GeoEngineers

Memorandum

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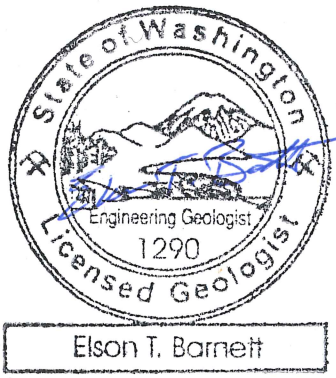
To: Kelly Purnell, Puget Sound Energy

From: Elson T. "Chip" Barnett, LG, LEG;
Timothy D. Bailey, PE
Andrew J. Caneday, LG, LEG

Date: September 14, 2018

File: 0186-871-07

Subject: Energize Eastside Bellevue and Richards Creek Substation: City of Bellevue Comment Response



INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) has prepared this memorandum in response to a City of Bellevue (City) land use review comment related to the Critical Areas Report for the Richards Creeks Substation, dated July 11, 2017. The general location of the Richards Creek Substation is presented in Figure 1, Vicinity Map. Kelly Purnell of Puget Sound Energy (PSE) requested this memorandum during a phone conversation with Chip Barnett on August 16, 2018. This memorandum incorporates comments from Kerry Kriner of PSE received on September 6, 2018. The City provided the following land use review comment in a letter dated August 14, 2018:

> "Geotechnical Considerations
>
> Landslide Deposits
>
> The Washington State Department of Natural Resources (DNR) has completed a final draft of a map of landslide deposits in the City of Bellevue. A copy of the May 2018 final draft is attached. The map indicates landslide deposits in the area of the proposed Richards Creek Substation. The geotechnical report and addenda for the Richards Creek Substation do not mention landslide deposits in this area. Please have the geotechnical engineer review the DNR map and provide comments on the map and on potential impacts of landslide deposits on the proposed Richards Creek Substation."

COMMENT RESPONSE

We reviewed the draft DNR May 2018 landslide map of Bellevue provided by the City, as well as logs of borings completed in the area mapped as a landslide deposit. We also reviewed aerial imagery and Light Detection and Ranging (LiDAR) hillshade maps of the project area and conducted a reconnaissance of the site in December 2014 and in February 2017. The approximate locations of the borings and the limits of the DNR-mapped landslide in the vicinity of the Richards Creek Substation are presented in Figures 2 and 3.

Borings performed in the vicinity of the Richards Creek Substation suggest that the area is underlain by fill and recessional outwash overlying dense to very dense glacial till. We observed no evidence of landslide deposits in our borings and we observed no indication of landslide activity in the steep slope area on the LiDAR hillshade

(Figure 3) and during our site reconnaissance. Furthermore, it is our opinion that the area mapped as a landslide does not include geomorphic characteristics consistent with a landslide. Based on our review of the LiDAR data (Figure 3), the mapped area does not appear to be a landslide but rather cut and fill slopes associated with site development and roadways, including 139 Avenue SE that is east of the proposed PSE substation.

Based on our review of the available data, it is our opinion that the existing soils underlying the proposed Richards Creek Substation do not appear to be landslide deposits and the mapping performed by DNR is a general characterization of potential conditions within a broader area including the project site and does not represent the actual conditions at the project site.

We appreciate the opportunity to assist you on this project. Please contact us if you have any questions concerning this memorandum or our services.

Attachments:

