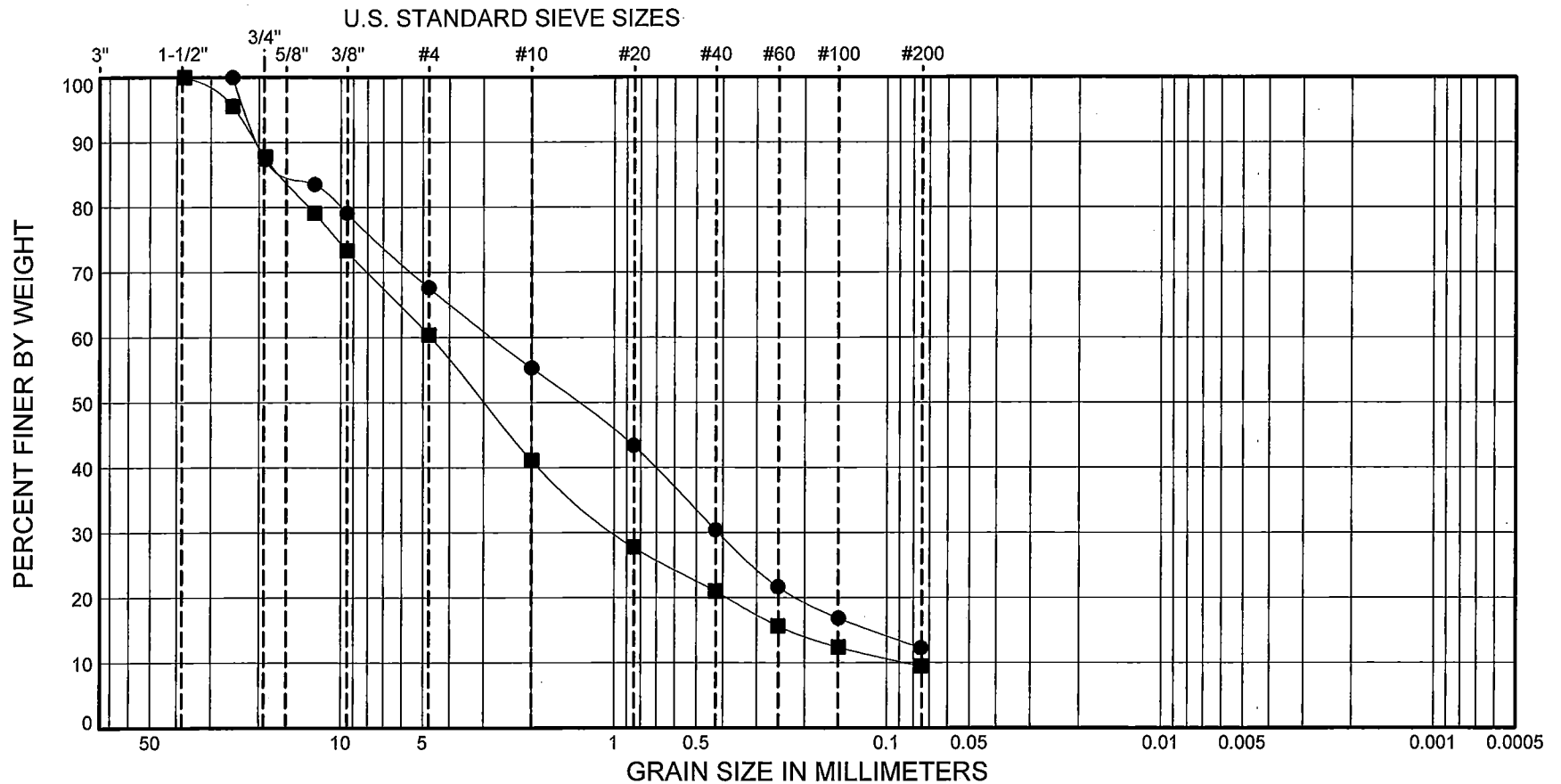


SOUND TRANSIT EASTLINK, PHASE 3  
King County, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2009-142    BORING NAME: B-C-BTC-4p

GRAVEL		SAND			SILT	CLAY
Coarse	Fine	Coarse	Medium	Fine		



SYMBOL	SAMPLE	DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	B-C-BTC-4p SS-10	55.0 - 56.5	(SM) Olive brown, silty SAND with gravel	5				32.3	55.4	12.3
■	B-C-BTC-4p SS-11	60.0 - 61.5	(SW-SM) Gray, well graded SAND with silt and gravel	7				39.6	50.9	9.5



SOUND TRANSIT EASTLINK, PHASE 3  
King County, Washington

PARTICLE-SIZE ANALYSIS  
OF SOILS  
METHOD ASTM D422

PROJECT NO.: 2009-142 BORING NAME: B-C-BTC-4p

# APPENDIX A.3

## Groundwater Measurements

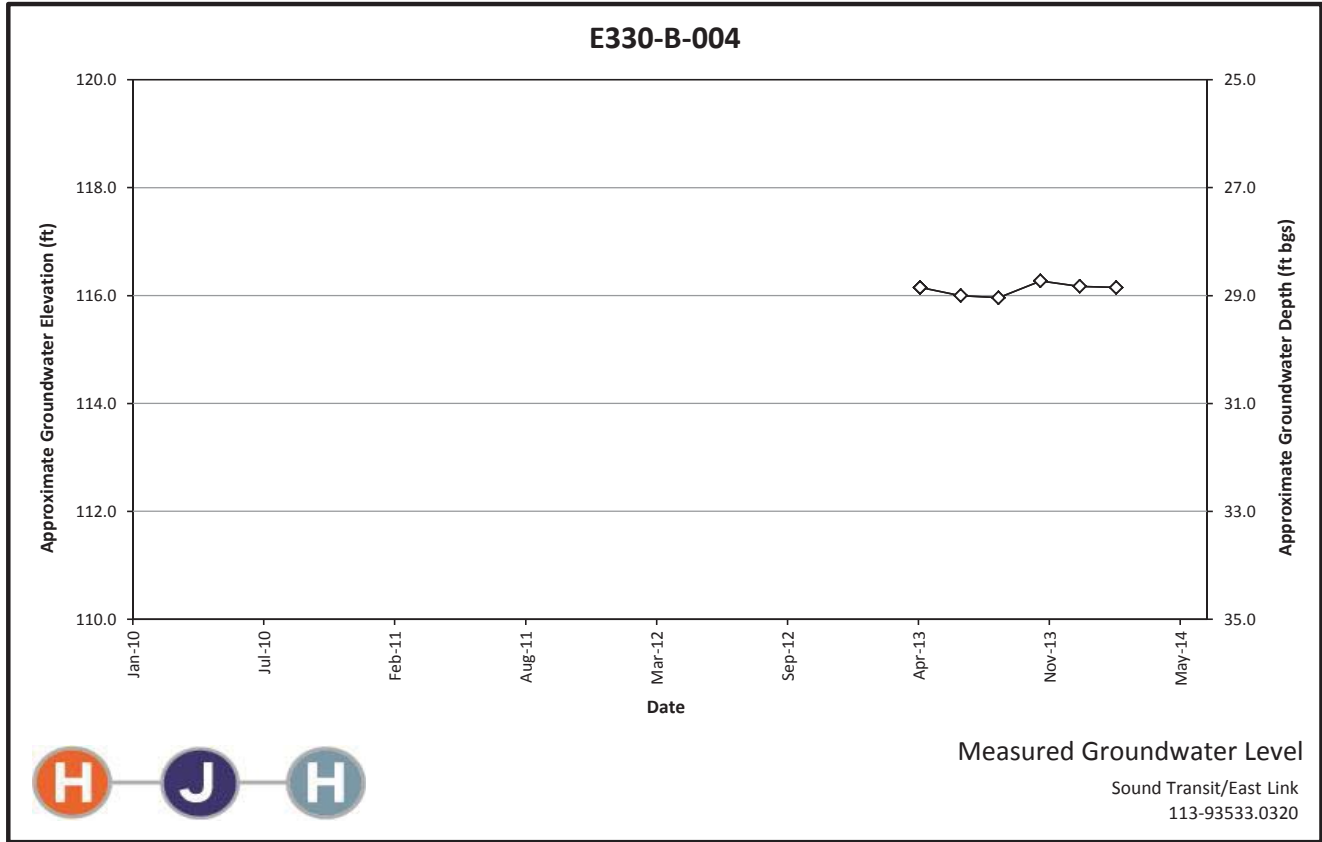


**Borehole ID**

**E330-B-004**

Ground Surface Elevation (ft) =

145.01



**Notes:**

- 1. BGS = Below Ground Surface
- 2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report

Borehole	E330-B-004
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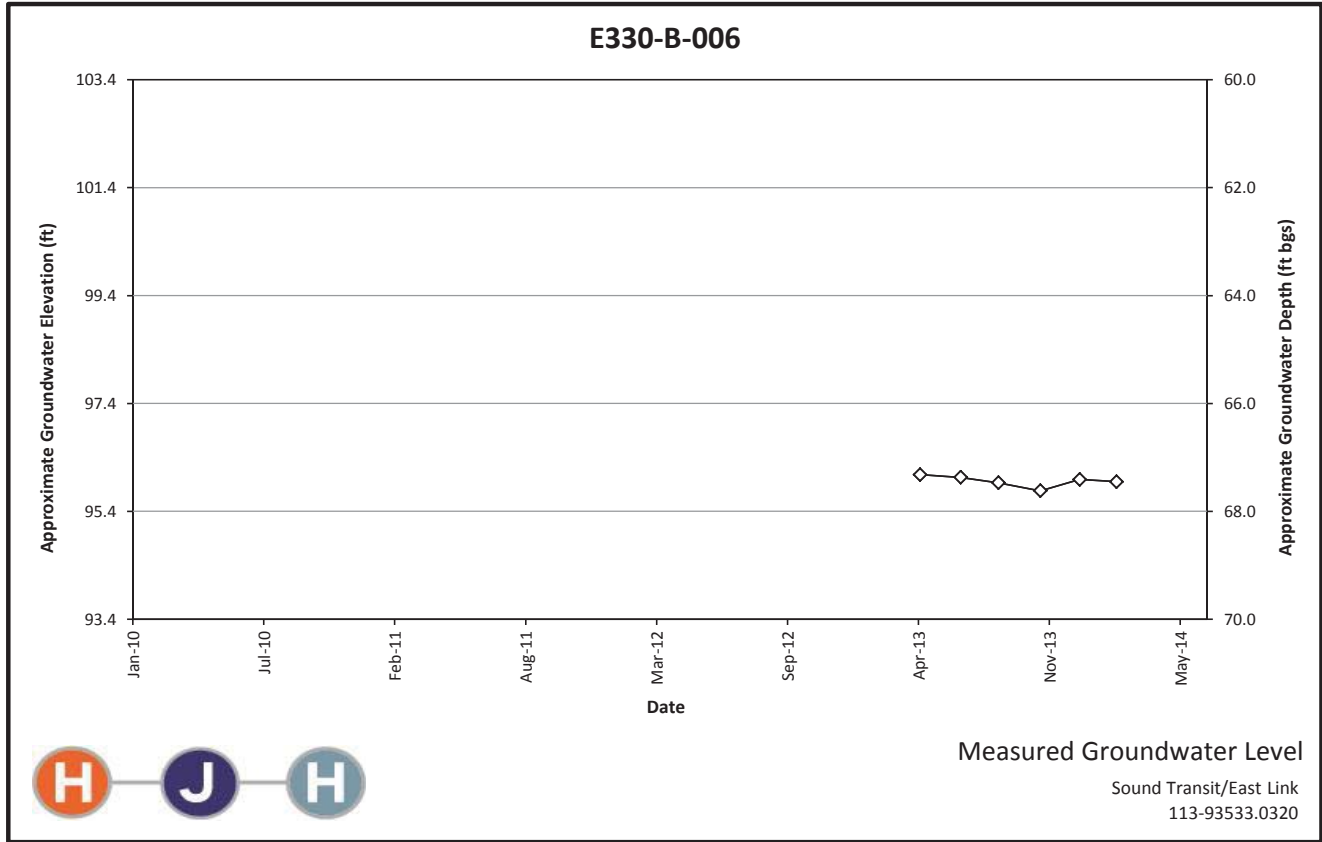
Date	Groundwater Elev (ft)	Groundwater Depth (ft)
4/17/2013 14:00	116.2	28.9
4/17/2013 14:05	116.2	28.9
6/18/2013 11:58	116.0	29.0
8/15/2013 11:10	116.0	29.1
10/18/2013 11:20	116.3	28.7
12/17/2013 6:00	116.2	28.8
2/11/2014 6:12	116.2	28.9

**Borehole ID**

**E330-B-006**

Ground Surface Elevation (ft) =

163.41



**Notes:**

1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report

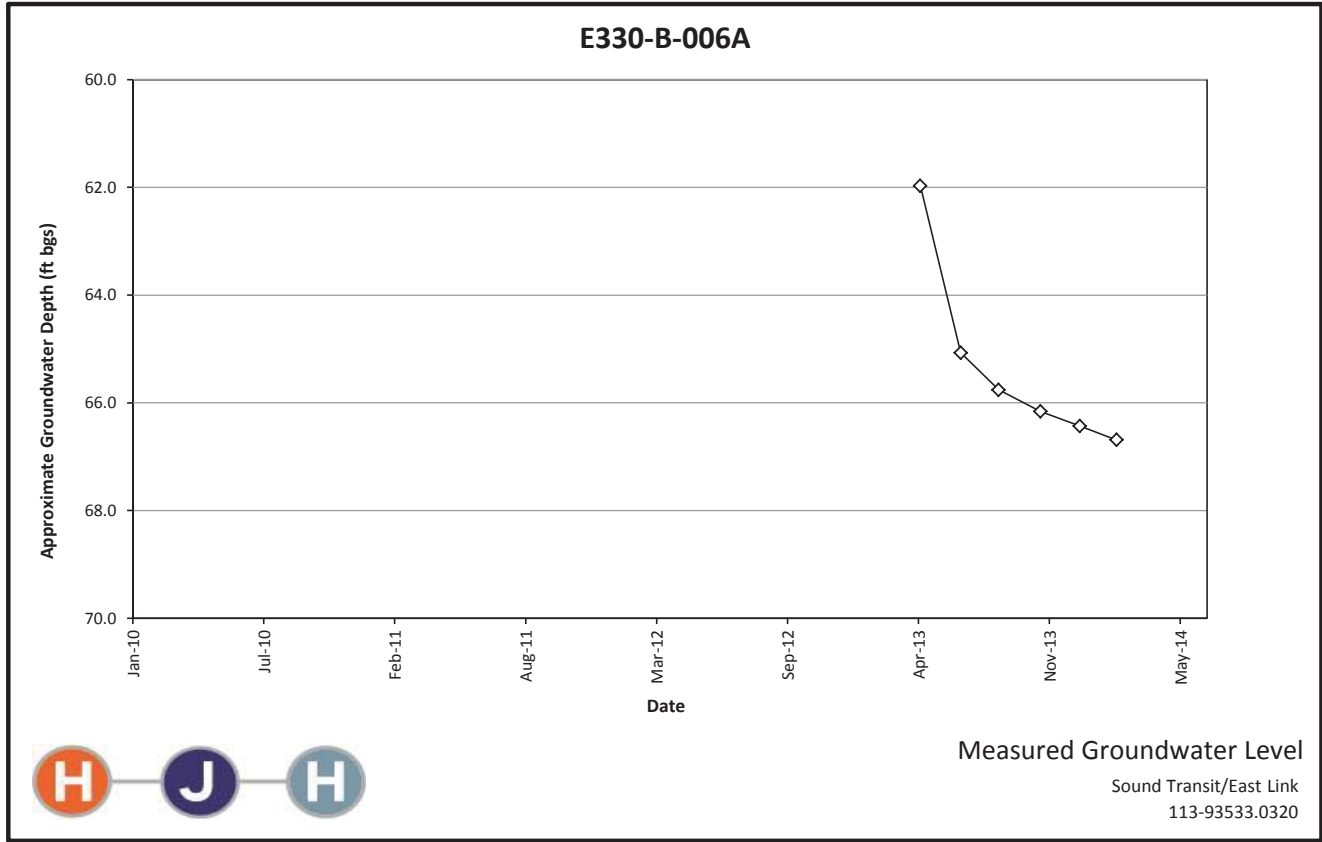
Borehole	E330-B-006
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Date	Groundwater Elev (ft)	Groundwater Depth (ft)
4/17/2013 15:22	96.1	67.3
6/18/2013 11:36	96.0	67.4
8/15/2013 10:53	95.9	67.5
10/18/2013 10:33	95.8	67.6
12/17/2013 8:03	96.0	67.4
2/11/2014 8:11	96.0	67.5

**Borehole ID**

**E330-B-006A**

Ground surface elevation not surveyed at time of report



**Notes:**

1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report

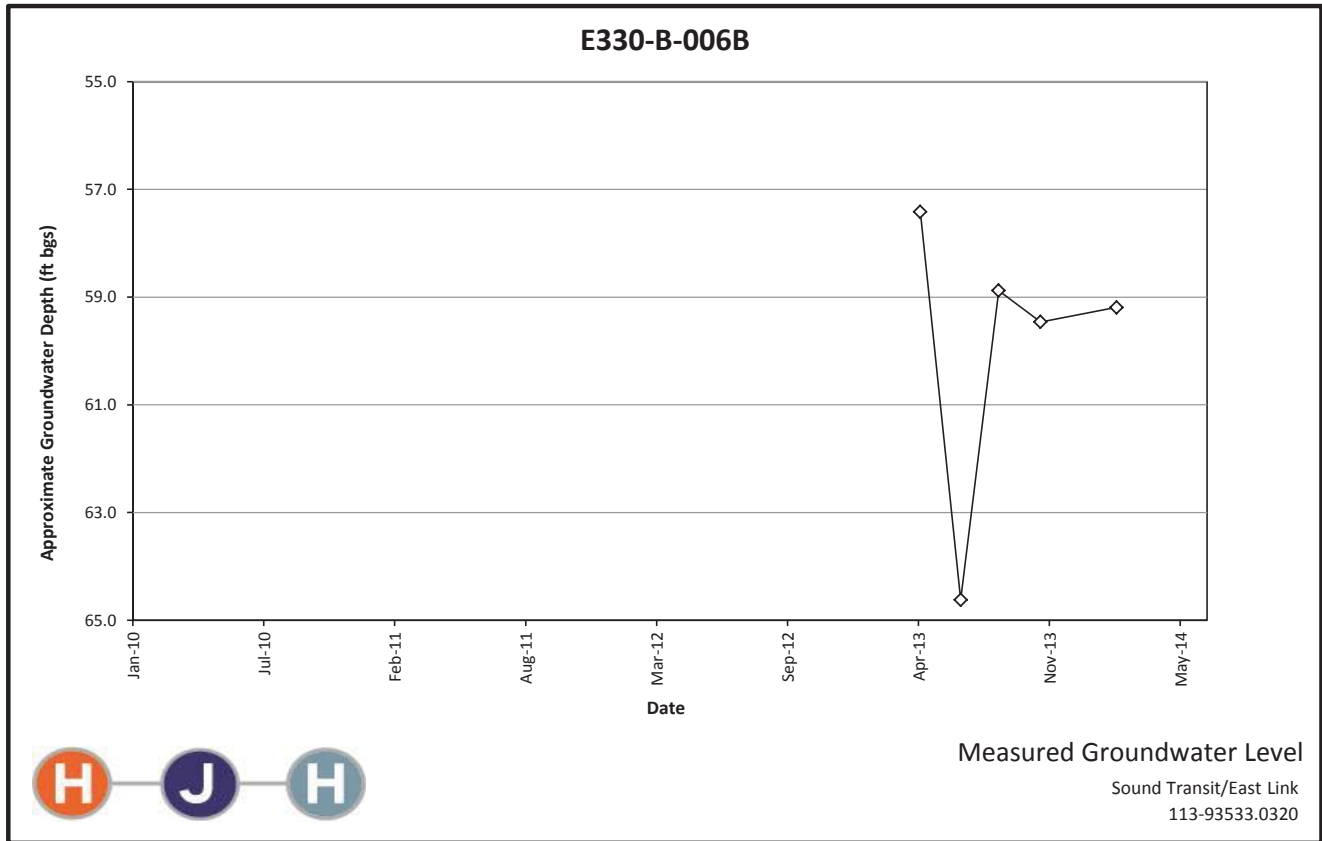
Borehole	E330-B-006A
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Date	Groundwater Depth (ft bgs)
4/17/2013	62.0
6/18/2013	65.1
8/15/2013	65.8
10/18/2013	66.2
12/17/2013	66.4
2/11/2014	66.7

**Borehole ID**

**E330-B-006B**

Ground surface elevation not surveyed at time of report



**Notes:**

1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report

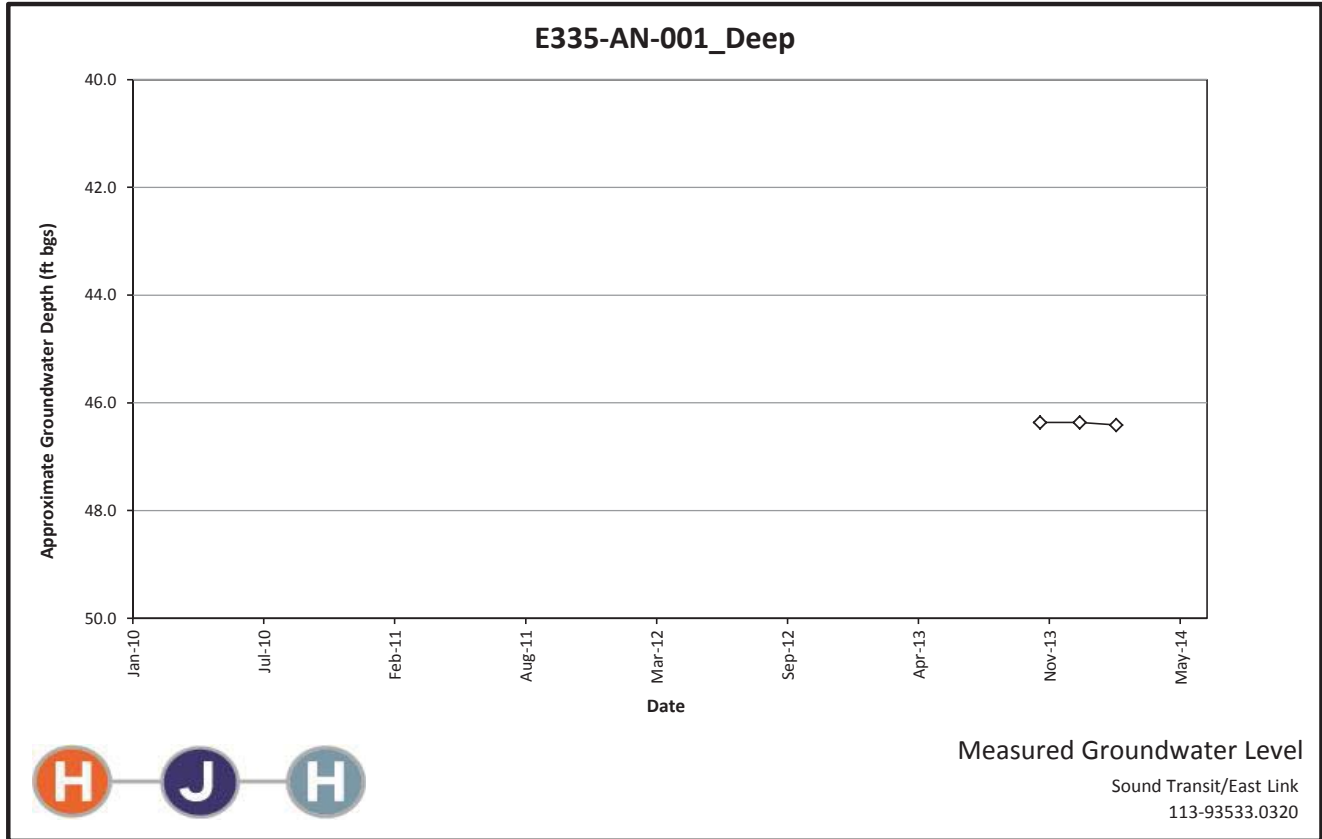
Borehole	E330-B-006B
----------	-------------

Date	Groundwater Depth (ft bgs)
4/17/2013	57.4
6/18/2013	64.6
8/15/2013	58.9
10/18/2013	59.5
2/11/2014	59.2

**Borehole ID**

**E335-AN-001\_Deep**

Ground surface elevation not surveyed at time of report



**Notes:**

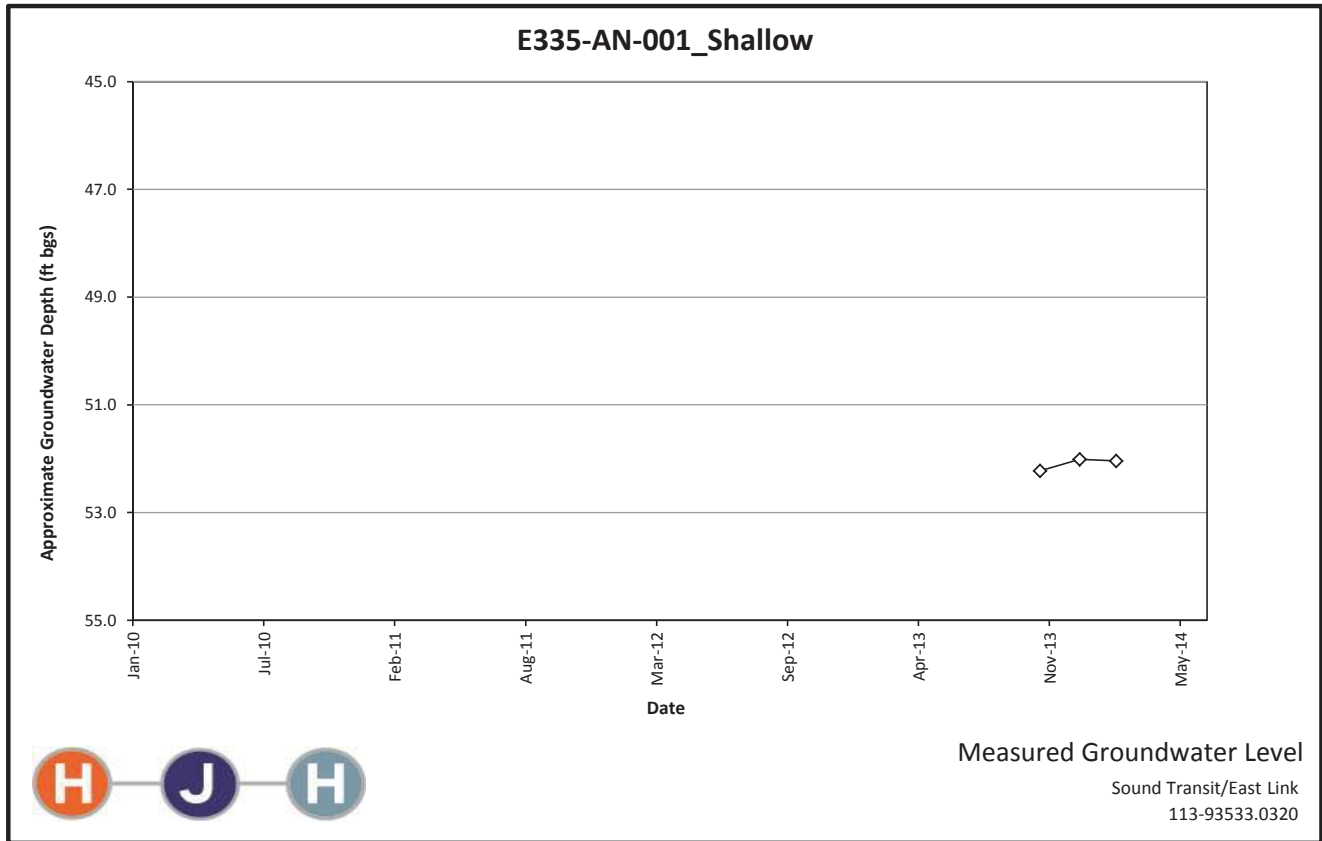
1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report
3. Vibrating wire piezometer (VWP) installed in borehole angled at 50 degrees
4. VWP installed at 77 ft bgs (100 ft along borehole length)

Borehole	E335-AN-001_deep
<b>Date</b>	<b>Groundwater Depth (ft bgs)</b>
10/17/2013	46.4
12/17/2013	46.4
2/11/2014	46.4

**Borehole ID**

**E335-AN-001\_Shallow**

Ground surface elevation not surveyed at time of report



**Notes:**

1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report
3. Vibrating wire piezometer (VWP) installed in borehole angled at 50 degrees
4. VWP installed at 51.3 ft bgs (67 ft along borehole length)
5. VWP reading show negative pressure on the transducer, which may indicate groundwater below the transducer

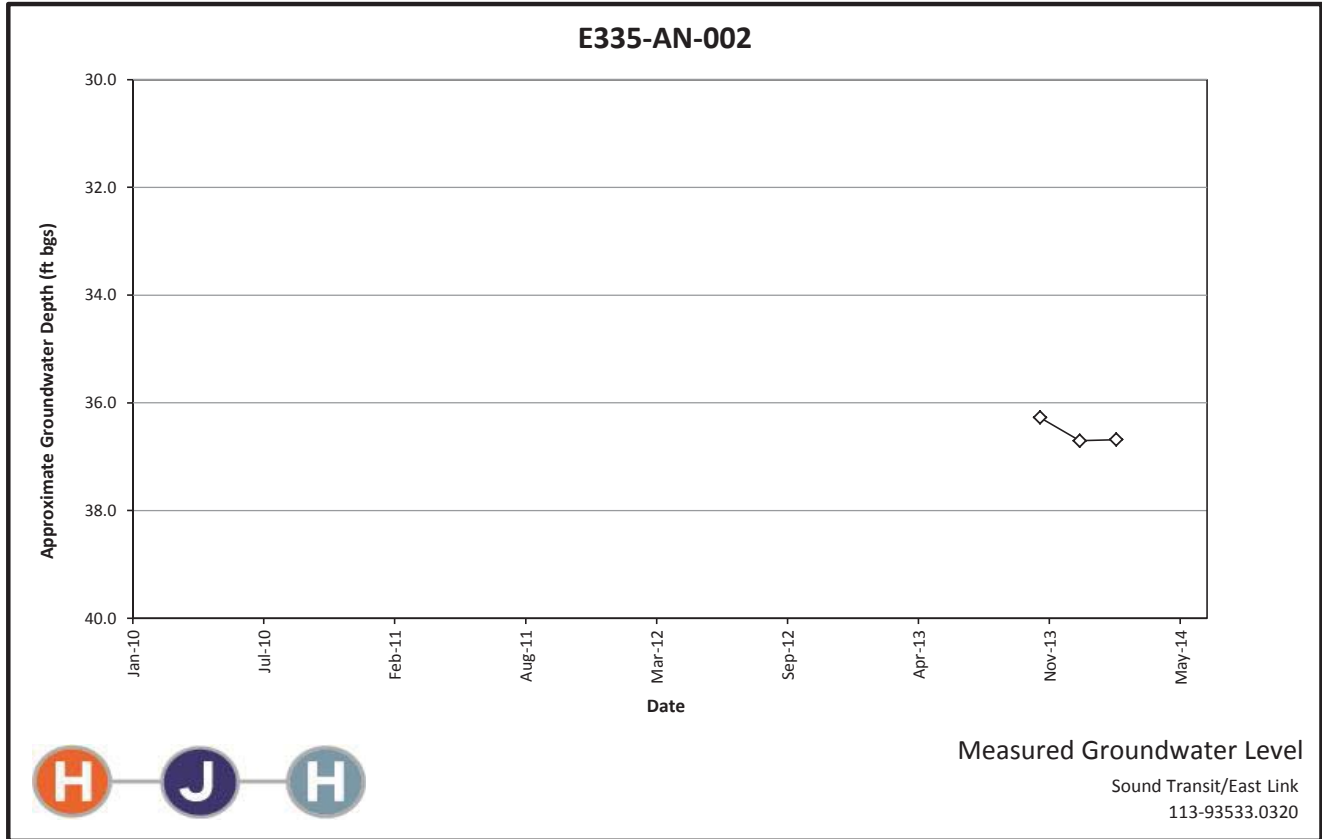
Borehole	E335-AN-001_SHALLOW
----------	---------------------

Date	Groundwater Depth (ft bgs)
10/17/2013	52.2
12/17/2013	52.0
2/11/2014	52.0

**Borehole ID**

**E335-AN-002**

Ground surface elevation not surveyed at time of report



**Notes:**

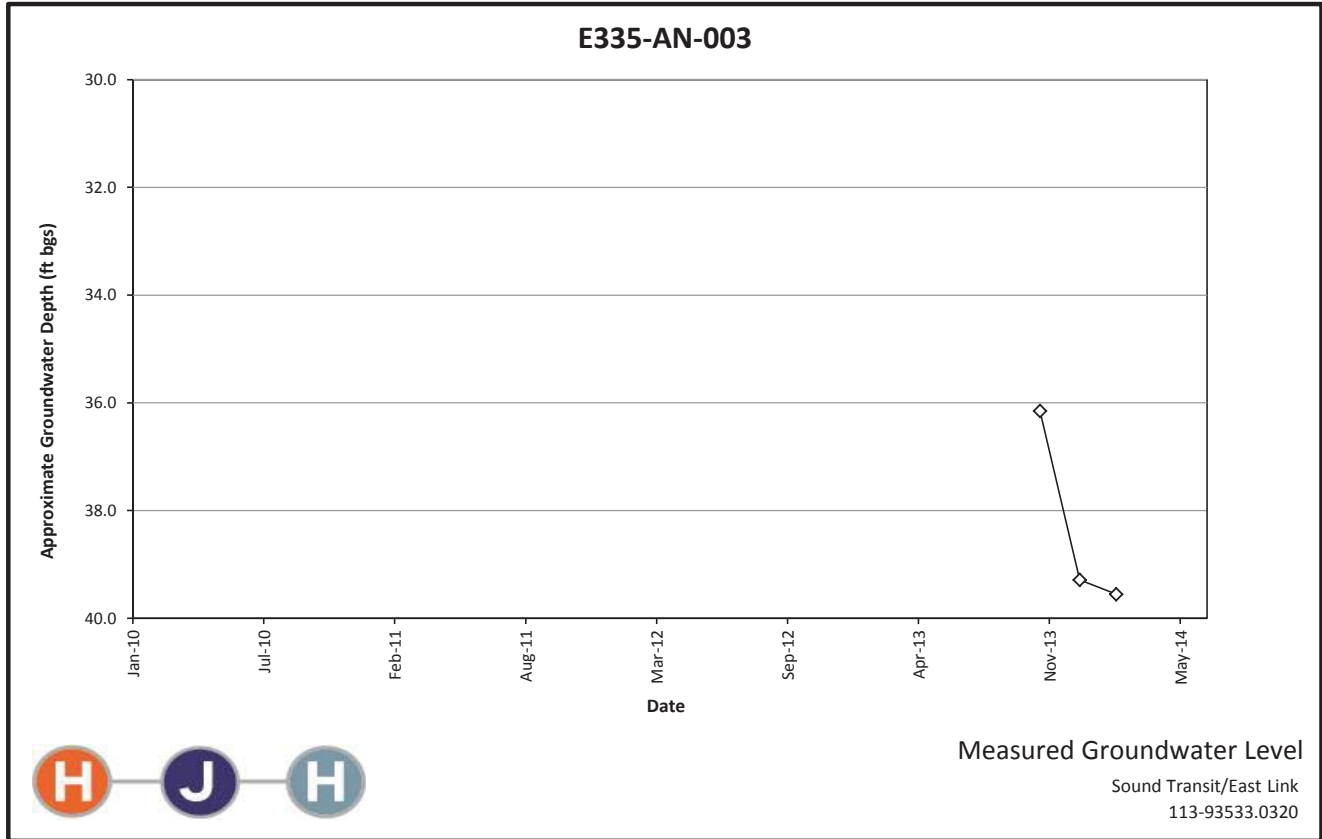
- 1. BGS = Below Ground Surface
- 2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report
- 3. Vibrating wire piezometer (VWP) installed in borehole angled at 60 degrees
- 4. VWP installed at 41 ft bgs (47 ft along borehole length)

Borehole	E335-AN-002
Date	Groundwater Depth (ft bgs)
10/17/2013	36.3
12/17/2013	36.7
2/11/2014	36.7

**Borehole ID**

**E335-AN-003**

Ground surface elevation not surveyed at time of report



**Notes:**

1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report
3. Vibrating wire piezometer (VWP) Installed at 45 ft bgs.

Borehole	E335-AN-003
<b>Date</b>	<b>Groundwater Depth (ft bgs)</b>
10/17/2013	36.2
12/17/2013	39.3
2/11/2014	39.6

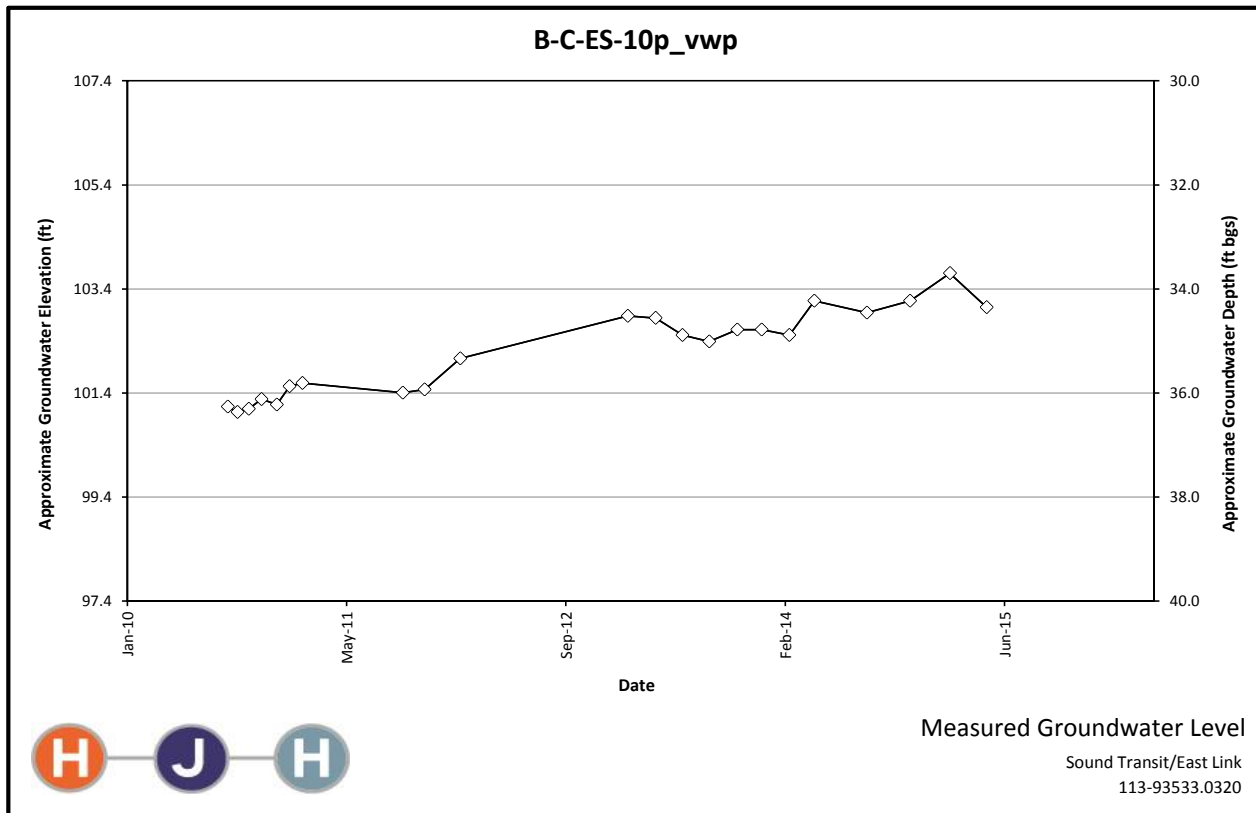


**Borehole ID**

Ground Surface Elevation (ft) =

**B-C-ES-10p\_vwp**

137.4



**Notes:**

1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report
3. Vibrating wire piezometer (VWP) installed at 80 ft bgs

Borehole	B-C-ES-10P_vwp
----------	----------------

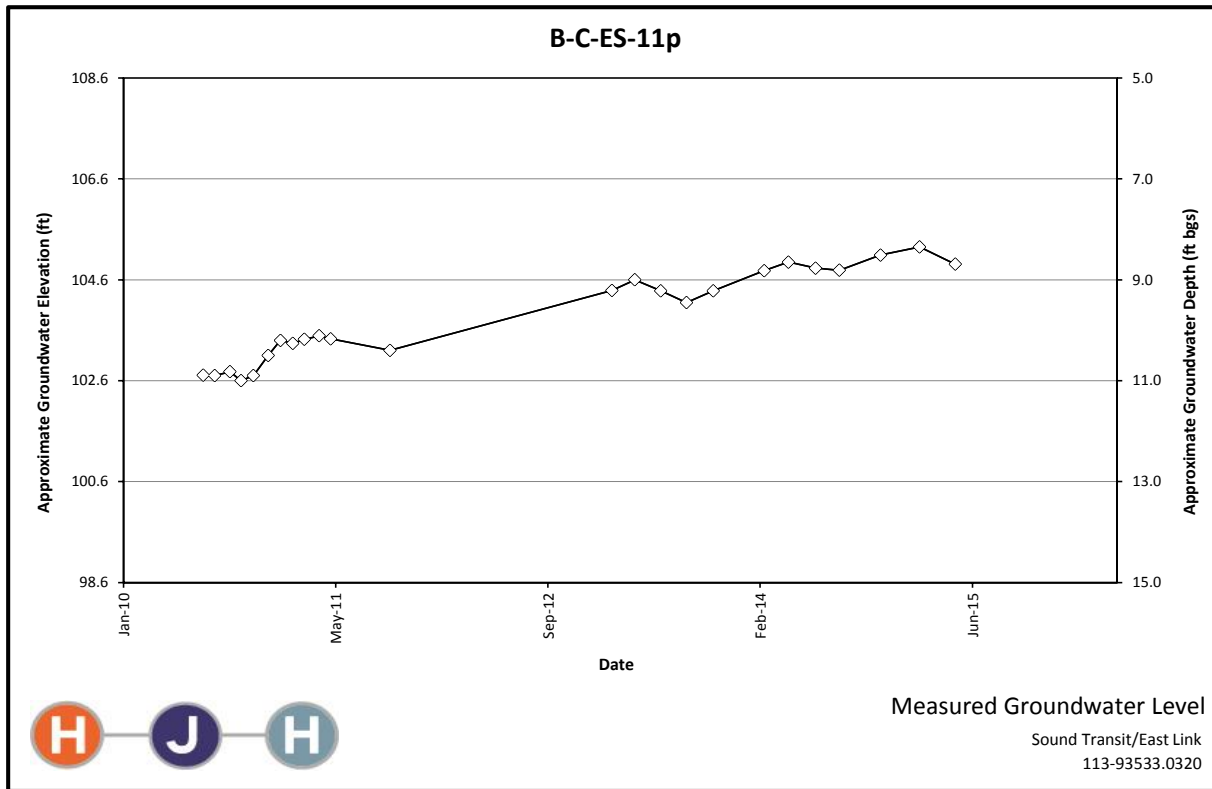
Date	Groundwater Elev (ft)	Groundwater Depth (ft)
8/18/2010	101.1	36.3
9/9/2010	101.0	36.4
10/5/2010	101.1	36.3
11/3/2010	101.3	36.1
12/8/2010	101.2	36.2
1/6/2011	101.5	35.9
2/4/2011	101.6	35.8
9/21/2011	101.4	36.0
11/10/2011	101.5	35.9
1/30/2012	102.1	35.3
2/15/2013	102.9	34.5
4/19/2013 17:45	102.8	34.6
6/19/2013 16:10	102.5	34.9
8/19/2013 15:47	102.4	35.0
10/22/2013 13:37	102.6	34.8
12/17/2013 14:50	102.6	34.8
2/18/2014 13:05	102.5	34.9
4/16/2014 12:20	103.2	34.2
8/14/2014 14:02	102.9	34.5
11/20/2014 13:36	103.2	34.2
2/19/2015 13:23	103.7	33.7
5/14/2015 10:48	103.0	34.4

**Borehole ID**

**B-C-ES-11p**

Ground Surface Elevation (ft) =

113.64



Notes:

1. BGS = Below Ground Surface
2. This graph is part of a geotechnical report. Data should only be used in combination with all data presented in the geotechnical report

Borehole	B-C-ES-11p
----------	------------

Date	Groundwater Elev (ft)	Groundwater Depth (ft)
7/8/2010	102.8	10.9
8/4/2010	102.7	10.9
9/9/2010	102.8	10.8
10/5/2010	102.6	11.0
11/3/2010	102.7	10.9
12/8/2010	103.1	10.5
1/6/2011	103.4	10.2
2/4/2011	103.4	10.3
3/3/2011	103.5	10.2
4/7/2011	103.5	10.1
5/4/2011	103.5	10.2
9/21/2011	103.2	10.4
2/25/2013	104.4	9.2
4/19/2013 17:58	104.6	9.0
6/19/2013 15:57	104.4	9.2
8/19/2013 15:34	104.2	9.5
10/21/2013 15:30	104.4	9.2
2/18/2014 12:45	104.8	8.8
4/16/2014 12:40	105.0	8.7
6/19/2014 12:44	104.9	8.8
8/14/2014 13:53	104.8	8.8
11/19/2014 14:44	105.1	8.5
2/19/2015 13:16	105.3	8.3
5/14/2015 10:37	105.0	8.7

# APPENDIX A.4

In-Situ Testing



## Appendix D – Vertical Seismic Profile Survey

**MEMORANDUM**

Sound Transit East Link | South Bellevue to OTC

**VERTICAL SEISMIC PROFILE SURVEY**

Date: March 21, 2014

To: H-J-H Final Design Partners

From: Peter Fahringer, Senior Geophysicist, Golder Associates Inc.

CC: Dave Findley, Golder Associates

Re: **Results of the Vertical Seismic Profile Survey for the East Link Sound Transit Project**

This memorandum provides the results of vertical seismic profile (VSP) testing at borehole location E330-B-05 in downtown Bellevue, Washington performed by Golder Associates Inc. (Golder) on March 20, 2013.

**Project Objective**

The objective of the investigation was to determine shear and compressional wave velocities of soils and bedrock at the borehole location, E330-B-005, for the East Link expansion of Sound Transit's operations. To meet this objective, a seismic data acquisition system with a tri-axial borehole geophone and surface seismic source were used to obtain vertical seismic profile data.

**Site Description**

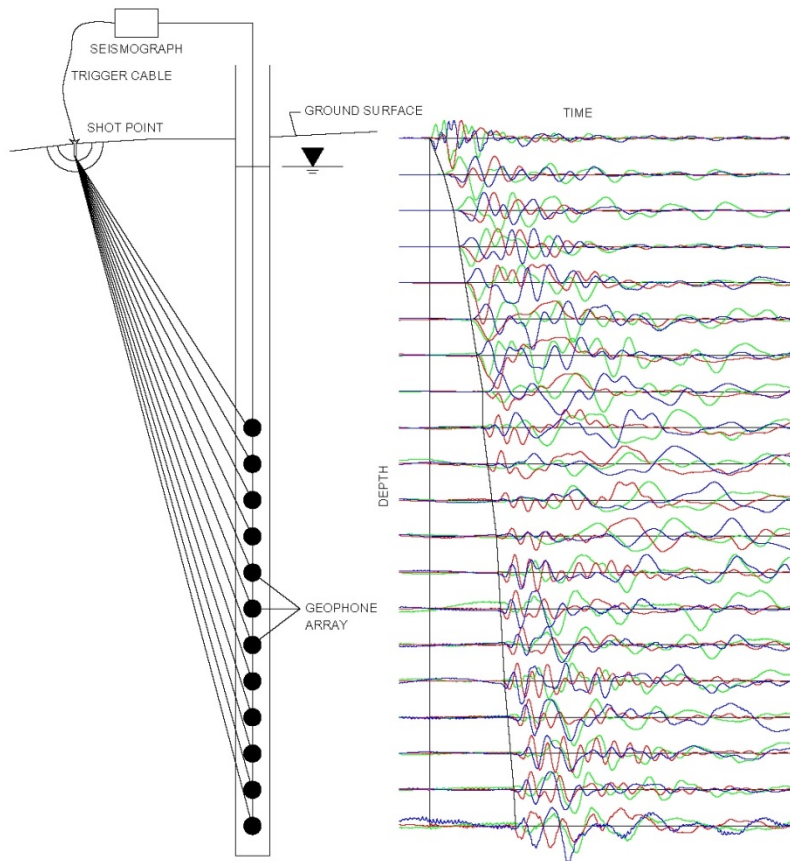
Borehole location E330-B-005 is situated in the asphalt of the northbound lane of 110th Ave NE, directly west of Bellevue City Hall. The boring had a measured depth of 22.5 meters (74 feet), is cased with polyvinyl chloride (PVC) and sealed at the surface with grout, a locking PVC cap, and flush-mount surface monument. The site receives a moderate to high volume of vehicular and pedestrian traffic. Interference due to cultural noise was kept to a minimum during periods of data acquisition by avoiding data collection when traffic was moving in the immediate vicinity of the borehole.

**Method**

Vertical seismic profiling is a single borehole geophysical method. Seismic energy is generated at the ground surface by an active seismic source and recorded by a geophone located a known depth below ground surface. The time required for energy to reach the geophone along a path of known distance, between the source and receiver, provides a measurement of average compressional seismic velocity of the medium between the source and receiver. Data obtained from different geophone depths is used to calculate a detailed seismic velocity profile of the subsurface in the immediate vicinity of the test borehole.

The seismic source used is a wooden beam that is laid horizontally on the ground in close vicinity of the borehole. The beam is coupled to the ground by parking a vehicle on the beam. The beam is struck with a 16 pound sledge hammer on alternate ends of the beam to induce polarized shear waves. A three component borehole geophone is lowered in the borehole and clamped against the borehole wall or casing.

The high resolution results of a VSP survey are often used for earthquake engineering site classification, as per the International Building Code (ICC 2012) and ASCE/SEI 7-10 (ASCE 2010).



Example 1: Layout and resulting time traces from a VSP survey.

The recorded data are subsequently analyzed by splitting the three recorded components (vertical, longitudinal, and transverse) into depth-wave trains. P- and S-wave arrivals are then picked and are best fit to a model to derive layer thicknesses and compression and shear wave velocities in the vicinity of the borehole.

Values for Poisson's ratio ( $\nu$ ), shear modulus ( $G$ ), Young's modulus ( $E$ ) and Bulk Modulus ( $K$ ) are calculated from compression wave and shear wave velocities as:



$$\text{Poisson's Ratio: } \nu = \frac{0.5\left(\frac{V_p}{V_s}\right)^2 - 1}{\left(\frac{V_p}{V_s}\right)^2 - 1}$$

$$\text{Shear Modulus: } G = \frac{E}{2(1 + \nu)} = V_s^2 \rho$$

$$\text{Young's Modulus: } E = \frac{V_p^2 \rho (1 + \nu)(1 - 2\nu)}{(1 - \nu)} = 2G(1 + \nu)$$

$$\text{Bulk Modulus: } K = \frac{E}{3(1 - 2\nu)} = V_p^2 \rho - \frac{4}{3}G$$

Where  $\rho$  is the bulk density (in Kg/m<sup>3</sup>),  $V_p$  is the compression wave velocity (m/s) and  $V_s$  is the shear wave velocity (m/s). Additionally, we have used recently-published correlations of shear wave velocity ( $V_s$ ) to standard penetration tests (SPT) (Marto et al. 2013) to estimate N count using the formula:

$$N = e^{\frac{\ln(V_s/77.13)}{0.377}}$$

### Field Procedure

For data acquisition, Golder utilized a Geostuff BG2 3-axis (triaxial) borehole geophone, Geometrics Geode multichannel seismograph with an accelerometer electronic trigger, a field laptop computer and Geometrics SeisModule software. A 16 pound sledge hammer struck against a wood plank was used as a manual energy source. Data was processed using Geometrics SeisImager software.

The borehole geophone was suspended down hole at a maximum depth of 22 meters (72.2 feet) below ground surface (bgs). For each depth where data was recorded, three seismic records were acquired separately (two shear waves of opposing polarity and a compressional [p-] wave). Each record was comprised of multiple stacks in order to minimize the influence of background seismic noise. Data collection commenced at 22.5 meters (74 feet) bgs, continued at 1 meter intervals, and ended at 1 meter bgs. Seismic energy was generated using a sledge hammer in contact with the top and ends of a horizontal wooden plank 10 feet in length. The plank was secured to the ground surface under the rear axle of a 4x4 truck.

### Results

Table 1 summarizes the results of the VSP investigation at E330-B-005 and Figure 1 provides a chart of velocity verses depth bgs. Seismic velocities at the site range between 514 and 1,187 meters per second (m/s) for compressional (P) waves and 350 and 462 m/s for shear (S) waves. These velocities are within the expected range for seismic velocities in the glacial till and outwash deposits observed during drilling.



**Table 1: VSP Observed Velocities and Calculated Dynamic Engineering Properties**

Depth meters	P-Wave Velocity (m/sec)	S-Wave Velocity m/sec	Estimated Bulk Density (kg/m3)	Shear Modulus (MPa)	Young's Modulus (MPa)	Bulk Modulus (MPa)	Estimated N (blows) **
1	573	363	2200	291	677	336	61
2	514	350	2200	270	575	220	55
3	517	376	2200	312	585	173	67
4	529	409	2200	368	556	124	84
5	588	425	2200	398	758	231	93
6	639	433	2200	413	888	348	97
7	708	436	2200	418	1000	546	99
8	776	396	2200	346	915	865	77
9	842	389	2200	334	910	1116	73
10	907	406	2200	362	996	1325	82
11	915	418	2200	384	1050	1331	88
12	900	411	2200	371	1015	1286	84
13	926	418	2000	349	959	1247	88
14	946	429	2000	367	1007	1299	95
15	1000	448	2000	401	1103	1465	106
16	1049	462	2000	426	1176	1634	115
17	1101	466	2000	435	1209	1843	118
18	1111	464	2000	430	1199	1897	117
19	1157	447	2000	400	1129	2146	106
20	1166	440	2000	388	1098	2202	102
21	1174	446	2000	398	1126	2225	105
22	1187	445	2000	396	1124	2287	105

Notes: \*\* from Marto, et al., 2013.





Raw waveforms from the P-wave and S-wave records as well as picks of the first arrival of the wavefronts are displayed in Figures 2 and 3. These picks were used to generate the values calculated in Table 1.

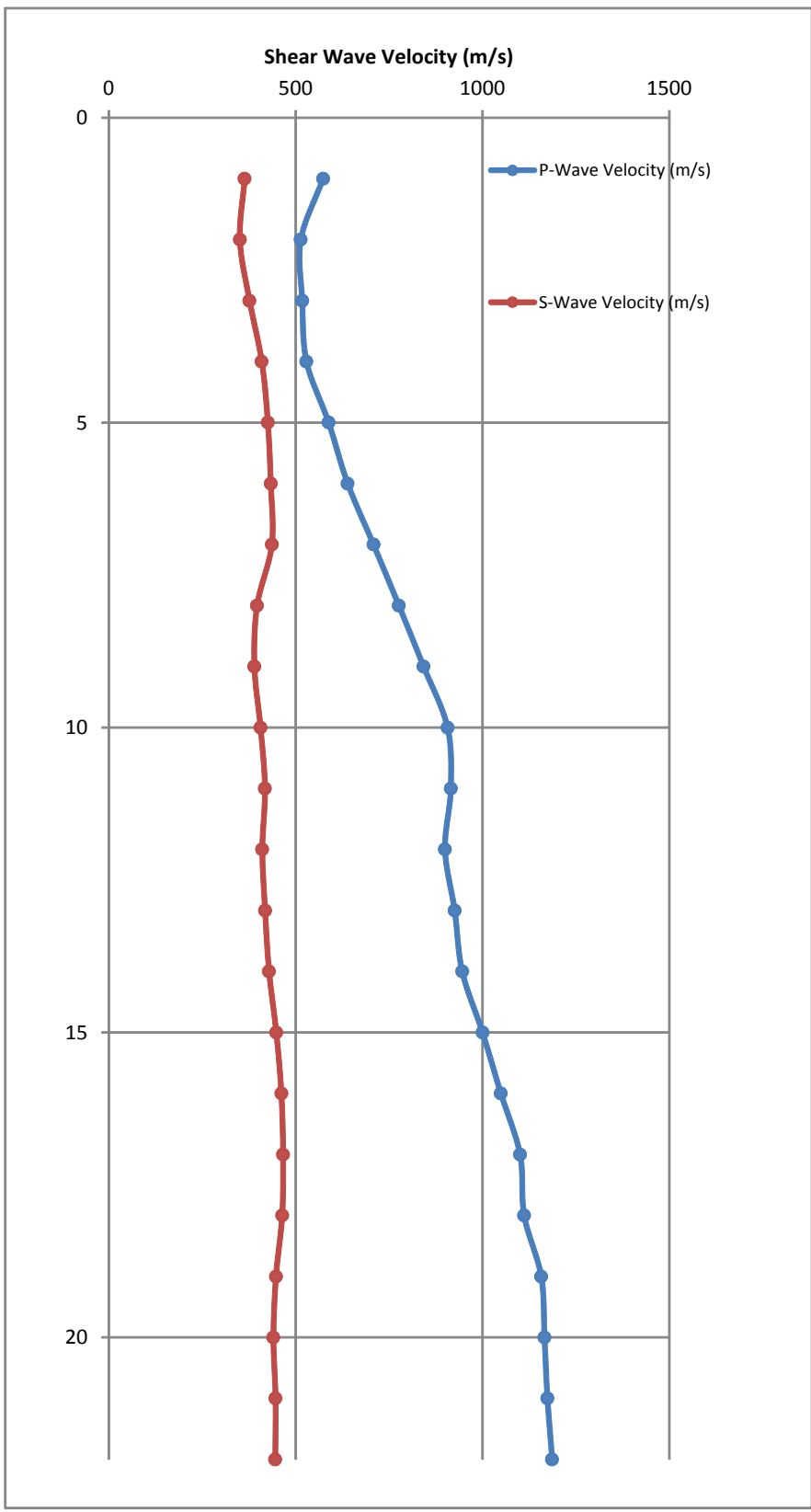
### References


American Society of Civil Engineers (ASCE). 2010. ASCE/SEI 7-10, Minimum Design Loads for Buildings and Other Structures, Chapter 20, pp 203-205.

International Code Consortium (ICC). 2012. International Building Code (IBC), Section 1613.

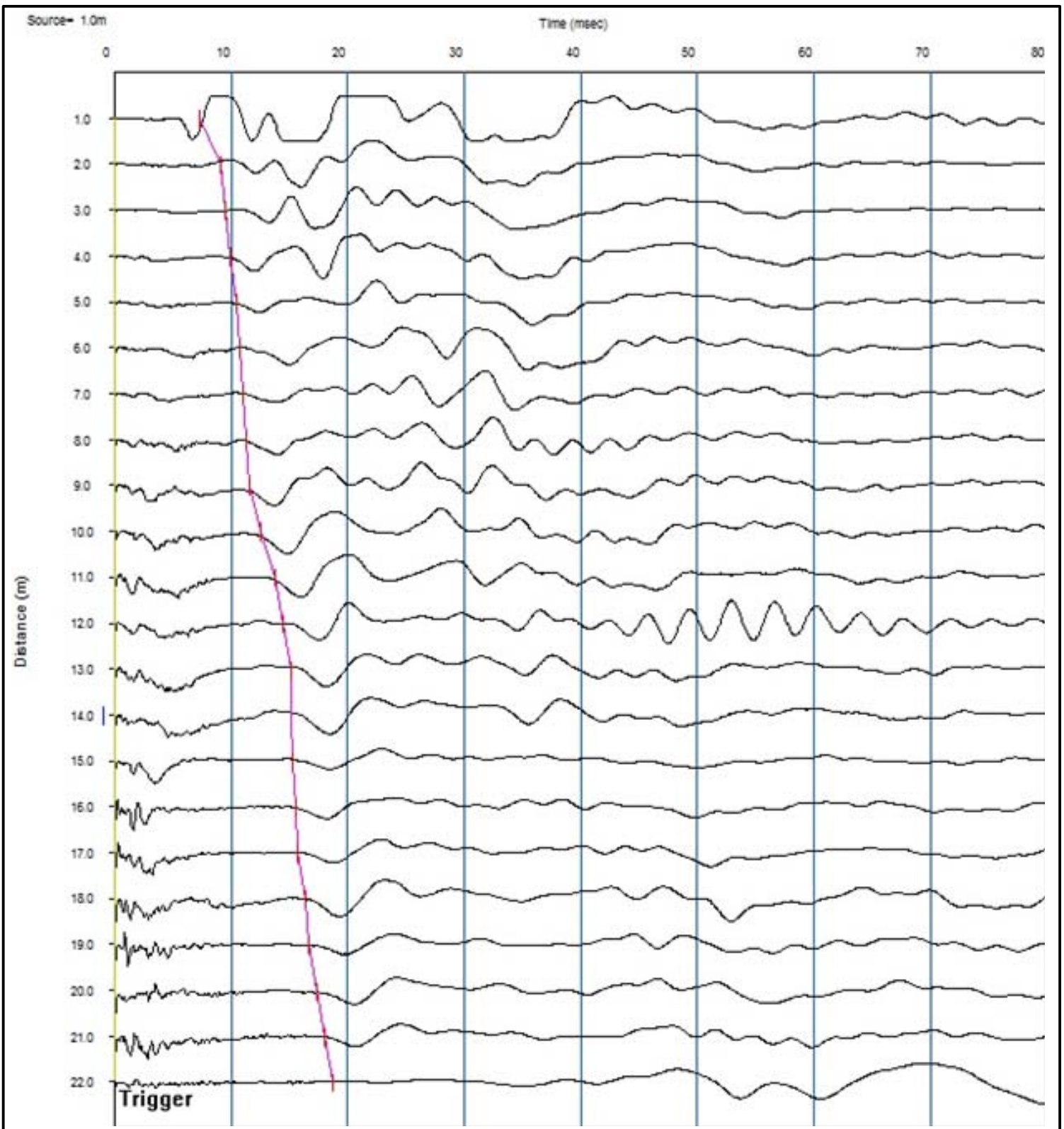
Marto, Aminaton, Soon, Tan Choy, Kasim, Fauziah, Suhatri, Meldi. 2013. A Correlation of Shear Wave Velocity and Standard Penetration Resistance, *Electronic Journal of Geotechnical Engineering*, v18: pp. 463-471.

## Figures



PROJECT	<b>SOUND TRANSIT EASTLINK PROJECT BELLEVUE, WASHINGTON</b>			
TITLE	<b>BORING E330-B-005 SEISMIC VELOCITY PROFILE</b>			
	PROJECT No.	113-93533.0320.2100	FILE No.	FIGURE_1
			SCALE	NOT TO SCALE
				<b>FIGURE 1</b>

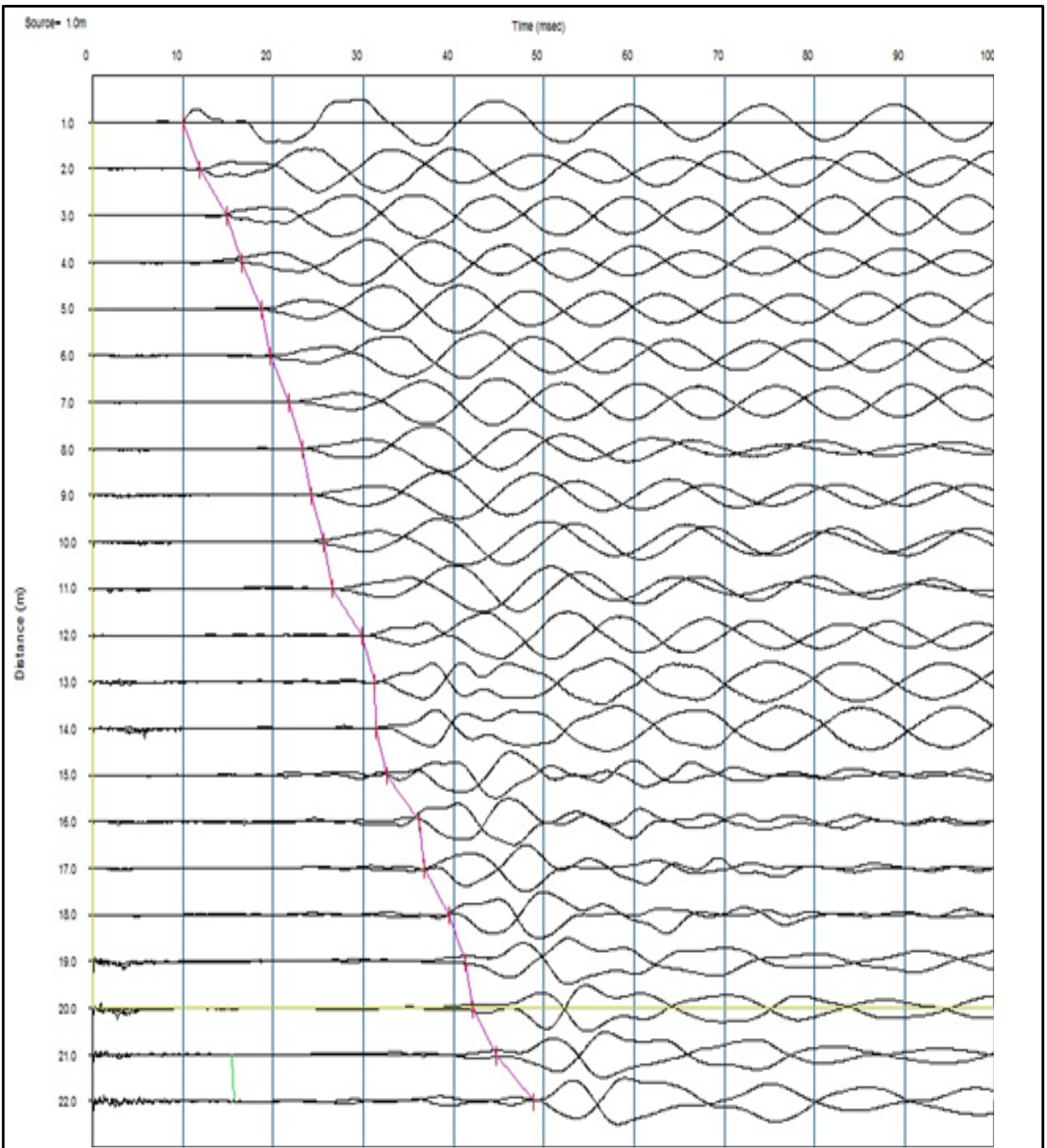
NOTES



PROJECT	<b>SOUND TRANSIT EASTLINK PROJECT BELLEVUE, WASHINGTON</b>		
TITLE	<b>BORING E330-B-005 Compressional (P-wave) Waveforms</b>		
	PROJECT No.	113-93533 03202100	FILE No.
			FIGURE_2
			SCALE
			NOT TO SCALE
	<b>FIGURE 2</b>		



NOTES



PROJECT			
<b>SOUND TRANSIT EASTLINK PROJECT BELLEVUE, WASHINGTON</b>			
TITLE			
<b>BORING E330-B-005 Shear (S-wave) Waveforms</b>			
PROJECT No.		113-93533 03202100	FILE No.
			FIGURE_3
		SCALE	NOT TO SCALE
			<b>FIGURE 3</b>

NOTES

# Appendix I Pressuremeter Data Tables

**Table 1 – Pressuremeter Test depth and Material Description**

<b>Date</b>	<b>Boring</b>	<b>Test</b>	<b>Depth (ft)</b>	<b>Material</b>
02/28/2013	E330 – PMT – 03	Sound01	10.0	Till
02/28/2013	E330 – PMT – 03	Sound02	8.5	Till
02/28/2013	E330 – PMT – 03	Sound03	24.5	Till
02/28/2013	E330 – PMT – 03	Sound04	24.5	Till
02/28/2013	E330 – PMT – 03	Sound05	23.0	Till
03/01/2013	E330 – PMT – 03	Sound06	33.0	Till
03/07/2013	E330 – PMT – 03	Sound10	64.3	Clayey Silt
03/07/2013	E330 – PMT – 03	Sound11	73.0	Clayey Silt
03/07/2013	E330 – PMT – 03	Sound12	71.5	Clayey Silt
03/04/2013	E330 – PMT – 01	Sound07	31.0	Till
03/05/2013	E330 – PMT – 01	Sound08	59.1	Till
03/05/2013	E330 – PMT – 01	Sound09	57.5	Till
03/08/2013	E330 – PMT – 01	Sound13	80.0	Clayey Silt
03/26/2013	E330 – PMT – 02	Sound14	25.0	Till
03/26/2013	E330 – PMT – 02	Sound15	23.5	Till
03/27/2013	E330 – PMT – 02	Sound16	55.0	Till
03/27/2013	E330 – PMT – 02	Sound17	53.5	Till
03/27/2013	E330 – PMT – 02	Sound18	65.0	Till
03/28/2013	E330 – PMT – 02	Sound19	85.0	Sandy Silt
03/28/2013	E330 – PMT – 02	Sound20	83.5	Sandy Silt

**Table 2 – Unload-Reload Shear Modulus**

<b>Test</b>	<b>Shear Modulus (psi)</b>			
	Sound01	12,900	24,100	41,900
Sound02	1,980	3,620	14,500	-
Sound03	-	-	-	-
Sound04	13,800	30,200	45,300	-
Sound05	690	-	-	-
Sound06	870	-	-	-
Sound07	41,000	71,600	93,600	-
Sound08	66,100	103,600	154,000	-
Sound09	75,900	119,500	176,100	-
Sound10	-	-	-	-
Sound11	7,300	21,400	30,100	-
Sound12	5,800	15,600	-	-
Sound13	125,000	135,000	109,000	118,000
Sound14	13,600	31,400	51,000	-
Sound15	-	-	-	-
Sound16	55,800	86,100	115,200	-
Sound17	61,600	92,300	117,700	-
Sound18	76,400	101,200	-	-
Sound19	9,700	20,300	24,500	-
Sound20	12,600	13,600	-	-

**Table 3 – Shear Strengths from Model Analysis**

<b>Test</b>	<b>Depth (feet)</b>	<b>Gibson</b>	
		<b>Load Shear (psi)</b>	<b>Unload Shear * (psi)</b>
Sound01	10.0	133	103
Sound02	8.5	58	-
Sound03	24.5	-	-
Sound04	24.5	145	105
Sound05	23.0	-	-
Sound06	33.0	-	-
Sound07	31.0	325	238
Sound08	59.1	265	165
Sound09	57.5	353	247
Sound10	64.3	-	-
Sound11	73.0	135	95
Sound12	71.5	96	70
Sound13	80.0	265	200
Sound14	25.0	230	200
Sound15	23.5	-	-
Sound16	55.0	330	260
Sound17	53.5	285	210
Sound18	65.0	320	225
Sound19	85.0	114	90
Sound20	83.5	81	73

\* The Unload Shear Strengths have been halved.



**Table 4 – Frictional Strengths from Model Analysis**

<b>Test</b>	<b>Depth (feet)</b>	<b>Friction Angle</b>	<b>Effective Lateral Stress (psi)</b>
Sound01	10.0	50	3
Sound02	8.5	53	3
Sound03	24.5	-	-
Sound04	24.5	42	27
Sound05	23.0	-	-
Sound06	33.0	-	-
Sound07	31.0	44	37
Sound08	59.1	40	61
Sound09	57.5	41	60
Sound10	64.3	-	-
Sound11	73.0	41	42
Sound12	71.5	43	38
Sound13	80.0	35	85
Sound14	25.0	46	25
Sound15	23.5	-	-
Sound16	55.0	40	59
Sound17	53.5	40	59
Sound18	65.0	42	50
Sound19	85.0	36	47
Sound20	83.5	35	47

**Table 5 – Balance Pressure Analysis**

Test	Boring	Depth (ft)	Lateral Earth Pressure (psi)
Sound01	E330 – PMT – 03	10.0	3
Sound04	E330 – PMT – 03	24.5	27
Sound08	E330 – PMT – 01	59.1	92
Sound11	E330 – PMT – 03	73.0	50
Sound13	E330 – PMT – 01	80.0	84
Sound14	E330 – PMT – 02	25.0	25
Sound16	E330 – PMT – 02	55.0	60
Sound18	E330 – PMT – 02	65.0	49
Sound20	E330 – PMT – 02	83.5	48

**Table 6 – Test Quality Evaluation**

Test	Depth (ft)	Model Shift (% Strain)	Quality - Comments
Sound01	10.0	5	Fair – No consistent modulus values
Sound02	8.5	9.3	Poor – Considerable relaxation of material
Sound03	24.5	N/A	No useable test information
Sound04	24.5	7	Fair – Moduli becoming consistent
Sound05	23.0	N/A	Poor- Data unreliable due to extreme disturb.
Sound06	33.0	N/A	Poor- Data unreliable due to extreme disturb.
Sound07	31.0	2.8	Good – Good Friction and cohesive fits
Sound08	59.1	5	Fair – Good friction and cohesive fits
Sound09	57.5	5.5	Good – Good friction and fair cohesive fits
Sound10	64.3	N/A	No useable test information
Sound11	73.0	11	Fair – oversize hole, good friction and reasonable cohesive curve fits and balance
Sound12	71.5	10.2	Fair – No consistent modulus, poor cohesive fit
Sound13	80.0	.1	Excellent – Best test! Excellent curve fits, moduli all match well
Sound14	25.0	7	Poor – Poor model fits, inconsistent moduli
Sound15	23.5	N/A	No useable test information
Sound16	55.0	2.1	Good curve and modulus fits
Sound17	53.5	3.5	Fair curve fits, good moduli
Sound18	65.0	2.7	Fair – good curve and moduli values
Sound19	85.0	2.8	Good – Good curve and moduli
Sound20	83.5	4.1	Good – Good curve and moduli

# **Appendix II Pressuremeter Data Plots**



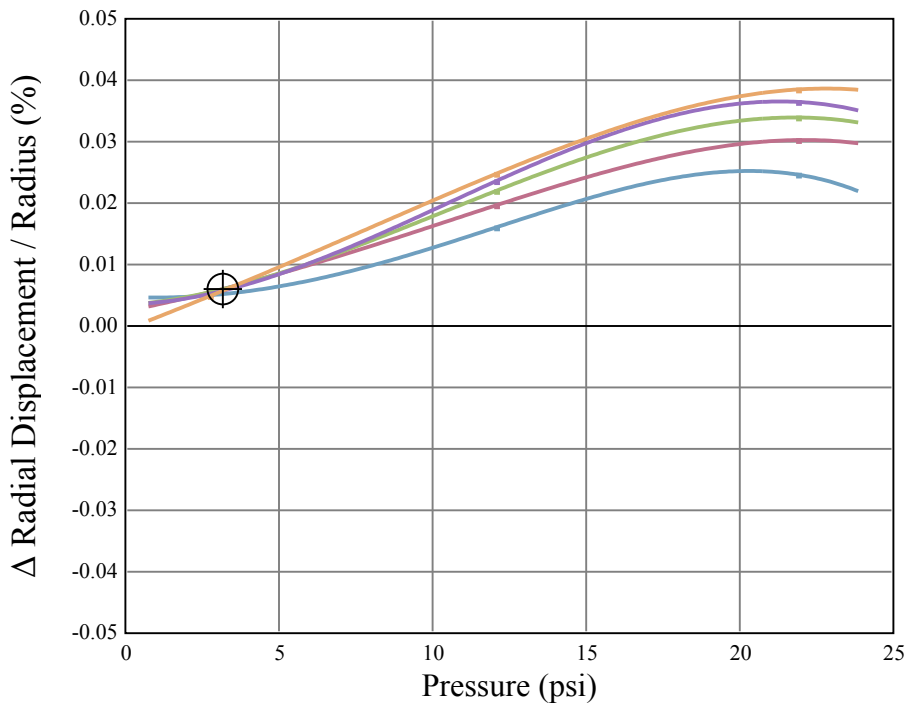
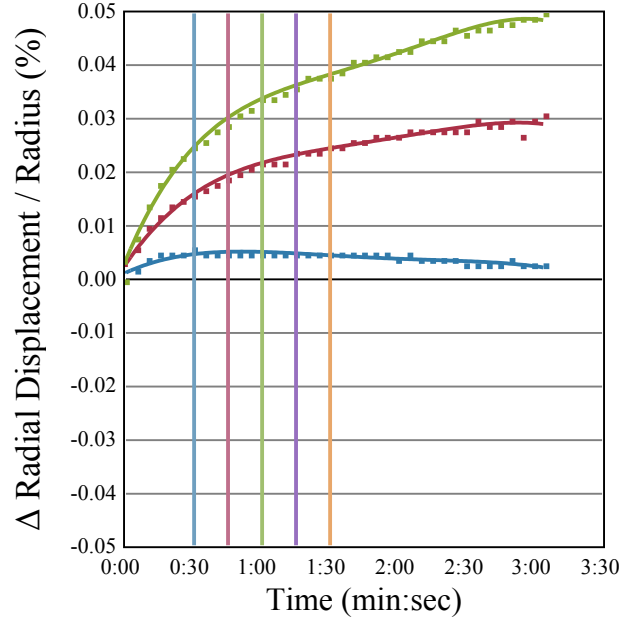
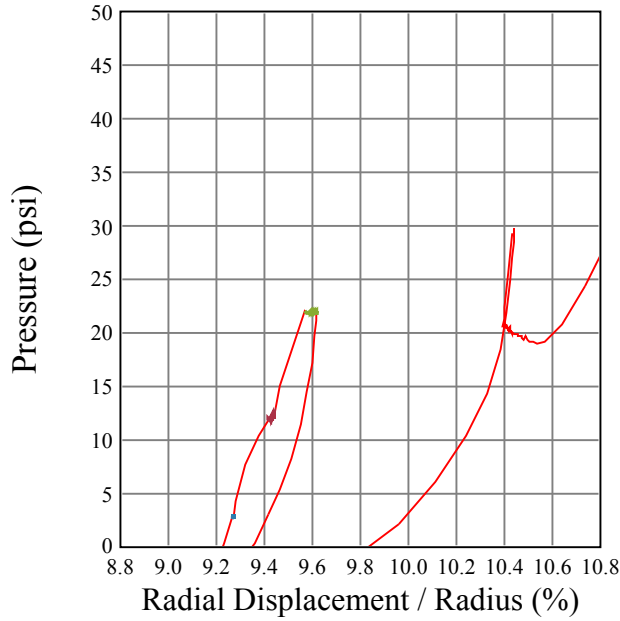
# In Situ Engineering - Balance Pressure

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound01 Depth: 10FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



DATA

Balance Pressure = 3 psi



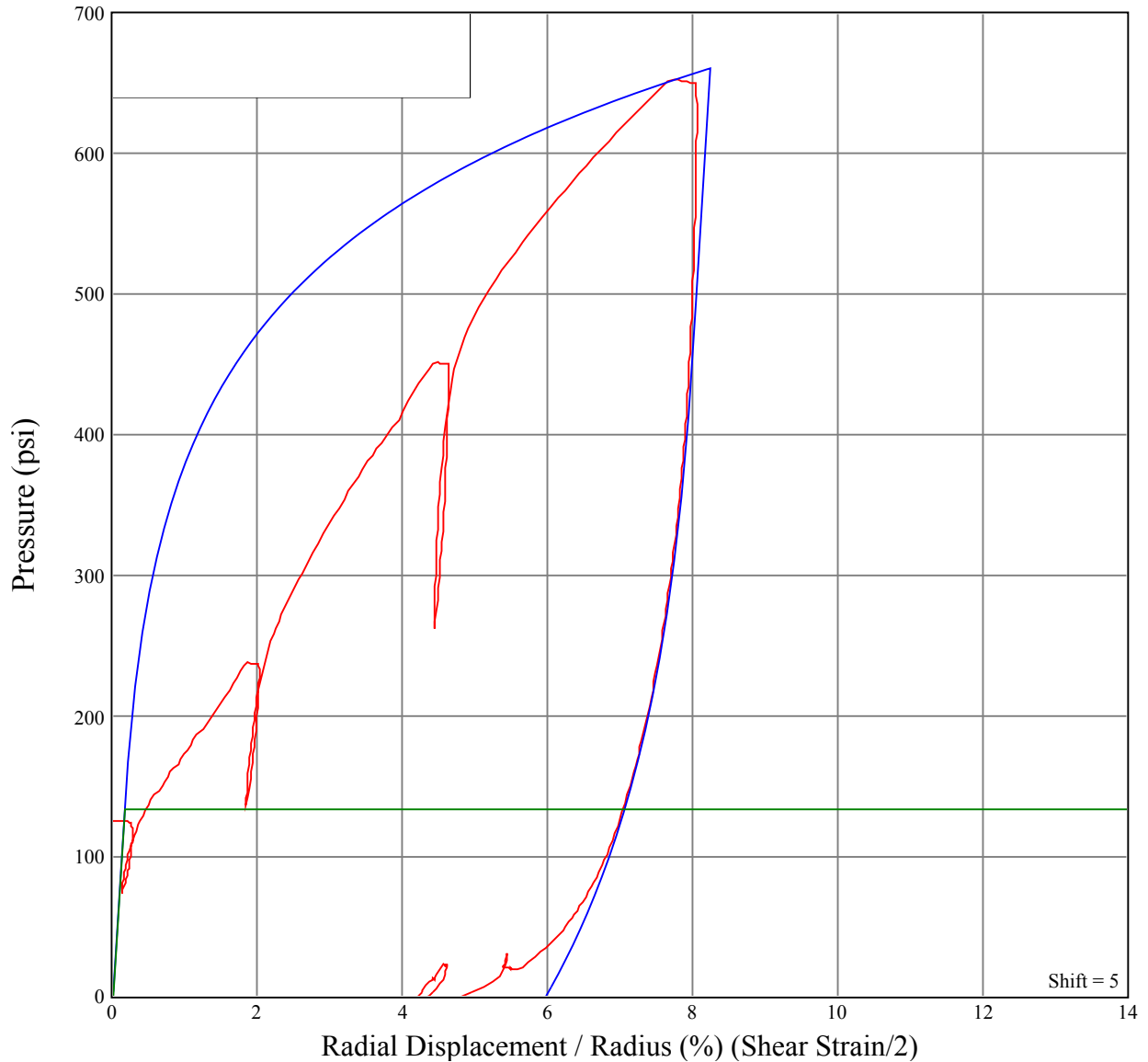
# In Situ Engineering - Gibson's Clay Model

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound01 Depth: 10FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

### LOADING

Shear Strength = 133 psi

In Situ Stress = 3 psi

Shear Modulus = 41900 psi

### UNLOADING

Shear Strength = 205 psi

Shear Modulus = 41900 psi



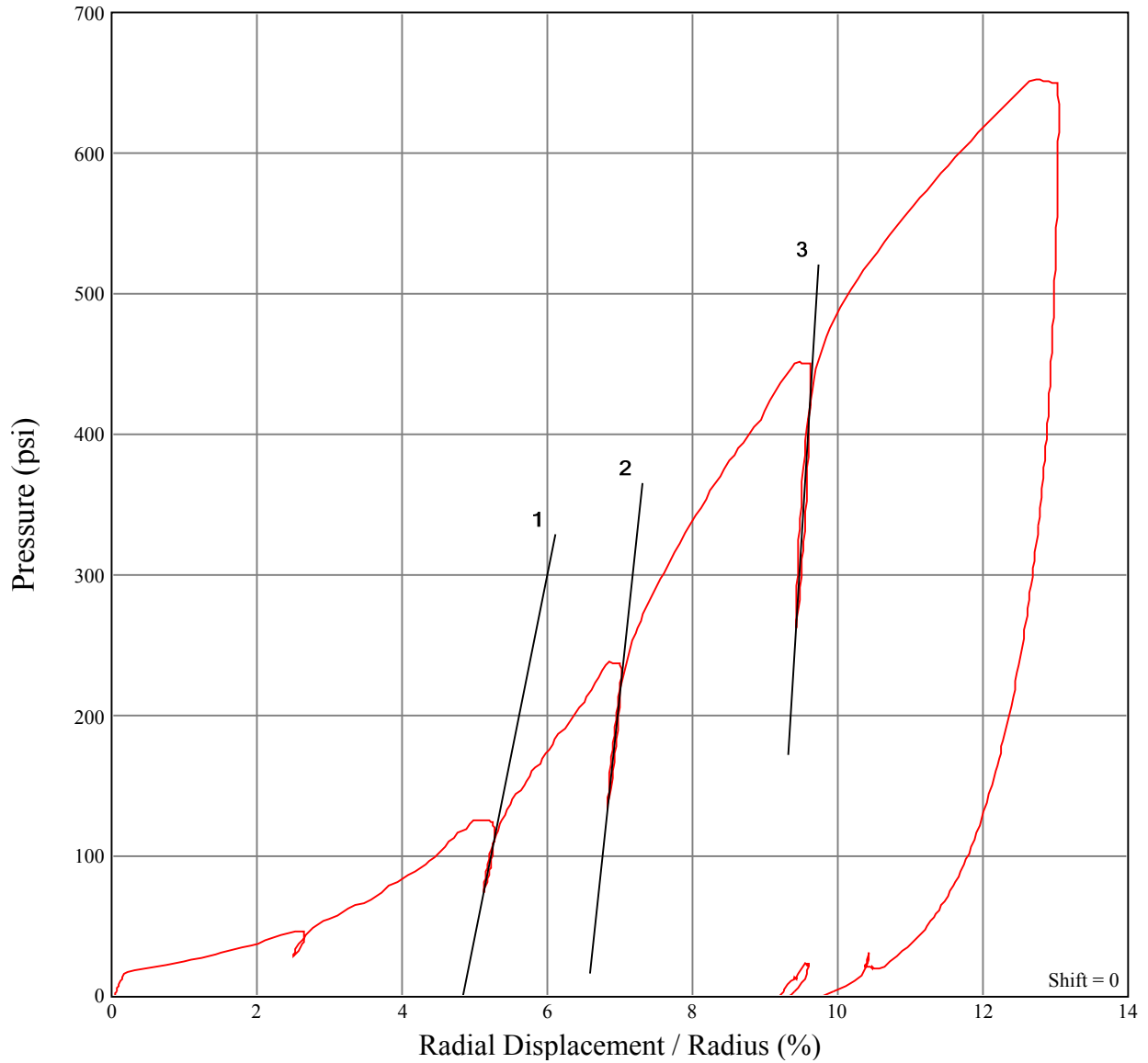
# In Situ Engineering - Shear Modulus Plot

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound01 Depth: 10FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

#1 Shear Modulus = 12900 psi

#2 Shear Modulus = 24100 psi

#3 Shear Modulus = 41900 psi



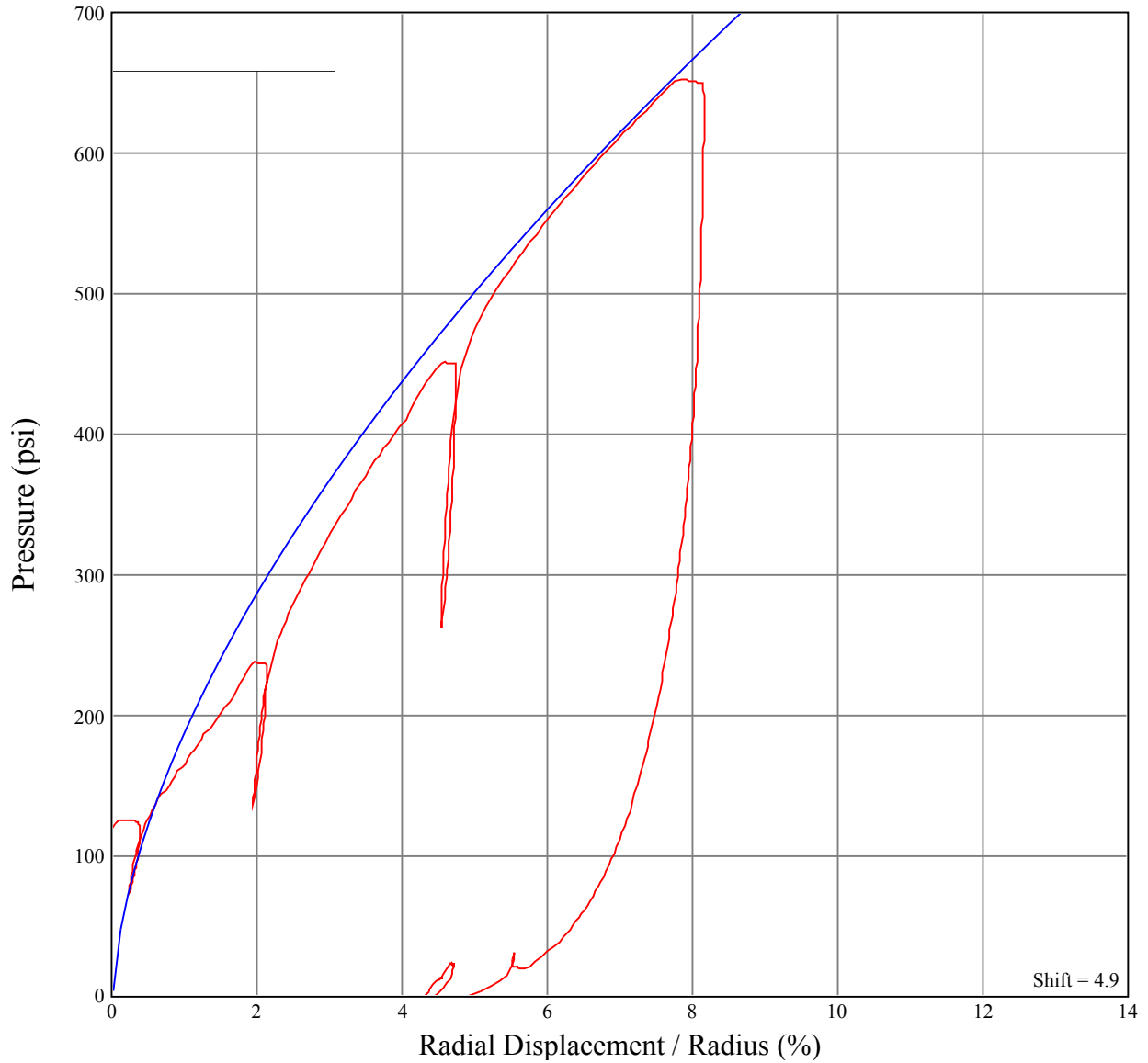
# In Situ Engineering - Hughes' Sand Model

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound01 Depth: 10FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

Water Pressure = 0 psi

Lateral Stress = 3 psi

Friction Angle = 50 deg

Shear Modulus = 41900 psi

Critical Friction Angle = 32 deg



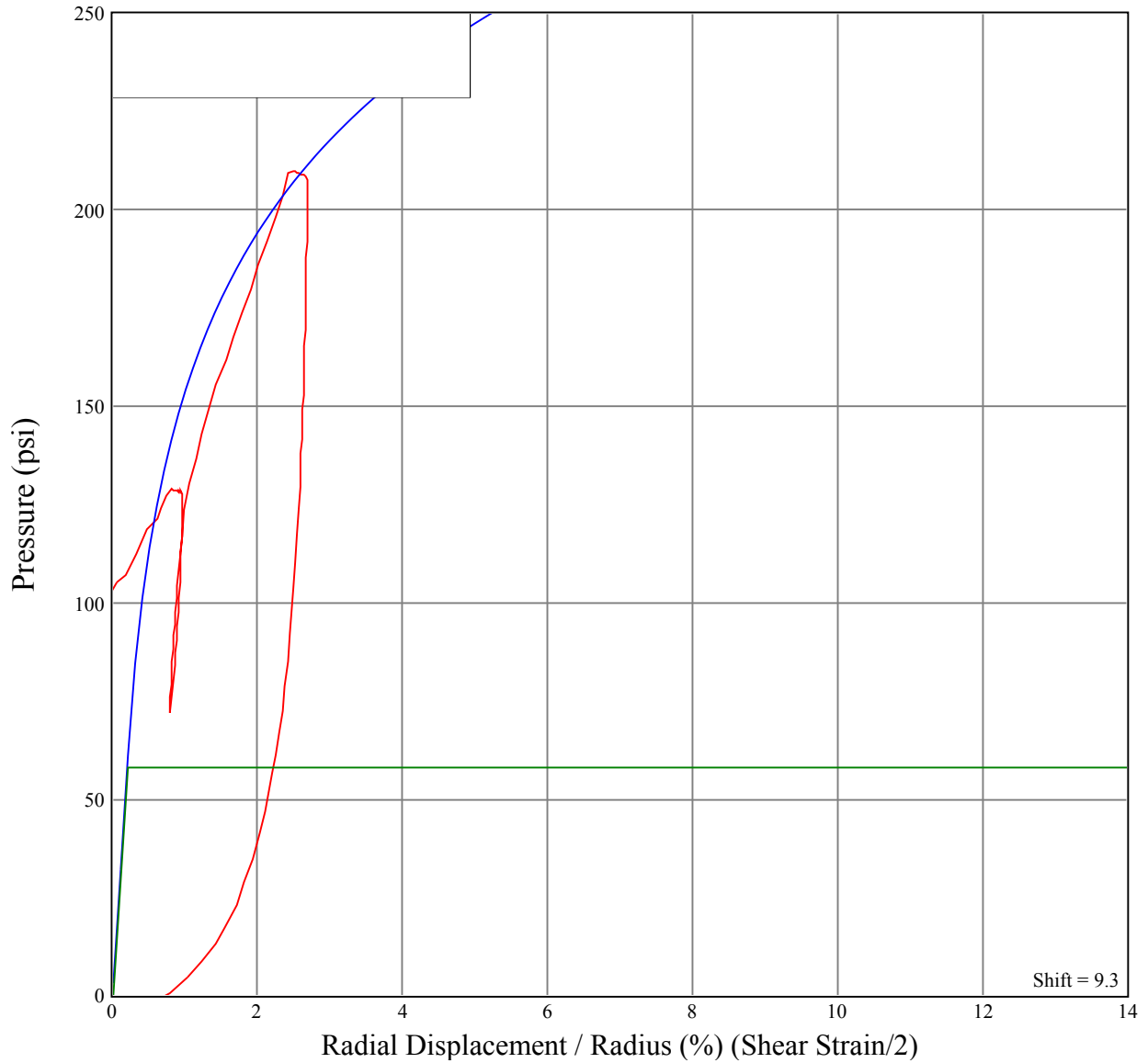
# In Situ Engineering - Gibson's Clay Model

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound02 Depth: 8.5FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

### LOADING

Shear Strength = 58 psi

In Situ Stress = 3 psi

Shear Modulus = 14500 psi





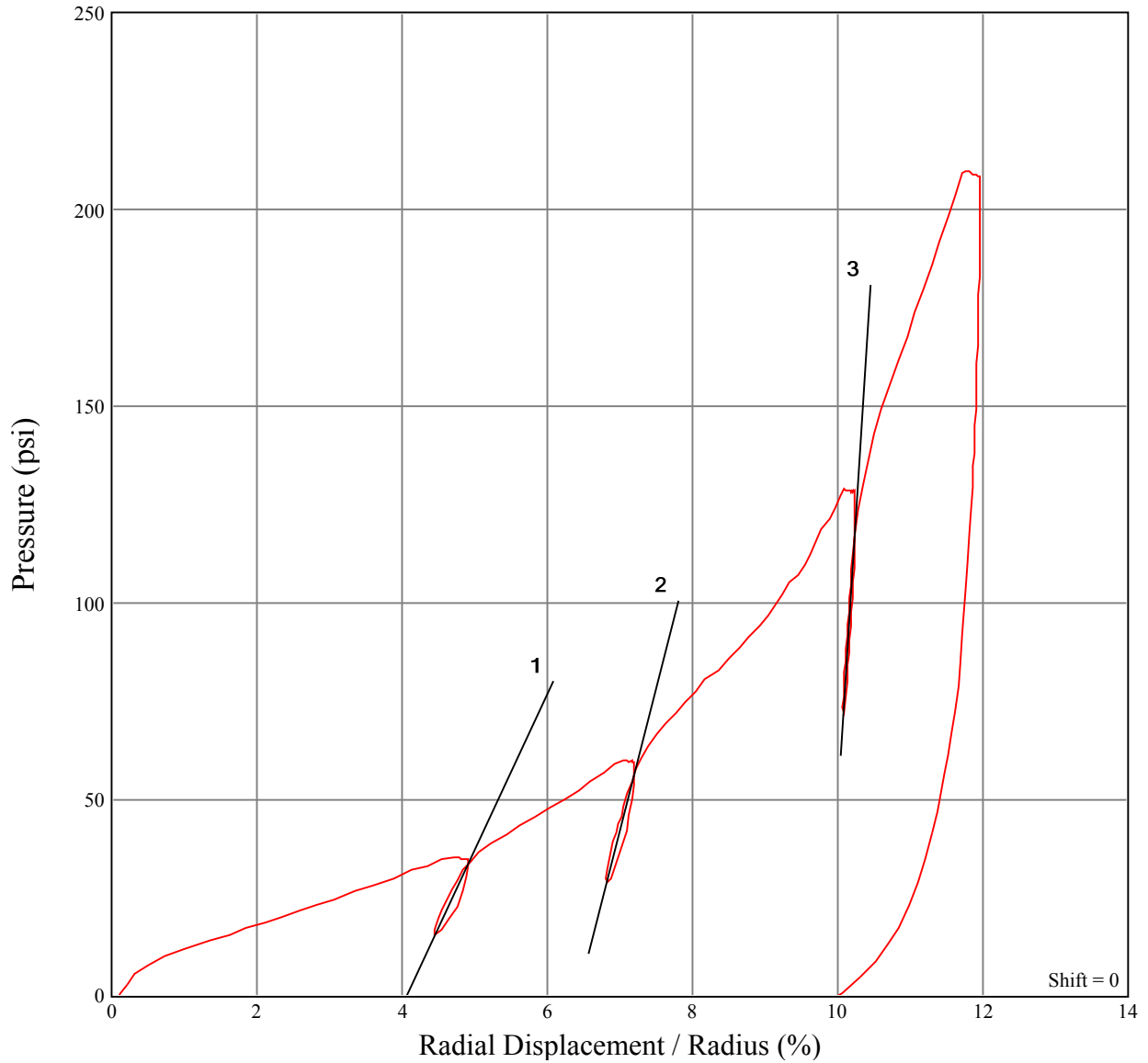
# In Situ Engineering - Shear Modulus Plot

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound02 Depth: 8.5FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

#1 Shear Modulus = 1980 psi

#2 Shear Modulus = 3620 psi

#3 Shear Modulus = 14500 psi



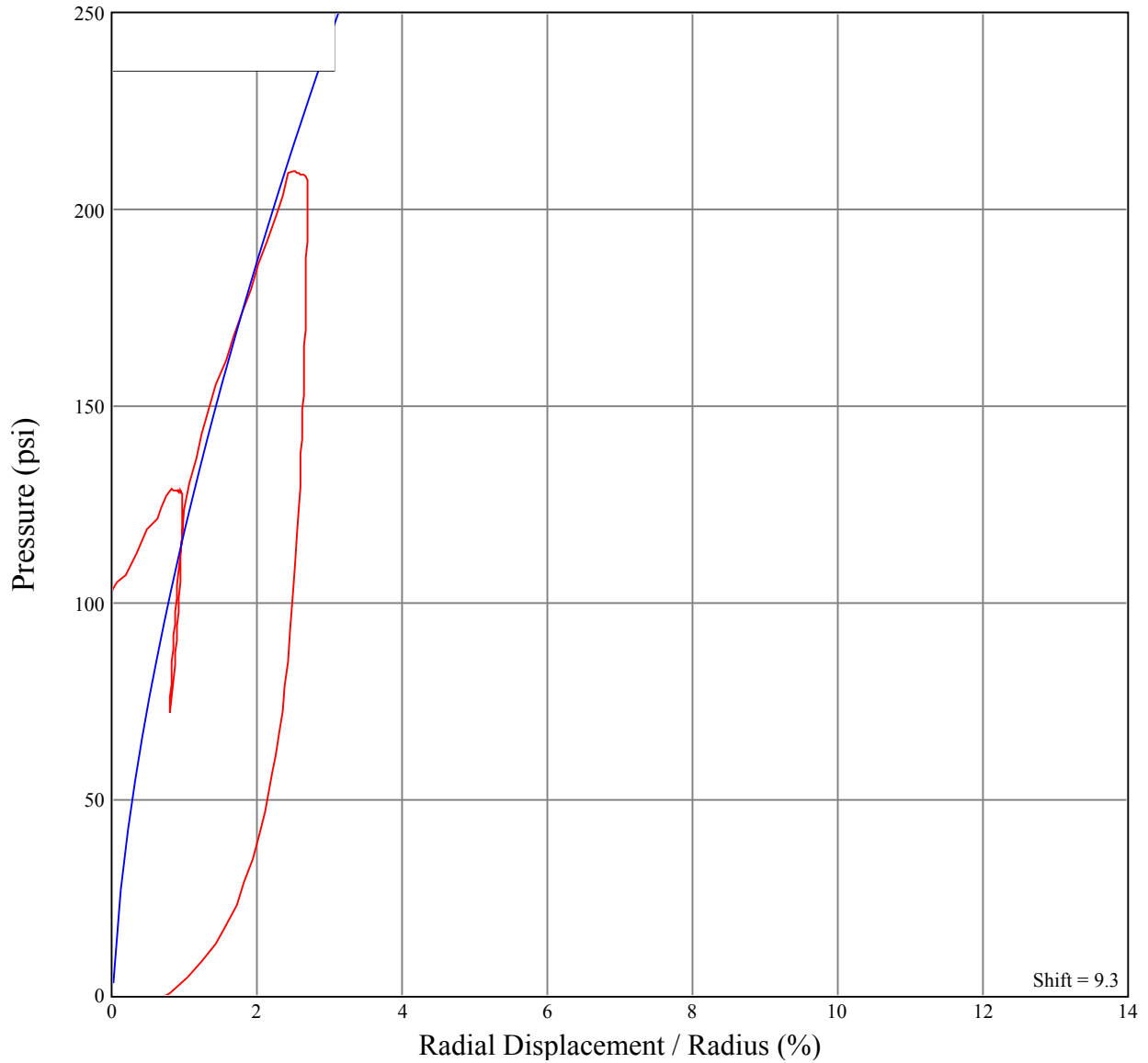
# In Situ Engineering - Hughes' Sand Model

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound02 Depth: 8.5FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

Water Pressure = 0 psi

Lateral Stress = 3 psi

Friction Angle = 53 deg

Shear Modulus = 14000 psi

Critical Friction Angle = 32 deg



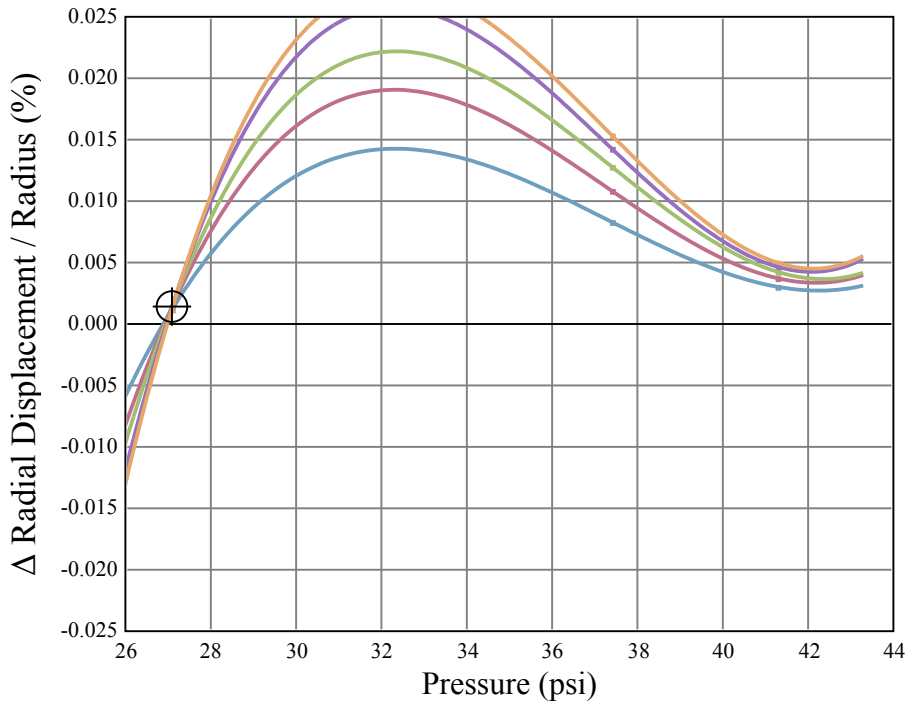
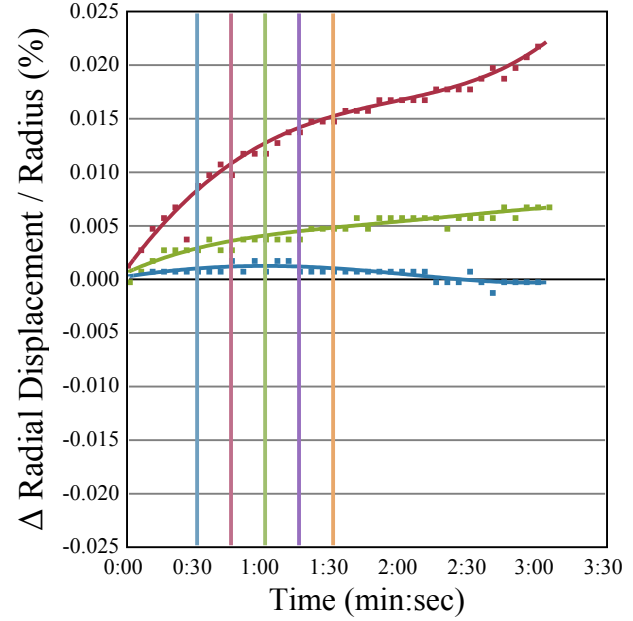
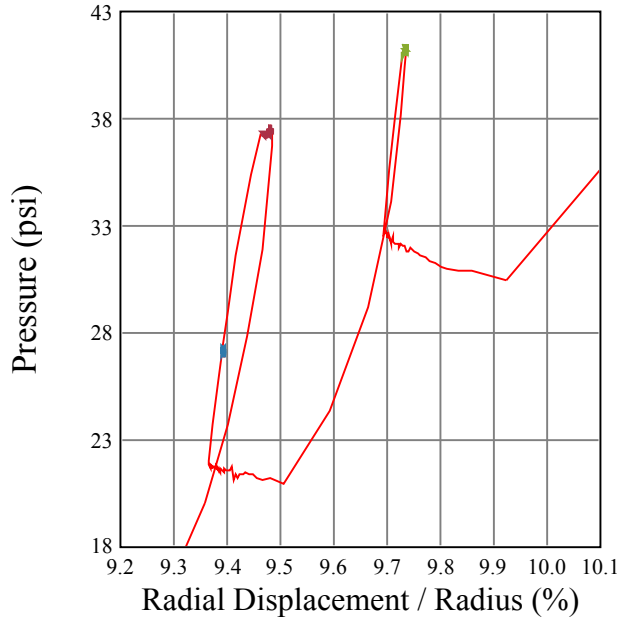
# In Situ Engineering - Balance Pressure

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound04 Depth: 24.5FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



DATA

Balance Pressure = 27 psi



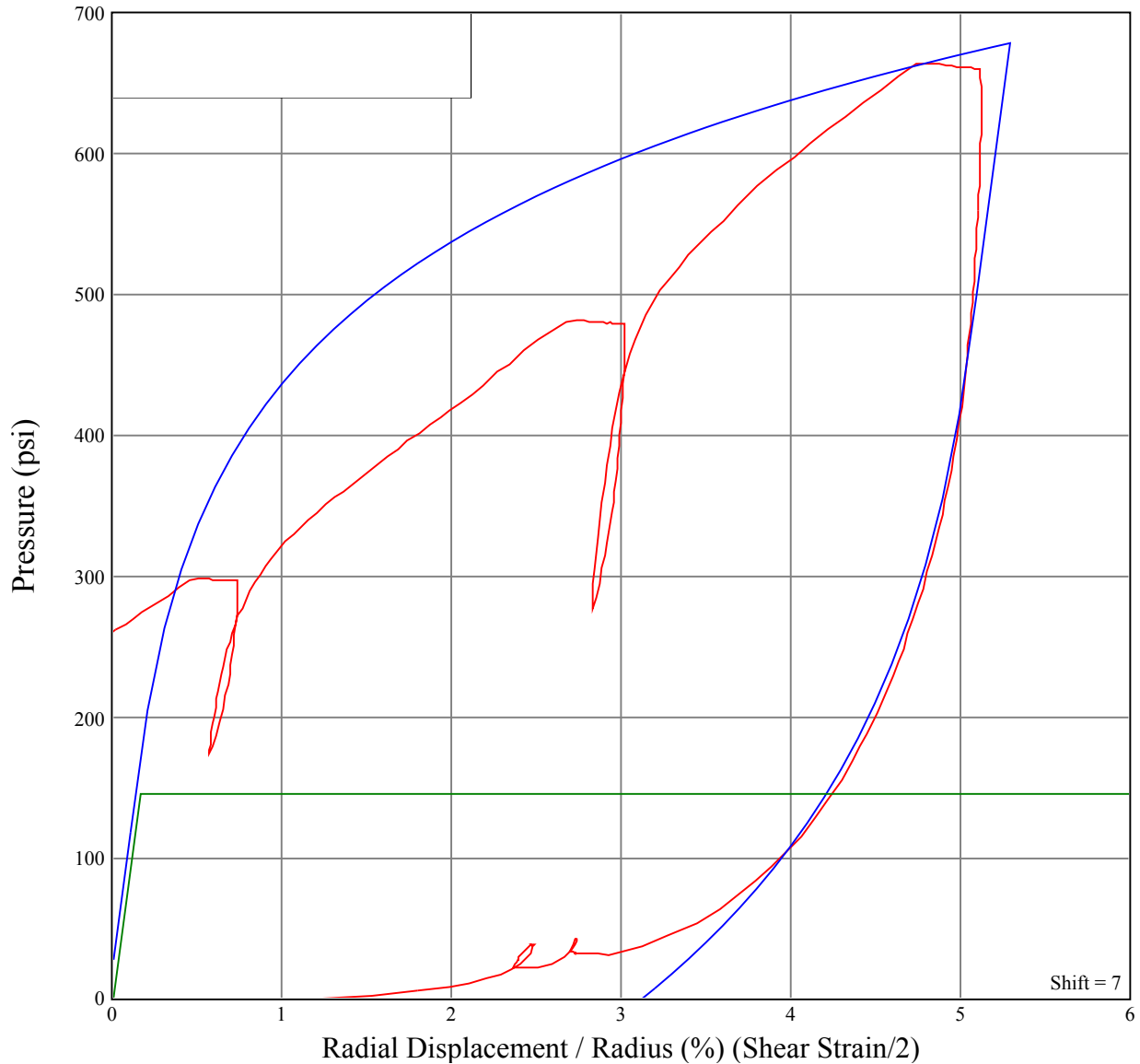
# In Situ Engineering - Gibson's Clay Model

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound04 Depth: 24.5FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

### LOADING

Shear Strength = 145 psi

In Situ Stress = 27 psi

Shear Modulus = 45300 psi

### UNLOADING

Shear Strength = 210 psi

Shear Modulus = 45300 psi



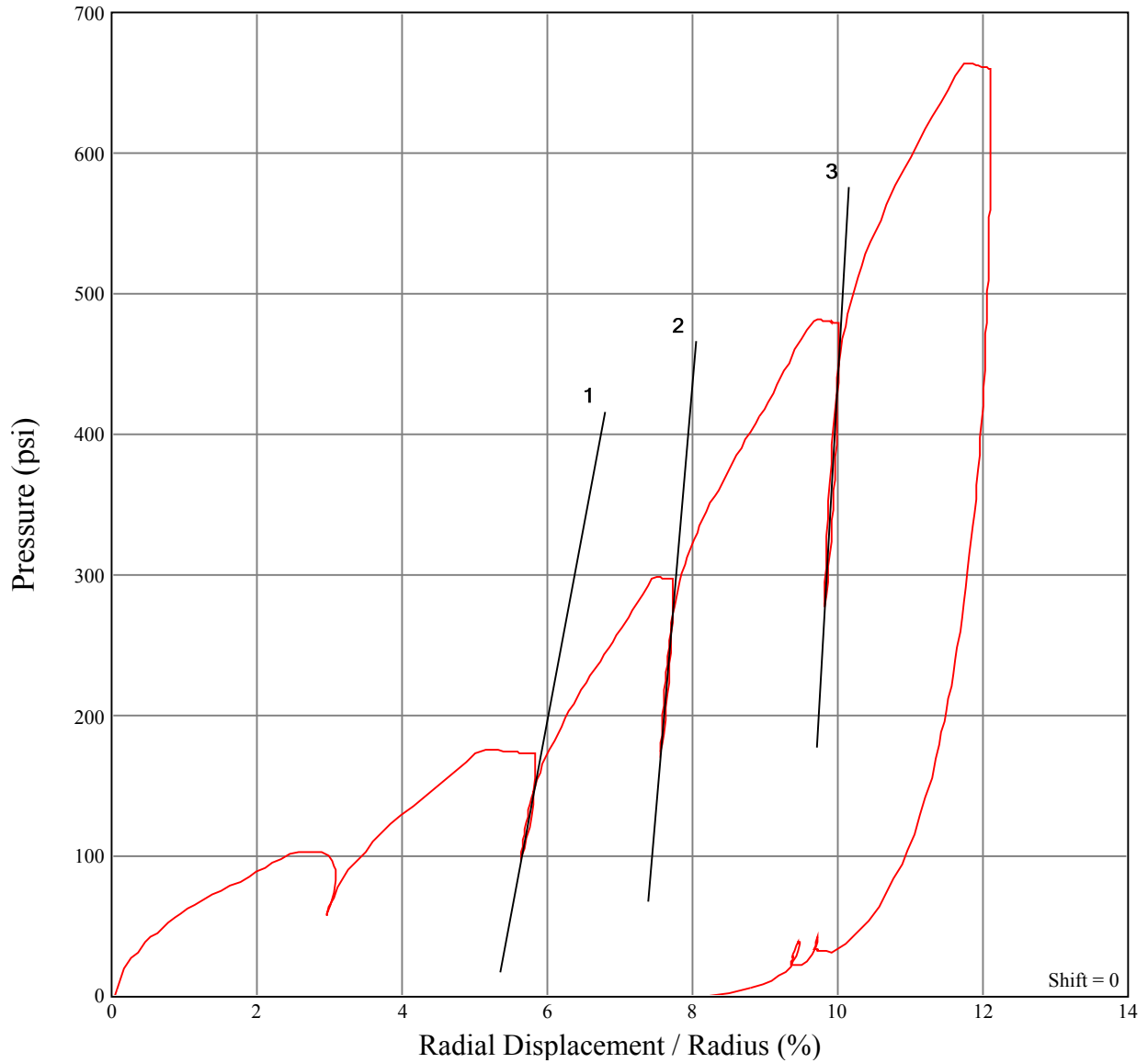
# In Situ Engineering - Shear Modulus Plot

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound04 Depth: 24.5FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

#1 Shear Modulus = 13800 psi

#2 Shear Modulus = 30200 psi

#3 Shear Modulus = 45300 psi



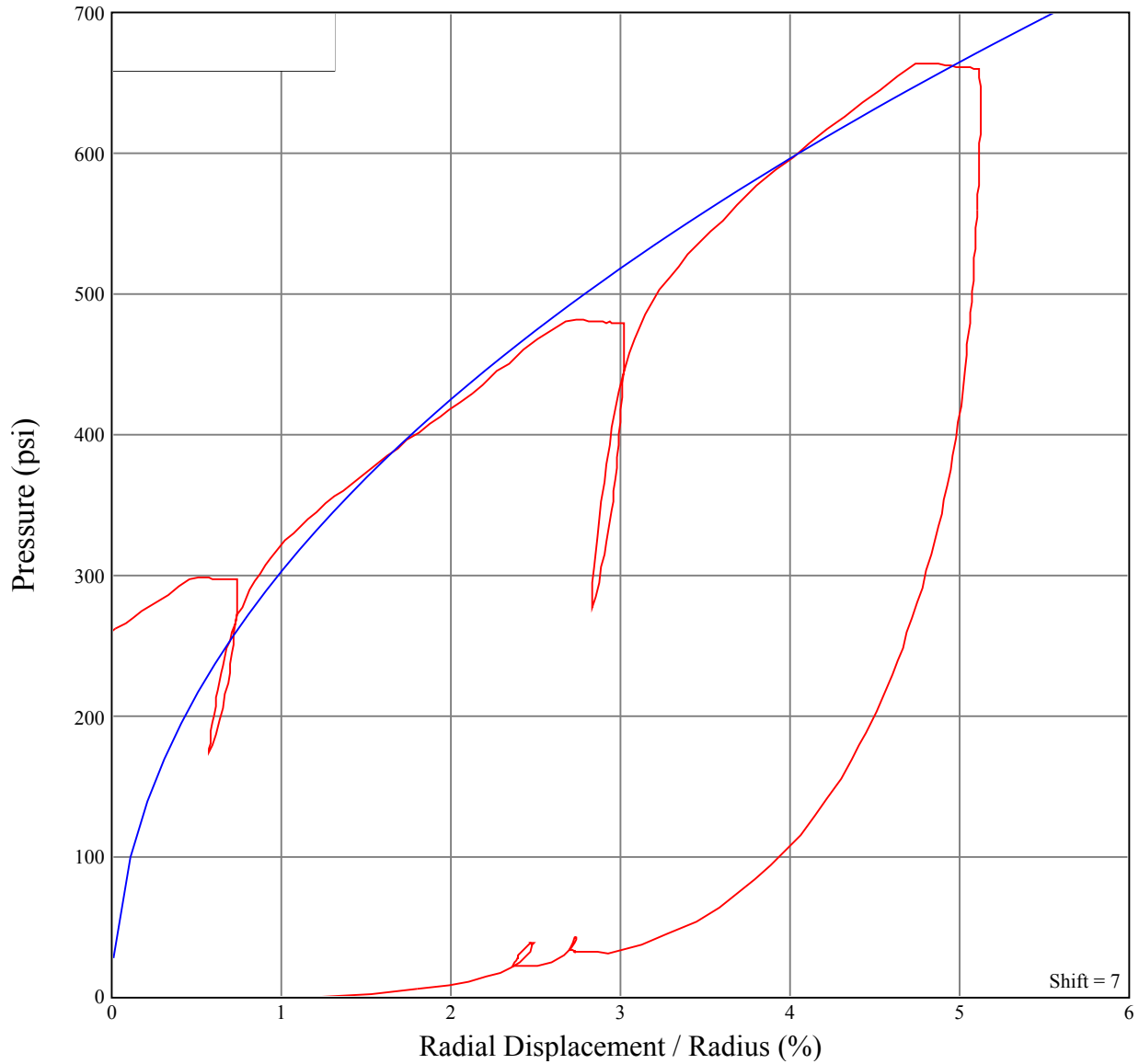
# In Situ Engineering - Hughes' Sand Model

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound04 Depth: 24.5FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



## DATA

Water Pressure = 0 psi

Lateral Stress = 27 psi

Friction Angle = 42 deg

Shear Modulus = 45300 psi

Critical Friction Angle = 32 deg



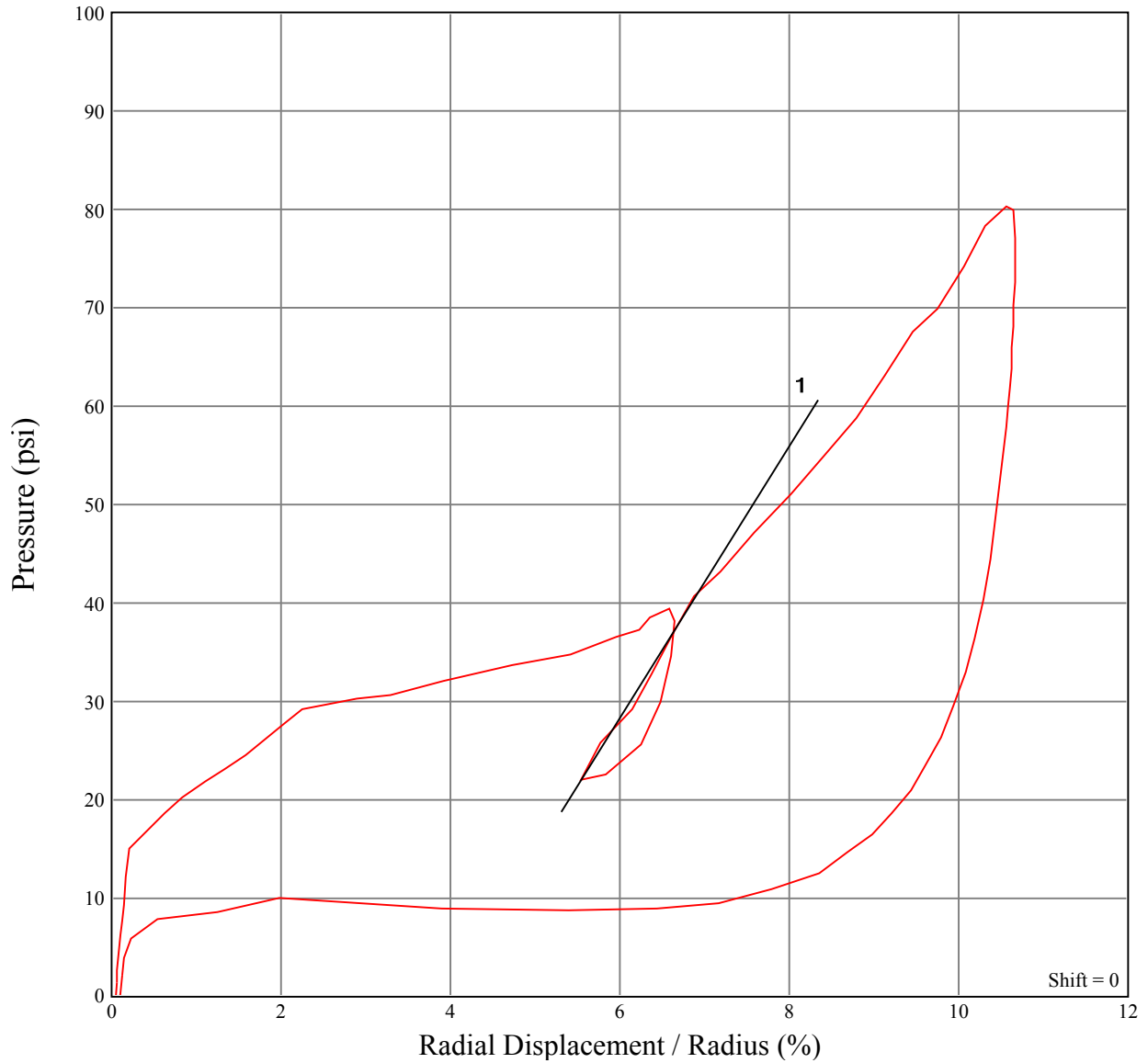
# In Situ Engineering - Shear Modulus Plot

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound05 Depth: 23FT Date: 02/28/2013

Oper: Gerdes Job # 1117 Inst: 06



DATA

#1 Shear Modulus = 690 psi



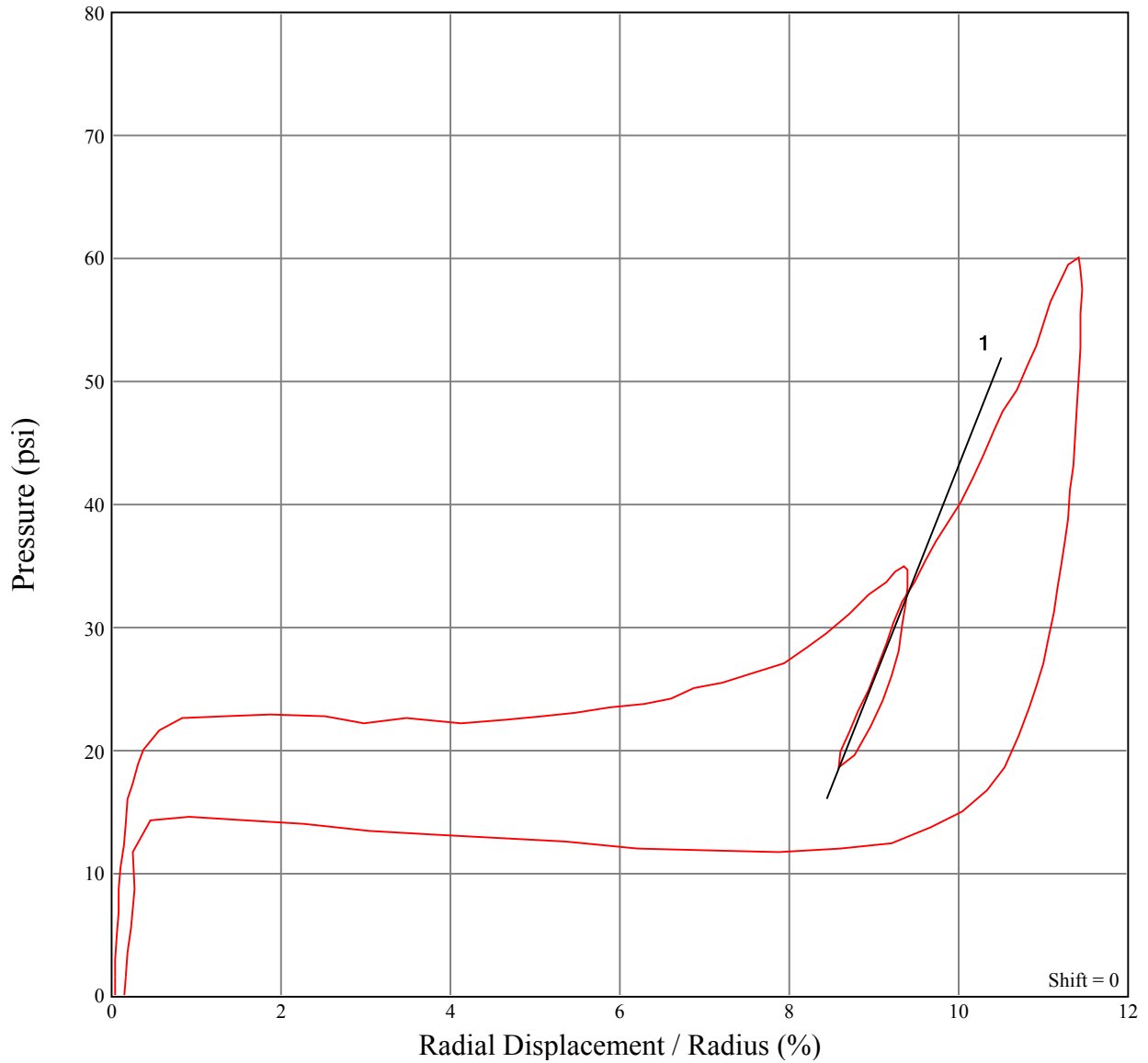
# In Situ Engineering - Shear Modulus Plot

Golder Associates

Sound Transit

Boring: E330-PMT-03 Test: Sound06 Depth: 33FT Date: 03/01/2013

Oper: Gerdes Job # 1117 Inst: 06



DATA

#1 Shear Modulus = 870 psi



# APPENDIX A.5

Photographs



E330-B-004 0.8-2.5FT



E330-B-004 2.5-5.0FT



E330-B-004 5.0-7.5FT



E330-B-004 7.5-10.0FT





E330-B-004 10.0-12.5FT




E330-B-004 12.5-15.0FT

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION


  
 SUBMITTED BY: D. FINDLEY


  
 FINAL DESIGN PARTNERS.


  
 DATE: 03/20/14

SCALE: NOT TO SCALE  
 FILENAME: 11393533\_0330\_106.ai  
 CONTRACT No.: RTA / AE 0143-11  
 DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-004 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	H-4A
REV:	



E330-B-004 15.0-17.5FT



E330-B-004 17.5-20.0FT



E330-B-004 20.0-22.5FT



E330-B-004 22.5-24.5FT



E330-B-004 24.5-27.0FT



E330-B-004 27.0-30.0FT

No.	DATE	DSN	CHK	APP	REVISION

DESIGNED BY:  
X.XXXXXX  
DRAWN BY:  
A. PARKIN  
CHECKED BY:  
X.XXXXXX  
APPROVED BY:  
X.XXXXXX



**Golder Associates**  
SUBMITTED BY:  
D. FINDLEY

**H J H**  
FINAL DESIGN PARTNERS.  
DATE:  
03/20/14  
REVIEWED BY:  
D. FINDLEY

LINE IS 1" AT FULL SCALE  
**SOUNDTRANSIT**  
DATE:  
03/20/14

SCALE:  
NOT TO SCALE  
FILENAME:  
11393533\_0330\_106.ai  
CONTRACT No.:  
RTA / AE 0143-11  
DATE:  
03/20/14

**EAST LINK EXTENSION  
CONTRACT E330  
BEL-RED  
SONIC CORE PHOTO LOGS  
E330-B-004 SOILS**

DRAWING No.:  
LOCATION ID:  
FIGURE No: H-4B  
REV:



E330-B-004 30.0-32.5FT



E330-B-004 32.5-35.0FT



E330-B-004 35.0-37.5FT



E330-B-004 37.5-40.0FT



E330-B-004 40.0-42.5FT



E330-B-004 42.5-45.0FT

No.	DATE	DSN	CHK	APP	REVISION

DESIGNED BY:	X.XXXXXX
DRAWN BY:	A. PARKIN
CHECKED BY:	X.XXXXXX
APPROVED BY:	X.XXXXXX

			SCALE: NOT TO SCALE FILENAME: 11393533_0330_106.ai CONTRACT No.: RTA / AE 0143-11	<b>EAST LINK EXTENSION                  CONTRACT E330                  BEL-RED                  SONIC CORE PHOTO LOGS                  E330-B-004 SOILS</b>	DRAWING No.: LOCATION ID: FIGURE No:      REV: H-4C
SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14		



E330-B-004 45.0-47.5FT



E330-B-004 47.5-50.0FT



E330-B-004 50.0-52.0FT



E330-B-004 52.0-54.0FT



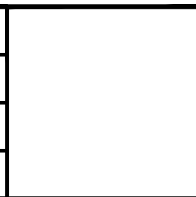
E330-B-004 54.0-56.0FT



E330-B-004 56.0-58.0FT

No.	DATE	DSN	CHK	APP	REVISION

DESIGNED BY:  
X.XXXXXX  
DRAWN BY:  
A. PARKIN  
CHECKED BY:  
X.XXXXXX  
APPROVED BY:  
X.XXXXXX



SUBMITTED BY:  
D. FINDLEY

DATE:  
03/20/14

REVIEWED BY:  
D. FINDLEY

DATE:  
03/20/14

SCALE:  
NOT TO SCALE  
FILENAME:  
11393533\_0330\_106.ai  
CONTRACT No.:  
RTA / AE 0143-11  
DATE:  
03/20/14

**EAST LINK EXTENSION  
CONTRACT E330**  
BEL-RED  
SONIC CORE PHOTO LOGS  
E330-B-004 SOILS

DRAWING No.:  
LOCATION ID:  
FIGURE No: H-4D  
REV:



E330-B-004 58.0-60.0FT



E330-B-004 60.0-62.0FT

E330-B-004 62.0-66.0FT NO PHOTO






E330-B-004 66.0-68.0FT



E330-B-004 68.0-70.0FT



E330-B-004 70.0-72.0FT

						DESIGNED BY: X.XXXXXX	  FINAL DESIGN PARTNERS.	 SOUNDTRANSIT	SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION</b> <b>CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-004 SOILS	DRAWING No.:
						DRAWN BY: A. PARKIN			FILENAME: 11393533_0330_106.ai		LOCATION ID:
						CHECKED BY: X.XXXXXX			CONTRACT No.:		FIGURE No.:
						APPROVED BY: X.XXXXXX			RTA / AE 0143-11		REV:
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14		H-4E



E330-B-004 72.0-74.0FT



E330-B-004 74.0-76.0FT



E330-B-004 76.0-78.0FT






E330-B-004 78.0-80.0FT



E330-B-004 80.0-82.0FT



E330-B-004 82.0-85.0FT (END OF BOREHOLE)

						DESIGNED BY: X.XXXXXX				SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-004 SOILS	DRAWING No.:
						DRAWN BY: A. PARKIN				LOCATION ID:		
						CHECKED BY: X.XXXXXX				FIGURE No.:		REV:
						APPROVED BY: X.XXXXXX				H-4F		
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	CONTRACT No.: RTA / AE 0143-11		



E330-B-001 8-10FT



E330-B-001 10-15FT

E330-B-001 0-8FT NO SAMPLE RUN



E330-B-001 15-20FT






E330-B-001 20-25FT



E330-B-001 25-30FT

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION

				SCALE:	NOT TO SCALE
				FILENAME:	11393533_0330_101.ai
SUBMITTED BY:	DATE:	REVIEWED BY:	DATE:	CONTRACT No.:	RTA / AE 0143-11
D. FINDLEY	03/20/14	D. FINDLEY	03/20/14	DATE:	03/20/14

<b>EAST LINK EXTENSION</b> <b>CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-001 SOILS		DRAWING No.:
		LOCATION ID:
		FIGURE No: REV:
		H-1A

DRAWING No.:
LOCATION ID:
FIGURE No: REV:
H-1A





E330-B-001 30-35FT



E330-B-001 35-40FT



E330-B-001 40-45FT



E330-B-001 45-50FT





E330-B-001 50-55FT




E330-B-001 55-60FT

						DESIGNED BY: X.XXXXXX
						DRAWN BY: A. PARKIN
						CHECKED BY: X.XXXXXX
						APPROVED BY: X.XXXXXX
No.	DATE	DSN	CHK	APP	REVISION	


  
 SUBMITTED BY:  
D. FINDLEY


  
 FINAL DESIGN PARTNERS.

DATE: 03/20/14  
 REVIEWED BY: D. FINDLEY


  
 SCALE:  
NOT TO SCALE

FILENAME:  
11393533\_0330\_101.ai  
 CONTRACT No.:  
RTA / AE 0143-11

DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-001 SOILS




DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-1B	



E330-B-001 60-65FT



E330-B-001 65-70FT (END OF BOREHOLE)

						DESIGNED BY: X.XXXXXX				SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-001 SOILS	DRAWING No.:	
						DRAWN BY: A. PARKIN				FILENAME: 11393533_0330_101.ai		LOCATION ID:	
						CHECKED BY: X.XXXXXX				CONTRACT No.:		FIGURE No.:	REV.:
						APPROVED BY: X.XXXXXX				RTA / AE 0143-11		H-1C	
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	DATE: 03/20/14			

E330-B-002 0-5FT NO SAMPLE RUN



E330-B-002 5-10FT



E330-B-002 10-12.5FT




E330-B-002 12.5-20FT NO PHOTO



E330-B-002 20-25FT



E330-B-002 25-30FT

						DESIGNED BY: X.XXXXXX	  FINAL DESIGN PARTNERS.		SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-002 SOILS	DRAWING No.:
						DRAWN BY: A. PARKIN			FILENAME: 11393533_0330_102.ai		LOCATION ID:
						CHECKED BY: X.XXXXXX			CONTRACT No.:		FIGURE No:
						APPROVED BY: X.XXXXXX			RTA / AE 0143-11		REV:
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14		H-2A



E330-B-02 30-35FT



E330-B-02 35-40FT



E330-B-02 40-45FT



E330-B-02 45-50FT




E330-B-02 50-55FT




E330-B-02 55-60FT

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION


  
 SUBMITTED BY: D. FINDLEY


  
 FINAL DESIGN PARTNERS.

DATE: 03/20/14  
 REVIEWED BY: D. FINDLEY


  
 SCALE: NOT TO SCALE  
 FILENAME: 11393533\_0330\_102.ai  
 CONTRACT No.: RTA / AE 0143-11  
 DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-02 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-2B	






E330-B-002 60-65FT



E330-B-002 65-67.5FT



E330-B-002 67.5-70FT (END OF BOREHOLE)

						DESIGNED BY: X.XXXXXX				SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-002 SOILS	DRAWING No.:
						DRAWN BY: A. PARKIN				LOCATION ID:		
						CHECKED BY: X.XXXXXX				FIGURE No.:		REV.:
						APPROVED BY: X.XXXXXX				H-2C		
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	CONTRACT No.: RTA / AE 0143-11		



E330-B-003 5-10FT



E330-B-003 10-12.5FT (1)

E330-B-003 0-5FT NO SAMPLE RUN






E330-B-003 10-12.5FT (2)



E330-B-003 12.5-15FT (1)



E330-B-003 12.5-15FT (2)

						DESIGNED BY: X.XXXXXX	  FINAL DESIGN PARTNERS.	 SOUNDTRANSIT	SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION</b> <b>CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-003 SOILS	DRAWING No.:
						DRAWN BY: A. PARKIN			FILENAME: 11393533_0330_103.ai		LOCATION ID:
						CHECKED BY: X.XXXXXX			CONTRACT No.:		FIGURE No:
						APPROVED BY: X.XXXXXX			RTA / AE 0143-11		REV:
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14		H-3A



E330-B-003 15-17.5FT (1)



E330-B-003 15-17.5FT (2)



E330-B-003 17.5-20FT (1)



E330-B-003 17.5-20FT (2)



E330-B-003 20-22.5FT (1)



E330-B-003 20-22.5FT (2)

					DESIGNED BY: X.XXXXXX
					DRAWN BY: A. PARKIN
					CHECKED BY: X.XXXXXX
					APPROVED BY: X.XXXXXX
No.	DATE	DSN	CHK	APP	REVISION

	 FINAL DESIGN PARTNERS.			SCALE: NOT TO SCALE
				FILENAME: 11393533_0330_103.ai
SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	CONTRACT No.: RTA / AE 0143-11

<b>EAST LINK EXTENSION</b> <b>CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-003 SOILS	
DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-3B	

DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-3B	



E330-B-003 22.5-25FT (1)



E330-B-003 22.5-25FT (2)



E330-B-003 25-27.5FT (1)



E330-B-003 25-27.5FT (2)





E330-B-003 27.5-30FT (1)




E330-B-003 27.5-30FT (2)

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION


  
 SUBMITTED BY: D. FINDLEY


  
 FINAL DESIGN PARTNERS.

DATE: 03/20/14  
 REVIEWED BY: D. FINDLEY


  
 SCALE: NOT TO SCALE  
 FILENAME: 11393533\_0330\_103.ai  
 CONTRACT No.: RTA / AE 0143-11  
 DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No.:	H-3C
REV:	





E330-B-003 30-32.5FT (1)



E330-B-003 30-32.5FT (2)



E330-B-003 32.5-35FT (1)



E330-B-003 32.5-35FT (2)



E330-B-003 35-37FT (1)



E330-B-003 35-37FT (2)

					DESIGNED BY: X.XXXXXX
					DRAWN BY: A. PARKIN
					CHECKED BY: X.XXXXXX
					APPROVED BY: X.XXXXXX
No.	DATE	DSN	CHK	APP	REVISION



SUBMITTED BY:  
D. FINDLEY

DATE:  
03/20/14

REVIEWED BY:  
D. FINDLEY

DATE:  
03/20/14

SCALE:  
NOT TO SCALE  
FILENAME:  
11393533\_0330\_103.ai  
CONTRACT No.:  
RTA / AE 0143-11  
DATE:  
03/20/14

**EAST LINK EXTENSION  
CONTRACT E330**  
BEL-RED  
SONIC CORE PHOTO LOGS  
E330-B-003 SOILS

DRAWING No.:  
LOCATION ID:  
FIGURE No: REV:  
H-3D



E330-B-003 37-40FT (1)



E330-B-003 37-40FT (2)



E330-B-003 40-42.5FT (1)



E330-B-003 40-42.5FT (2)





E330-B-003 42.5-45FT (1)




E330-B-003 42.5-45FT (2)

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION


  
 SUBMITTED BY:  
 D. FINDLEY


  
 FINAL DESIGN PARTNERS.

DATE: 03/20/14  
 REVIEWED BY: D. FINDLEY


  
 SCALE:  
 NOT TO SCALE

FILENAME:  
 11393533\_0330\_103.ai  
 CONTRACT No.:  
 RTA / AE 0143-11

DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-3E	



E330-B-003 45-47.5FT (1)



E330-B-003 45-47.5FT (2)



E330-B-003 47.5-50FT (1)



E330-B-003 47.5-50FT (2)





E330-B-003 50-52.5FT (1)




E330-B-003 50-52.5FT (2)

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION


  
 SUBMITTED BY: D. FINDLEY


  
 FINAL DESIGN PARTNERS.

DATE: 03/20/14  
 REVIEWED BY: D. FINDLEY


  
 DATE: 03/20/14

SCALE: NOT TO SCALE  
 FILENAME: 11393533\_0330\_103.ai  
 CONTRACT No.: RTA / AE 0143-11  
 DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	H-3F
REV:	



E330-B-003 52.5-55FT (1)



E330-B-003 52.5-55FT (2)



E330-B-003 55-57.5FT (1)



E330-B-003 55-57.5FT (2)





E330-B-003 57.5-60FT (1)




E330-B-003 57.5-60FT (2)

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION


  
 SUBMITTED BY: D. FINDLEY


  
 FINAL DESIGN PARTNERS.

DATE: 03/20/14  
 REVIEWED BY: D. FINDLEY


  
 SCALE: NOT TO SCALE  
 FILENAME: 11393533\_0330\_103.ai  
 CONTRACT No.: RTA / AE 0143-11  
 DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-3G	



E330-B-003 60-62FT (1)



E330-B-003 60-62FT (2)



E330-B-003 62.5-65FT (1)



E330-B-003 62.5-65FT (2)



E330-B-003 65-67.5FT (1)



E330-B-003 65-67.5FT (2)

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION

DESIGNED BY:	X.XXXXXX
DRAWN BY:	A. PARKIN
CHECKED BY:	X.XXXXXX
APPROVED BY:	X.XXXXXX

**Golder Associates**

SUBMITTED BY: D. FINDLEY

**FINAL DESIGN PARTNERS.**

DATE: 03/20/14

REVIEWED BY: D. FINDLEY

**SOUNDTRANSIT**

DATE: 03/20/14

SCALE:	NOT TO SCALE
FILENAME:	11393533_0330_103.ai
CONTRACT No.:	RTA / AE 0143-11
DATE:	03/20/14

**EAST LINK EXTENSION  
CONTRACT E330**

BEL-RED

SONIC CORE PHOTO LOGS  
E330-B-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No.:	H-3H
REV:	



E330-B-003 67.5-70FT (1)



E330-B-003 67.5-70FT (2)



E330-B-003 70-72.5FT (1)



E330-B-003 70-72.5FT (2)




E330-B-003 72.5-75FT (1)




E330-B-003 72.5-75FT (2)


DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION

DESIGNED BY:	X.XXXXXX
DRAWN BY:	A. PARKIN
CHECKED BY:	X.XXXXXX
APPROVED BY:	X.XXXXXX


  
 SUBMITTED BY: D. FINDLEY


  
 FINAL DESIGN PARTNERS.

REVIEWED BY: D. FINDLEY


  
 SCALE: NOT TO SCALE

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	H-31
REV:	



E330-B-003 75-77.5FT (1)



E330-B-003 75-77.5FT (2)



E330-B-003 77.5-80FT (1)



E330-B-003 77.5-80FT (2)




E330-B-003 80-83.5FT (1)




E330-B-003 80-83.5FT (2)

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION


  
 SUBMITTED BY: D. FINDLEY


  
 FINAL DESIGN PARTNERS.

DATE: 03/20/14  
 REVIEWED BY: D. FINDLEY


  
 SCALE: NOT TO SCALE  
 FILENAME: 11393533\_0330\_103.ai  
 CONTRACT No.: RTA / AE 0143-11  
 DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E330**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E330-B-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No.:	H-3J
REV:	



E330-B-003 83.5-87FT (1)






E330-B-003 83.5-87FT (2)



E330-B-003 87-90FT (1)



E330-B-003 87-90FT (2) (END OF BOREHOLE)

						DESIGNED BY: X.XXXXXX				SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-003 SOILS	DRAWING No.:	
						DRAWN BY: A. PARKIN				FILENAME: 11393533_0330_103.ai		LOCATION ID:	
						CHECKED BY: X.XXXXXX				CONTRACT No.:		FIGURE No:	REV:
						APPROVED BY: X.XXXXXX				RTA / AE 0143-11		H-3K	
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	DATE: 03/20/14			



E330-B-005 0-6FT NO SAMPLE RUN



E330-B-005 6-7.5FT



E330-B-005 7.5-10FT



E330-B-005 10-12.5FT



E330-B-005 12.5-15FT




E330-B-005 15-22.5FT

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION



**Golder Associates**

SUBMITTED BY: D. FINDLEY




**H J H**

FINAL DESIGN PARTNERS.

DATE: 03/20/14

REVIEWED BY: D. FINDLEY



**SOUNDTRANSIT**

SCALE: NOT TO SCALE

FILENAME: 11393533\_0330\_104.ai

CONTRACT No.: RTA / AE 0143-11

DATE: 03/20/14

**EAST LINK EXTENSION  
CONTRACT E330**

BEL-RED

SONIC CORE PHOTO LOGS  
E330-B-005 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	H-5A
REV:	



E330-B-005 22.5-30FT



E330-B-005 30-32.5FT



E330-B-005 30-35FT

VE330-B-001 0-8FT NO SAMPLE RUN



E330-B-005 35-42.5FT



E330-B-005 42.5-47.5FT



E330-B-005 47.5-52.5FT

No.	DATE	DSN	CHK	APP	REVISION

DESIGNED BY:	X.XXXXXX
DRAWN BY:	A. PARKIN
CHECKED BY:	X.XXXXXX
APPROVED BY:	X.XXXXXX

**Golder Associates**

SUBMITTED BY:  
D. FINDLEY

**FINAL DESIGN PARTNERS.**

DATE: 03/20/14

REVIEWED BY:  
D. FINDLEY

**SOUNDTRANSIT**

SCALE:  
NOT TO SCALE

FILENAME:  
11393533\_0330\_104.ai

CONTRACT No.:  
RTA / AE 0143-11

DATE: 03/20/14

**EAST LINK EXTENSION  
CONTRACT E330**

BEL-RED

SONIC CORE PHOTO LOGS  
E330-B-005 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No.:	H-5B
REV:	



E330-B-005 52.5-55FT



E330-B-005 55-57.5FT



E330-B-005 57.5-62.5FT

VE330-B-001 0-8FT NO SAMPLE RUN



E330-B-005 62.5-67.5FT



E330-B-005 67.5-76FT (END OF BOREHOLE)

					DESIGNED BY: X.XXXXXX
					DRAWN BY: A. PARKIN
					CHECKED BY: X.XXXXXX
					APPROVED BY: X.XXXXXX
No.	DATE	DSN	CHK	APP	REVISION

	 FINAL DESIGN PARTNERS.			SCALE: NOT TO SCALE
				FILENAME: 11393533_0330_104.ai
SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	CONTRACT No.: RTA / AE 0143-11

<b>EAST LINK EXTENSION</b> <b>CONTRACT E330</b> BEL-RED SONIC CORE PHOTO LOGS E330-B-005 SOILS	
DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-5C	

DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-5C	



E335-AN-001 6-10FT



E335-AN-001 10-18.5FT



E335-AN-001 18-25FT



E335-AN-001 25-30FT



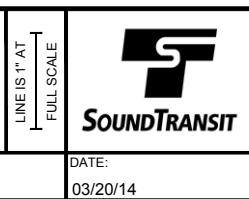
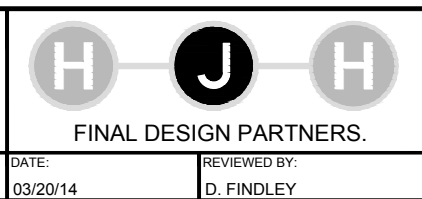
E335-AN-001 30-39FT



E335-AN-001 39-40FT

					DESIGNED BY: X.XXXXXX
					DRAWN BY: A. PARKIN
					CHECKED BY: X.XXXXXX
					APPROVED BY: X.XXXXXX
No.	DATE	DSN	CHK	APP	REVISION

SUBMITTED BY:  
D. FINDLEY



SCALE:  
NOT TO SCALE  
FILENAME:  
11393533\_0335\_101.ai  
CONTRACT No.:  
RTA / AE 0143-11  
DATE:  
03/20/14

**EAST LINK EXTENSION  
CONTRACT E335  
BEL-RED  
SONIC CORE PHOTO LOGS  
E335-AN-001 SOILS**

DRAWING No.:  
LOCATION ID:  
FIGURE No: H-7A  
REV:



E335-AN-001 40-48FT



E335-AN-001 48-50FT



E335-AN-001 50-60FT



E335-AN-001 60-70FT



E335-AN-001 70-80FT



E335-AN-001 80-90FT

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION

SUBMITTED BY:	D. FINDLEY

FINAL DESIGN PARTNERS.	
DATE:	03/20/14

DATE:	03/20/14

SCALE:	NOT TO SCALE
FILENAME:	11393533_0335_101.ai
CONTRACT No.:	RTA / AE 0143-11
DATE:	03/20/14

<b>EAST LINK EXTENSION</b> <b>CONTRACT E335</b> BEL-RED SONIC CORE PHOTO LOGS E335-AN-001 SOILS	
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DRAWING No.:	
LOCATION ID:	
FIGURE No:	H-7B
REV:	



E335-AN-001 90-100FT






E335-AN-001 100-110FT



E335-AN-001 110-120FT



E335-AN-001 120-130FT (END OF BOREHOLE)

						DESIGNED BY: X.XXXXXX				SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION CONTRACT E335</b> BEL-RED SONIC CORE PHOTO LOGS E335-AN-001 SOILS	DRAWING No.:	
						DRAWN BY: A. PARKIN				FILENAME: 11393533_0335_101.ai		LOCATION ID:	
						CHECKED BY: X.XXXXXX				CONTRACT No.:		FIGURE No.:	REV:
						APPROVED BY: X.XXXXXX				RTA / AE 0143-11		H-7C	
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	DATE: 03/20/14			



E335-AN-002 7.5-12FT



E335-AN-002 12-17FT



E335-AN-002 17-20FT



E335-AN-002 20-25FT



E335-AN-002 25-30FT



E335-AN-002 30-35FT

						DESIGNED BY: X.XXXXXX
						DRAWN BY: A. PARKIN
						CHECKED BY: X.XXXXXX
						APPROVED BY: X.XXXXXX
No.	DATE	DSN	CHK	APP	REVISION	




SUBMITTED BY:  
D. FINDLEY



FINAL DESIGN PARTNERS.

SUBMITTED BY:  
D. FINDLEY



SCALE:  
NOT TO SCALE

FILENAME:  
11393533\_0335\_102.ai

CONTRACT No.:  
RTA / AE 0143-11

DATE:  
03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E335**  
 BEL-RED  
**SONIC CORE PHOTO LOGS**  
 E335-AN-002 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	REV:
H-8A	



E335-AN-002 35-40FT



E335-AN-002 40-45FT



E335-AN-002 45-50FT



E335-AN-002 50-60FT



E335-AN-002 60-70FT



E335-AN-002 70-80FT

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION

SUBMITTED BY:	D. FINDLEY
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Golder Associates

FINAL DESIGN PARTNERS.

SOUNDTRANSIT

SCALE:	NOT TO SCALE
FILENAME:	11393533_0335_102.ai
CONTRACT No.:	RTA / AE 0143-11
DATE:	03/20/14

**EAST LINK EXTENSION  
CONTRACT E335  
BEL-RED  
SONIC CORE PHOTO LOGS  
E335-AN-002 SOILS**

DRAWING No.:	
LOCATION ID:	
FIGURE No.:	H-8B
REV:	








E335-AN-002 80-88FT



E335-AN-002 88-100FT



E335-AN-002 100-110FT (END OF BOREHOLE)

						DESIGNED BY: X.XXXXXX				SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION CONTRACT E335 BEL-RED SONIC CORE PHOTO LOGS E335-AN-002 SOILS</b>	DRAWING No.:
						DRAWN BY: A. PARKIN				LOCATION ID:		
						CHECKED BY: X.XXXXXX				FIGURE No:		REV:
						APPROVED BY: X.XXXXXX				H-8C		
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	CONTRACT No.: RTA / AE 0143-11	DATE: 03/20/14	



E335-AN-003 4-10FT



E335-AN-003 10-15FT



E335-AN-003 15-17.5FT



E335-AN-003 17.5-20FT



E335-AN-003 20-22.5FT



E335-AN-003 22.5-25FT

DESIGNED BY:	X.XXXXXX				
DRAWN BY:	A. PARKIN				
CHECKED BY:	X.XXXXXX				
APPROVED BY:	X.XXXXXX				
No.	DATE	DSN	CHK	APP	REVISION

DESIGNED BY:	X.XXXXXX
DRAWN BY:	A. PARKIN
CHECKED BY:	X.XXXXXX
APPROVED BY:	X.XXXXXX

Submitted by: D. FINDLEY

FINAL DESIGN PARTNERS.

Reviewed by: D. FINDLEY

DATE: 03/20/14

SCALE: NOT TO SCALE

FILENAME: 11393533\_0335\_103.ai

CONTRACT No.: RTA / AE 0143-11

DATE: 03/20/14

**EAST LINK EXTENSION**  
**CONTRACT E335**  
 BEL-RED  
 SONIC CORE PHOTO LOGS  
 E335-AN-003 SOILS

DRAWING No.:	
LOCATION ID:	
FIGURE No:	H-9A
REV:	



E335-AN-003 25-27.5'



E335-AN-003 27.5-30FT



E335-AN-003 30-32.5FT



E335-AN-003 32.5-35FT



E335-AN-003 35-37.5FT



E335-AN-003 37.5-40FT

					DESIGNED BY: X.XXXXXX
					DRAWN BY: A. PARKIN
					CHECKED BY: X.XXXXXX
					APPROVED BY: X.XXXXXX
No.	DATE	DSN	CHK	APP	REVISION

**Golder Associates**

SUBMITTED BY:  
D. FINDLEY

**FINAL DESIGN PARTNERS.**

DATE:  
03/20/14

REVIEWED BY:  
D. FINDLEY

**SOUNDTRANSIT**

DATE:  
03/20/14

SCALE:  
NOT TO SCALE

FILENAME:  
11393533\_0335\_103.ai

CONTRACT No.:  
RTA / AE 0143-11

DATE:  
03/20/14

**EAST LINK EXTENSION  
CONTRACT E335  
BEL-RED  
SONIC CORE PHOTO LOGS  
E335-AN-003 SOILS**

DRAWING No.:
LOCATION ID:
FIGURE No: H-9B
REV:






E335-AN-003 40-42.5FT



E335-AN-003 45-50FT



E335-AN-003 50-60FT (END OF BOREHOLE)

						DESIGNED BY: X.XXXXXX				SCALE: NOT TO SCALE	<b>EAST LINK EXTENSION</b> <b>CONTRACT E335</b> BEL-RED SONIC CORE PHOTO LOGS E335-AN-003 SOILS	DRAWING No.:
						DRAWN BY: A. PARKIN				LOCATION ID:		
						CHECKED BY: X.XXXXXX				FIGURE No:		REV:
						APPROVED BY: X.XXXXXX				H-9C		
No.	DATE	DSN	CHK	APP	REVISION	SUBMITTED BY: D. FINDLEY	DATE: 03/20/14	REVIEWED BY: D. FINDLEY	DATE: 03/20/14	CONTRACT No.: RTA / AE 0143-11	DATE: 03/20/14	



## Grand Connection Crossing Sturtevant Creek Alternatives

Date: March 12, 2024  
Subject: Bellevue Grand Connection: I-405 Crossing – Downtown to Eastrail  
Meeting with WSDOT on Sturtevant Creek Alternatives

---

### INTRODUCTION

The City of Bellevue is completing preliminary engineering and environmental analysis for the Bellevue Grand Connection: I-405 Crossing – Downtown to Eastrail project, also referred to as the Grand Connection Crossing. The project will provide an active transportation<sup>1</sup> crossing over I-405 just south of the new Sound Transit 2 Line (East Link), located on the south side of NE 6<sup>th</sup> Street. The proposed active transportation crossing would extend from Bellevue City Hall to Eastrail (former railroad right-of-way trail). The proposed active transportation crossing will cross above Sturtevant Creek, which is currently conveyed within a storm drain pipe which crosses the proposed project corridor just east of I-405. See project area map below.

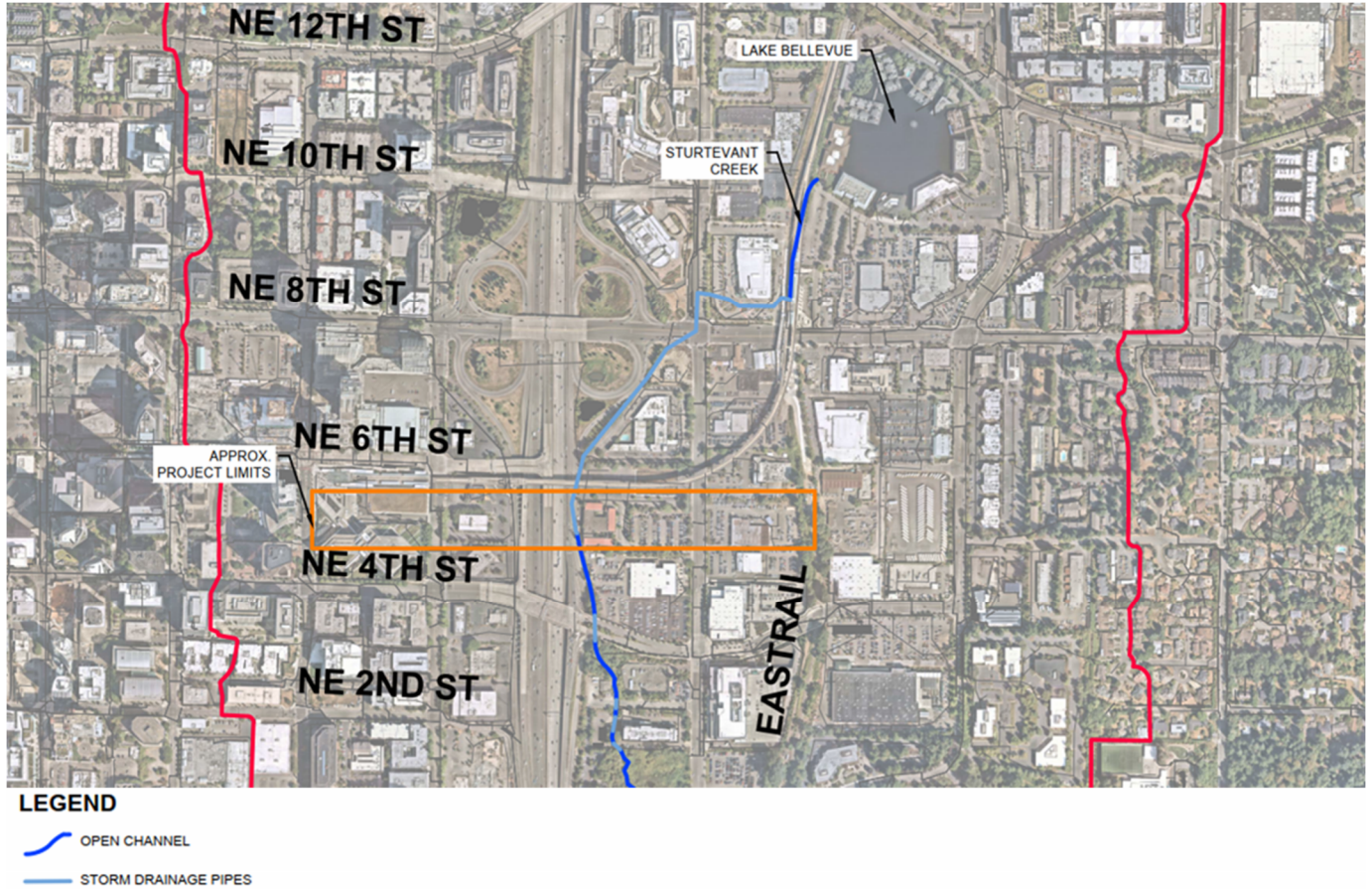
During prior discussions between WSDOT and the City, it is understood that WSDOT may be considering “daylighting” Sturtevant Creek through the project area as part of the I-405 Master Plan. It is further understood that the creek daylighting, if it occurs, would be a WSDOT project rather than a City of Bellevue project; however, it is important that the City plan for the creek “daylighting” in terms of alignment and width (assuming WSDOT continues to pursue it).

The City requested a meeting with WSDOT to present some of its initial findings on the existing creek as well as to discuss potential alternatives for two daylighting options and an optional alternative of water quality retrofits that could be potential preferable to the “daylighting” options. The intent of this discussion is to consider the alternatives and confirm whether or not the City needs to further examine all three alternative options.

The following section provides a review of the creek conditions based on a review of available planning information developed by the City of Bellevue and one site visit (jointly by WSP and WSDOT staff). The existing condition section is followed by a high-level alternative comparison.

---

<sup>1</sup> Active transportation refers to person-powered ways of getting around, such as walking, bicycling, or rolling a wheelchair.



**Figure 1: Approximate project limits relative to Sturtevant Creek**

## EXISTING STREAM CONDITIONS

What follows is a description of the Sturtevant Creek basin followed by brief summaries of existing environmental documents that have information on creek conditions. Following the summary of these documents is a summary of the site visit conducted by WSP staff and WSDOT representatives (Alex Strom – WSDOT consultant).

The Sturtevant Creek basin encompasses 772 acres in northwest Bellevue. The basin is bisected by I-405. The headwaters of the creek form at Lake Bellevue which receives runoff from primarily piped storm drain systems. Lake Bellevue outlets to a restored open channel section of creek.



## **Sturtevant Creek – Open Streams Condition Assessment (City of Bellevue, 2019)**

The City of Bellevue conducted a city-wide stream habitat assessment from 2018 to 2020, referred to as the Open Streams Condition Assessment (OSCA), to help characterize the City's streams and provide a solid foundation for watershed management planning efforts. For the OSCA of Sturtevant Creek, the City defined seven main reaches from its confluence with Kelsey Creek upstream to its source at Lake Bellevue. The OSCA includes summaries of the characteristics of each reach, including habitat composition, streambank conditions, streambed substrate composition, large woody material frequency and channel measurements. In addition, the OSCA provides descriptions of the habitat conditions, fish passage barriers and preferred priorities for future work within each reach.

The document describes the entire 772-acre Sturtevant Creek basin as primarily consisting of commercial and office land use and public/WSDOT right-of-way (ROW), including I-405. As a result, the creek is fragmented and constrained and alternates between open channel and piped reaches, with a total of only one mile of open channel and about 23 miles of storm drain pipes. Reaches 1 and 2 are the downstream-most reaches, respectively, on the west side of I-405 and downstream of the I-405 culvert. Reaches 3 through 7 are on the east side of I-405, between the I-405 culvert and Lake Bellevue (see Figure 2 below).

The active transportation improvements will be within the downstream section of Reach 6, just upstream of Reach 5. Reach 5 is defined as the open channel segment from the Hampton Inn and Suites parking lot culvert (at approximately river mile 0.8) and upstream to the outlet of the piped channel as the stream runs along the I-405 on-ramp. The upper half of Reach 5 includes the NE 4<sup>th</sup> Street box culvert and the channel upstream which is characterized as being confined, overgrown and in poor condition, with invasive species. The lower half of Reach 5 has been restored by WSDOT as part of a mitigation project and now includes moderate canopy cover of native vegetation (estimated to be 25% for the entire reach). Because the creek is piped immediately upstream of this reach, Reach 5 is starved for sediment and has pronounced channel incision. Generally, the habitat conditions are considered variable with some instream habitat complexity in the area that has been restored; however, no fish were observed. The City has identified two potential barriers to fish passage within Reach 5: the City-owned culvert under NE 2<sup>nd</sup> Place and the WSDOT box culvert under NE 4<sup>th</sup> Street as it is shallow with no streambed substrate. The OSCA recommends that future work affecting this reach should prioritize stormwater treatment before considering instream improvements.

Reach 6 is defined as the segment immediately north of Reach 5, the segment of the piped system that outfalls to Reach 5 and upstream to just north of NE 8<sup>th</sup> Street. The upstream-most end of Reach 6 meets with Reach 7, which is the segment of open channel that has recently been daylighted by Sound Transit and conveys the creek from Lake Bellevue.



Two reaches span privately-owned wetland parcels: Reaches 1 and 4. Reach 1 is the downstream-most reach that is an open channel that outfalls to Kelsey Creek, just upstream of where Kelsey Creek transitions to Mercer Slough. Reach 1 extends upstream to SE 6<sup>th</sup> Street. Downstream of Sturtevant Creek, Mercer Slough flows south for about two and a half miles before discharging to Lake Washington. Reach 4 extends from Main Street to a culvert under the Hampton Inn and Suites hotel in the vicinity of NE 2<sup>nd</sup> Street and at the downstream end of Reach 5.

Reach 2 is defined as the open channel between SE 6<sup>th</sup> Street and upstream to the I-405 culvert and has been observed as having sloughing banks, which has been attributed to flashy hydrology and streamflow in the creek.

For the open channel stream reaches downstream of the project area, i.e., Reaches 2, 4 and 5, the OSCA prioritizes the capturing and treating stormwater runoff before the consideration of instream improvements.



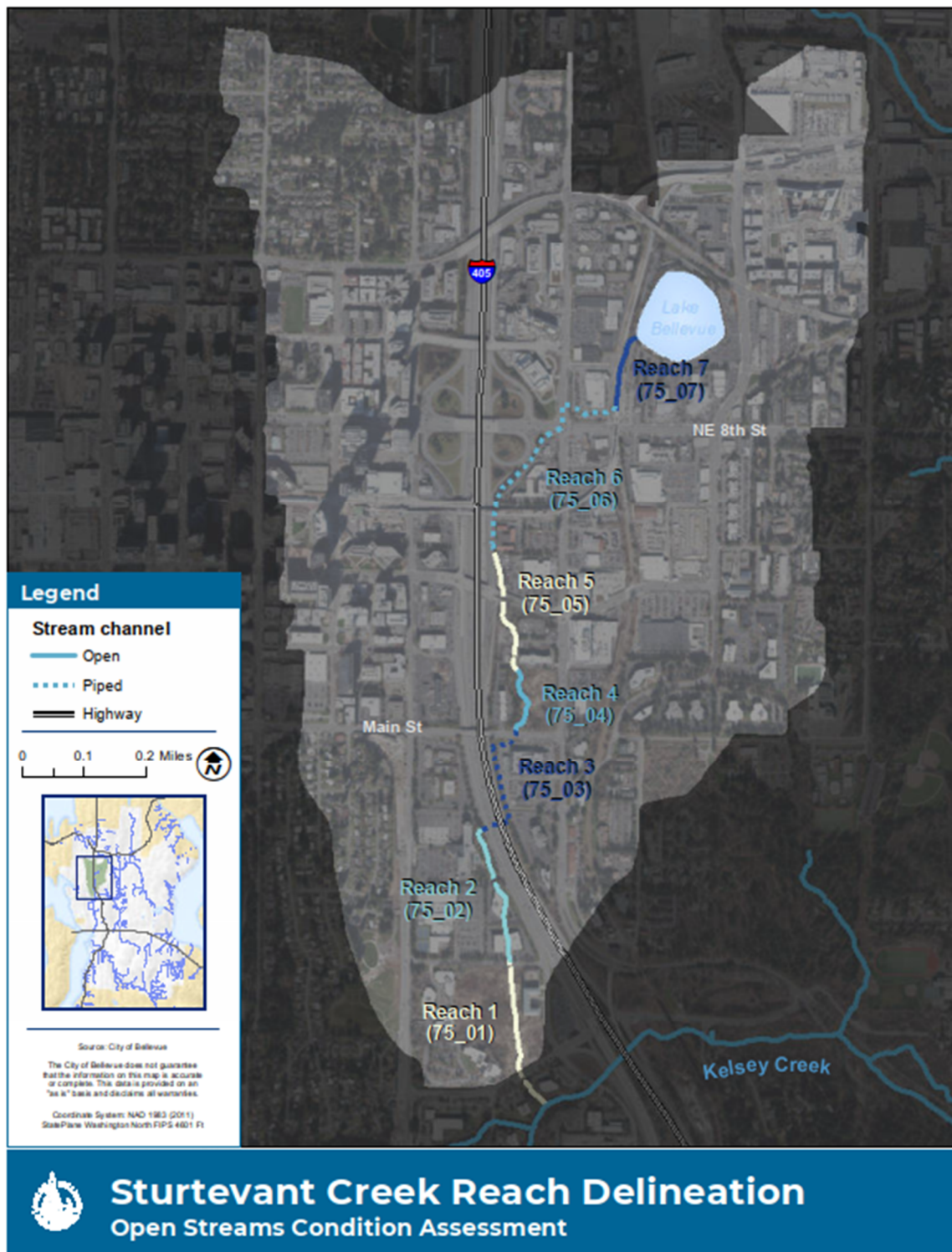


Figure 2: Sturtevant Creek Reach Delineation from the City’s OSCA



## **Greater Kelsey Creek Watershed Assessment Report (Jacobs Engineering, Inc. and Herrera Environmental Consultants, Inc., 2021)**

Jacobs and Herrera developed this assessment report (AR) of the Greater Kelsey Creek watershed, including Kelsey Creek and all its tributaries and the Sturtevant Creek subbasin, for the City to aid in the development of the associated watershed improvement plan, which will ultimately provide the basis for the recommended actions in the city-wide Watershed Management Plan. The main purpose of the AR was to evaluate the conditions within the watershed that are limiting the health of its streams, specifically the effects of stormwater runoff from urban areas. The AR also includes identified opportunities for improving in-stream watershed conditions and is based on information from the OSCA, existing data from past projects and monitoring, and existing project and environmental monitoring data.

The geomorphic characterization of the Sturtevant Creek subbasin includes the following:

- Most highly urbanized subbasin, lacking in riparian buffer and subject to flashy flows and resulting incision.
- Most confined stream due to entrenchment and modifications.
- Streambed material is mostly gravel and streambank armoring is above average for the subbasin, at 32%.
- Large woody material (LWM) is largely absent with minimal recruitment potential.
- Relatively good riffle/pool ratio, of 2, but pools are generally shallow and concentrated in Reach 4, where incision is very evident.
- Glide habitat percentage is high.

According to the AR, the wetlands in the various subbasins, including Sturtevant Creek, likely provide valuable fish habitat. Additionally, there are four known locations of partial fish passage barriers and one location of a complete fish passage barrier that have been documented by the Washington Department of Fish and Wildlife (WDFW).

The AR also discusses potential factors limiting stream health in the watershed, which were discussed and determined with City staff. A conceptual model of the impacts of urbanization on stream health was developed and used to help evaluate the limiting factors. For the Sturtevant Creek subbasin, the document identifies the primary limiting factors as stormwater runoff from effective impervious surfaces, loss of floodplain and riparian function and pollutant loading. The one secondary limiting factor includes road culverts and other physical barriers.

Regarding potential opportunities for improving the overall health of the watershed, in addition to stream restoration and instream maintenance activities, upland projects are also recommended (i.e. retrofits of existing stormwater facilities or installation of new stormwater facilities of flow control and/or water quality). The following were instream opportunities identified for Sturtevant Creek (using the OSCA reach designation convention):



Reaches 1 and 2 – Investigate potential oil water separator on I-405.

Reach 2 – Enhance instream fish habitat, restore riparian buffer and place LWM.

Reach 2 – Improve fish passage at I-405.

Reach 4 – Investigate actions to mitigate impacts of stormwater.

Following the City's 2019 OSCA, an updated 2021 OSCA Subbasin Summary for the Greater Kelsey Creek Watershed was produced (included as an attachment to the AR). The document contains more detailed information regarding the overall Sturtevant Creek subbasin than the 2019 survey. In the 2021 document, there is a more detailed description of the channel morphology and riparian corridor, habitat unit composition and off-channel habitat, large woody material, streambed substrate, streambank conditions and fish habitat and passage barriers.

According to the 2021 OSCA for the Kelsey Creek watershed, in Sturtevant Creek fish are now rather sparse. During the 2019 OSCA survey, trout were only observed in the lower portion of Reach 2 and the only other fish observed was a goldfish in Reach 4. The document notes that good spawning gravels are present and the pool habitats throughout the reaches could allow for resident fish. However, the lack of fish in the creek is likely because of poor water quality and flashy streamflow.

It documents the City's recommendations that to sustain ecosystem function and stream health, efforts should be focused on stormwater impacts, particularly on streamflow and pollutant/nutrient loading. Also, upland stormwater detention and runoff treatment would benefit the area as many oil spills have been documented along the I-405 off-ramps and regularly require instream cleanup efforts.

### **Assessment of Sturtevant Creek for Eligibility for the Washington State Department of Ecology Flow Control Standards for Highly Urbanized Drainage Basins (R.W. Beck, 2010)**

R.W. Beck, under contract with the City, completed a study which determined that all of the Sturtevant Creek basin was eligible for an alternative stormwater detention standard for highly urbanized areas. This standard, which is allowable by the Washington State Department of Ecology as a part of their National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Stormwater Permit, states that development or redevelopment projects is allowed to detain to existing land use conditions rather than historic, forested conditions. Ecology recognized that under some circumstances, streams with heavily urbanized basins can, overtime, become equilibrated to a new hydrologic regime (and are not experiencing significant erosion or sedimentation). Ecology established the standard as basins having had at least 40% total impervious area for at least 20-years and showing no significant erosion or sedimentation. The R.W. Beck report conducted historical mapping of impervious areas and to demonstrate this. The City has adopted this standard for the basin. It is also noted that WSDOT has a similar policy that allows detention to existing conditions for basins that met the 40% impervious standard (HRM Section 3-3.6.4).



## **WSP/WSDOT Site Visit**

WSP staff met a WSDOT representative/consultant onsite in January 2024 to collect information on Sturtevant Creek and to inform the feasibility of daylighting and/or restoration alternatives. The team took measurements and made qualitative observations of the creek at the WSDOT restoration site along Reach 5, south of NE 4th Street and the box culvert. The bankfull widths and maximum depths were measured at 11 locations, with an average width of 12.1 feet and an average depth of 1.5 feet.

The team observed that the stream restoration is holding up well, with LWM anchored in place (although some of the cable had become detached and was tangled in bushes). Some incision was observed but in general the channel appeared to be stable with a well-defined bankfull channel.

This section of Reach 5 was observed as having a plane-bed channel with gravel to cobble sized sediment (less than 10% sand/fines), and few pools. The section of reach had a moderate floodplain on the left bank composed of sand and fines with mature trees and established vegetation.

Approximately 200 feet downstream of the NE 4th Street culvert, Sturtevant Creek turns to the left, with riprap reinforcement of the banks.

The reach upstream of NE 4th Street is highly channelized (the upper portion of Reach 5 just downstream of the project area), confined by riprap banks and overgrown with reed canary grass. No natural channel formation was evident. Reach 6, the piped section of creek discharges to this section of channel approximately 200 feet upstream of NE 4th Street via a 48-inch to 50-inch concrete pipe.



## ALTERNATIVE DISCUSSION

As part of the Grand Connection Crossing scope of work pertaining to Sturtevant Creek, WSP was tasked with identifying and evaluating up to three options for daylighting and/or managing the creek. This section of the memo describes three preliminary options that could be considered and discusses some high-level advantages and disadvantages of each. At this point, no detailed modeling, concept design, or cost estimates have been developed. Rather, these options are being presented to City staff and WSDOT to solicit input on moving forward for further consideration of the alternatives. That is, some or all of the alternatives may be refined and/or removed from consideration following input. Following the meeting with the City and WSDOT, the team will also reach out to agencies (including WDFW and regional Tribes).

Three alternatives were identified for this high-level assessment: two “daylighting” alternatives and one off-site stormwater quality retrofit option. The third option was identified because of the conclusion of the City’s forthcoming Watershed Management Plan that the most significant need for Sturtevant Creek is to reduce stormwater impacts. Following is a brief description of each alternative and Table 1, an alternative comparison matrix.

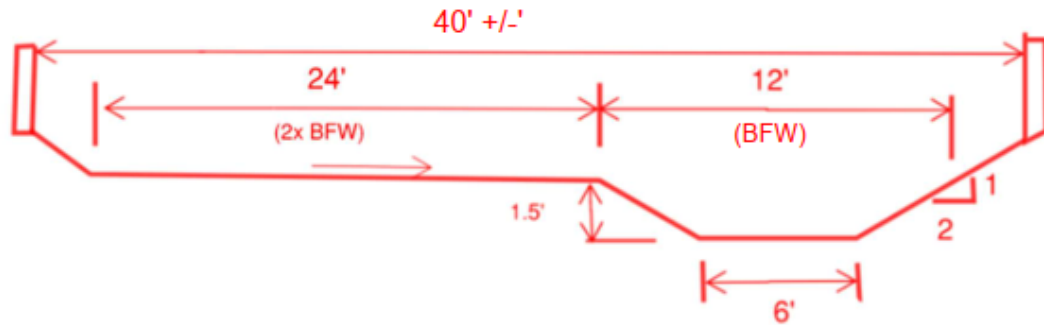
### **Alternative 1 – Daylighting Creek with Unconfined Channel**

Alternative 1 assumes that the creek will be completely daylighted in the future and would be restored as a natural and unconfined channel. Unconfined streams are those with a floodplain width of at least three times the bankfull width. This is to allow the channel to laterally migrate and engage the floodplain during high flows. A conceptual sketch of the anticipated required typical cross-section is shown in Figure 3. This section is based on an average bankfull width of 12 feet as measured by the joint WSP/WSDOT site visit. Overall, the minimum daylighted section width, not including the grading needed for construction, is about 40 feet. A key factor in determining whether this alternative is feasible will be based on land acquisition.

### **Alternative 2 – Daylighting Creek with Confined Channel**

Alternative 2 assumes that the creek will be completely daylighted in the future, confined and restored to a minimum width permissible to regulatory agencies. A stream confined between two walls can be considered analogous to a culvert crossing, so a preliminary width was estimated based on the WDFW Water Crossing Design Guidelines following the stream simulation method. The stream simulation method requires a minimum width of 1.2 times the bankfull width plus two feet. As the walled channel would have a length to width ratio of greater than 10, it could be considered a long culvert. For long culverts, WDFW recommends adding an additional 30% to the width. The added 30% allows the channel to migrate between the two structure walls. A preliminary sketch of the anticipated required typical cross-section is shown below in Figure 3. Following this methodology, the minimum daylighted section width, not including the grading need for construction, is approximately 22 feet.

Alternative 1 - Natural Channel (unconfined)



Alternative 2 - Confined Channel

Note: Width based on WDFW fish passage for "long-culvert"  
 BFW x 120% + 3' (all multiplied by 130%)

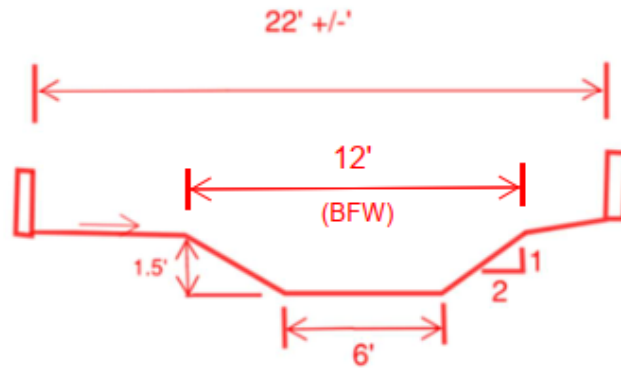


Figure 3 – Daylighting Alternative Cross-sections



### **Alternative 3 – Off-site Water Quality Retrofits**

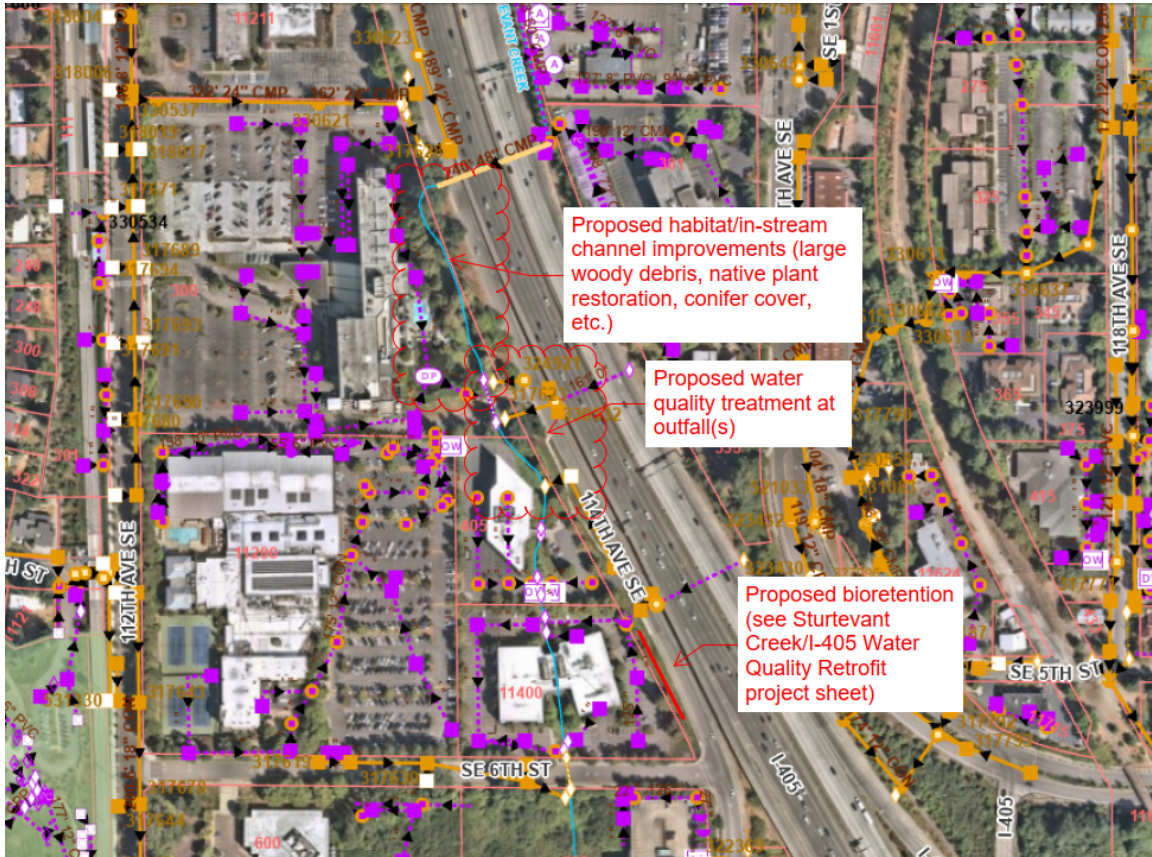
Alternative 3 focuses on stormwater retrofits to improve stream water quality rather than a “daylighting” option. Daylighting Sturtevant Creek under Alternatives 1 and 2 may in fact introduce the opportunity of new and/or additional pollutants to directly or indirectly outfall to the narrow stream corridor from I-405. Under this scenario, the City anticipates moving forward with the project with the assumption that the reaches of Sturtevant Creek within the project corridor will not be daylighted in the future. A key factor in determining whether this alternative is feasible is getting concurrence from regulatory agencies, namely WDFW and regional tribal interests.

Three potential off-site mitigation options were identified, primarily by reviewing recent City documents pertaining to the health and needs of the Sturtevant Creek subbasin and Kelsey Creek watershed and with input from City water resource planning staff. The three offsite water quality retrofit options are briefly described below and are referred to as Alternatives 3A, 3B and 3C.

#### **Alternative 3A – Sturtevant Creek Channel Restoration and Water Quality Retrofits Downstream of I-405**

Alternative 3A includes off-site channel restoration and water quality retrofits along Sturtevant Creek (and/or adjacent tributary) between the outlet of the I-405 crossing to north of SE 6th Street (see Figure 4). The alternative could include the following elements:

- Bioretention for I-405 runoff within WSDOT ROW just north of SE 6th Street (proposed as a part of the document : WSDOT Funding Implementation Assessment and Recommendations (recommendation document), prepared for the City by Parametrix and Osborn Consulting– see Figure 4 below for a graphic provided by the City showing potential locations for water quality enhancements based on the recommendation document). This element of the opportunity has been on the City’s CIP list but has been stalled due to questions about easements and property ownership.
- Water quality treatment, including spill control, for the WSDOT outfalls along the north half of Reach 2.
- Channel restoration from the outlet of the I-405 culvert to the south about 400 feet. Restoration could include adding LWM, channel regrading, native plant restoration and conifer cover. It is expected that Tribes and agencies will appreciate inclusion of instream channel improvements that will result in near-term benefits to fish resources. Some of the channel is on private property but the entire stretch that is considered for improvements as part of this alternative is adjacent to WSDOT ROW.

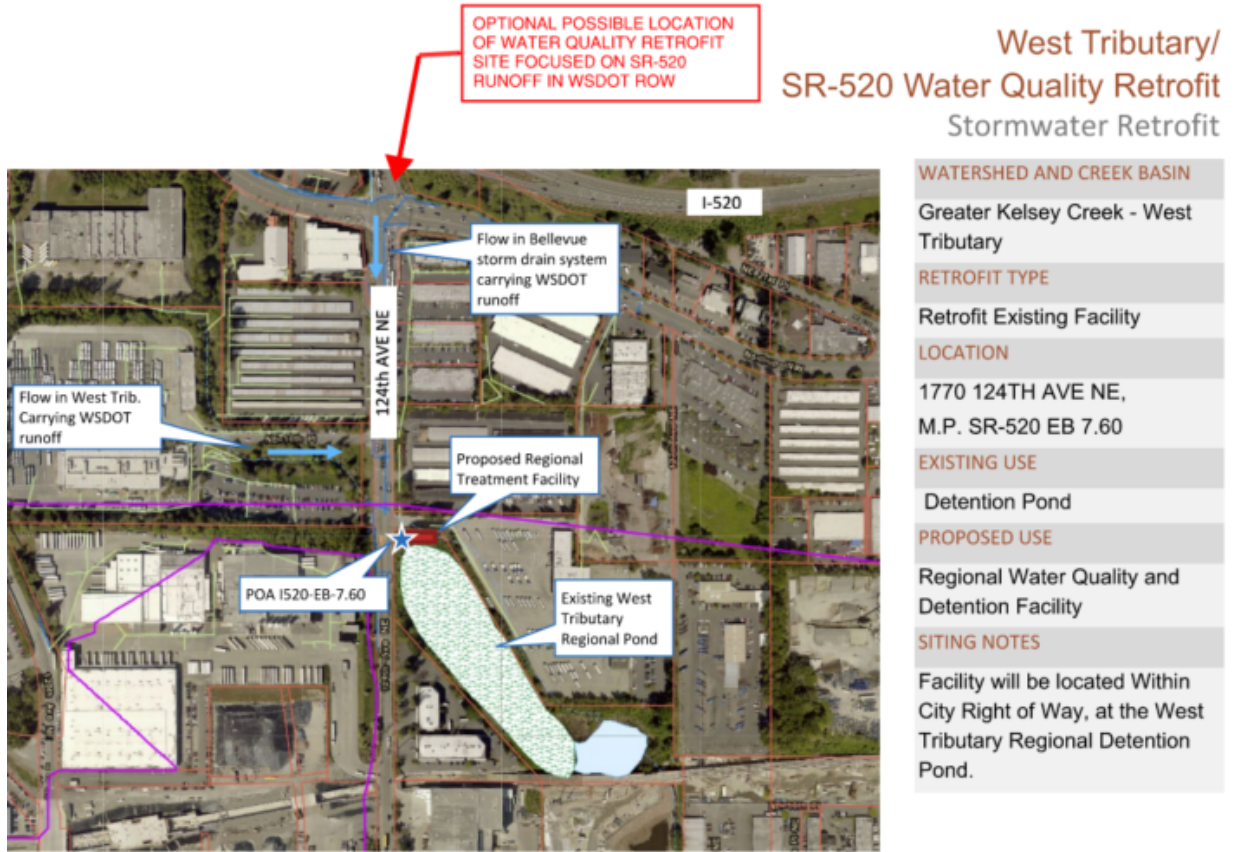


**Figure 4 – Alternative 3A**

**Alternative 3B - West Tributary/SR-520 Water Quality Retrofit**

Alternative 3B includes water quality treatment for the runoff from SR 520 at 124<sup>th</sup> Avenue NE. The improvements would treat runoff from both WSDOT and City ROW. The potential improvements were identified in the recommendation document by Parametrix and Osborn Consulting (Project number 216-1537-024) and include treatment at a city-owned property just upstream of the inlet to an existing City West Tributary (Kelsey Creek) regional detention pond. The pond currently collects untreated runoff from WSDOT and City impervious surfaces. Parametrix and Osborn Consulting identified proprietary filter media (Filterra or similar system) to provide basic treatment upstream of the pond. The document identified an order of magnitude cost of 10 million dollars. It was also noted a potential alternative within this area/subbasin would be to focus on treatment upstream within WSDOT’s SR 520 ROW and focus on treatment of WSDOT runoff. See Figure 5 below.





**Figure 5 – Alternative 3B**

**Alternative 3C – West Tributary (Kelsey Creek)/Bel-Red Regional Facility**

Alternative 3C includes a regional treatment facility on a parcel in the Bel-Red area that is adjacent to the East Link Extension of Sound Transit’s light rail. The parcel is currently privately owned but is a candidate for redevelopment and/or sale. This project would require acquisition of this parcel to build a facility that could incorporate public amenity elements such as stormwater park features upstream of the West Tributary. This project was identified in the City’s draft Watershed Improvement Strategy (Project number GKC-CIP-122) with an order of magnitude cost estimate including property acquisition of 66 million dollars. Due to the high cost, this alternative was considered more of a regional effort beyond this project’s off-site mitigation contribution alone. For example, this alternative could be considered as part of a potential solution to provide mitigation for the cumulative stream impacts created by multiple projects (i.e. impacts created by SR 520 and I-405 projects to Sturtevant Creek and other subbasins within the watershed).

Table 1 on the next page provides a summary of the alternative comparison.



Alternative	Description	Pros	Cons	Relative Cost
1	Daylighting with Unconfined Channel	<ul style="list-style-type: none"> <li>• Consistent with general intent of agencies to restore stream channels.</li> </ul>	<ul style="list-style-type: none"> <li>• Very limited habitat upstream and likely will not be fully restored as viable fish habitat.</li> <li>• Provides habitat but use by salmonids is unlikely due to downstream fish passage barriers and poor water quality.</li> <li>• Property acquisition will be required.</li> <li>• Creates potential for new required setbacks for adjacent properties if areas develop or redevelop near stream after creek daylighted (50-foot setback plus 50-foot buffer beyond setback).</li> <li>• May introduce the opportunity of new and/or additional pollutants to directly or indirectly outfall to the narrow stream corridor from I-405.</li> <li>• Greatest area needs (private land purchase) of usable commercial space.</li> <li>• Future LID over I-405 could impact planting in daylighted section.</li> </ul>	\$\$
2	Daylighting with Confined Channel	<ul style="list-style-type: none"> <li>• Generally consistent with general intent of agencies to provide fish passage.</li> <li>• Minimizes impact to properties.</li> </ul>	<ul style="list-style-type: none"> <li>• Provides fish passage through project corridor, but there is little to no viable habitat upstream. Downstream fish barriers and poor water quality have resulted in no native salmonids currently inhabiting the stream. Confined channel provides minimal habitat within the restored reach.</li> <li>• Provides habitat but use by salmonids may be limited by downstream fish passage barriers and poor water quality.</li> <li>• Creates potential for new required setbacks for adjacent properties if areas develop or redevelop near stream after creek daylighted (50-foot setback plus 50-foot buffer beyond setback).</li> <li>• May introduce the opportunity of new and/or additional pollutants to directly or indirectly outfall to the narrow stream corridor from I-405.</li> <li>• Reduced area needs (private land purchase) compared to Alternative 1.</li> <li>• Future LID over I-405 could impact planting in daylighted section.</li> </ul>	\$
3A	Sturtevant Creek Channel Restoration and Water Quality Retrofits	<ul style="list-style-type: none"> <li>• Helps to address poor water quality, a primary limiting factor in the watershed.</li> <li>• Benefits are realized sooner than Alternatives 1 and 2 (because reaches west of I-405 are currently accessible to fish).</li> <li>• Most of work can be within WSDOT's I-405 ROW.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not follow typical guidance to restore on-site fish passage.</li> <li>• Will need WDFW and Tribal buy-in.</li> </ul>	\$
3B	West Tributary/SR 520 Water Quality Retrofit	<ul style="list-style-type: none"> <li>• Helps to address poor water quality, which is a primary limiting factor in the watershed.</li> <li>• Benefits are realized sooner than Alternatives 1 and 2 (because reaches west of I-405 are currently accessible to fish).</li> </ul>	<ul style="list-style-type: none"> <li>• Does not follow typical guidance to restore on-site fish passage.</li> <li>• Will need WDFW and Tribal buy-in.</li> <li>• Not in Sturtevant Creek subbasin (but within the Greater Kelsey Creek watershed).</li> </ul>	\$\$
3C	West Tributary (Kelsey Creek)/Bel-Red Regional Facility	<ul style="list-style-type: none"> <li>• Helps to address poor water quality, which is a primary limiting factor in the watershed.</li> <li>• Regional water quality benefits for stormwater and salmon recovery. Potential for non-traditional mitigation banking.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not follow typical guidance to restore on-site fish passage.</li> <li>• Will need WDFW and Tribal buy-in.</li> <li>• Significant property acquisition will be required.</li> <li>• Likely long-term project due to high cost and needed property acquisition.</li> </ul>	\$\$\$

Table 1. Alternative Summary Comparison