Figure 1, Vicinity Map

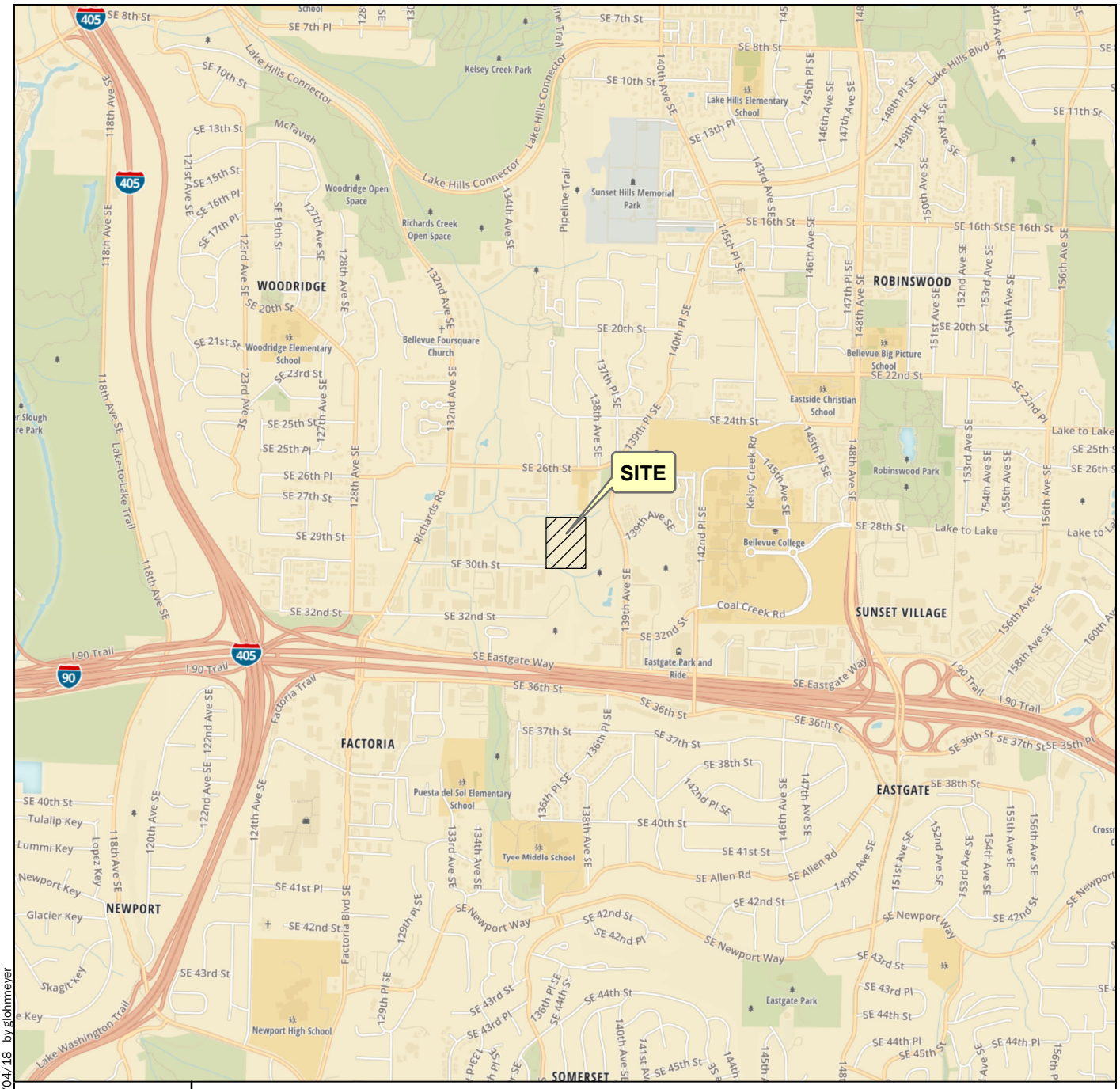
Figure 2. Site Plan Aerial

Figure 3. Site Plan Hillshade

Attachment A. Boring Logs

Attachment B. Previous Explorations

ETB:TDB:AJC:cam



Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Vicinity Map

PSE Energize Eastside Comment Response
Bellevue, Washington

GeoEngineers

Figure 1

P:\0\0186871\GIS\MXD\0186871107_F01_VicinityMap.mxd Date Exported: 09/04/18 by glohrmeyer

Notes:

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Data Source: Landslide boundary digitized from City of Bellevue "Landslide Deposits in the City of Bellevue DNR Final Draft - May 2018

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

B-1 J1, G2-1 TP-2 HH-2

B-1 Boring completed with monitoring well by Geoengineers (2014)

B-3 Boring completed by GeoEngineers (2014)

J2, G2-1 Boring completed with monitoring well by Geoengineers (2015) for the Energize Eastside Project

TP-1 Test pit completed by Converse Consultants (1984)

HH-1 Hand exploration completed by Converse Consultants (1984)

Energize Eastside Right-of-Way

City of Bellevue mapped landslide

N W E S

150 0 150

Feet

Site Plan - Aerial

PSE Energize Eastside Comment Response
Bellevue, Washington

GeoEngineers

Figure 2

P:\0\01868\71\GIS\MXD\01868710 7_F02_SitePlan-Aerial.mxd Date Exported: 09/14/18 by glohmeyer

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

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Energize Eastside Right-of-Way

City of Bellevue mapped landslide

N
W E
S

150 0 150
Feet

Site Plan - Hillshade

PSE Energize Eastside Comment Response
Bellevue, Washington

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Figure 3

P:\0\0186871\GIS\MXD\0186871\07_F03_SitePlan-Hillshade.mxd Date Exported: 09/14/18 by glohrmeyer

ATTACHMENT A
Boring Logs

SOIL CLASSIFICATION CHART

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

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

ADDITIONAL MATERIAL SYMBOLS

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

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

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

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

A "WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

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

Sheen Classification

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

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

KEY TO EXPLORATION LOGS

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FIGURE A-1

Rev. 02/16

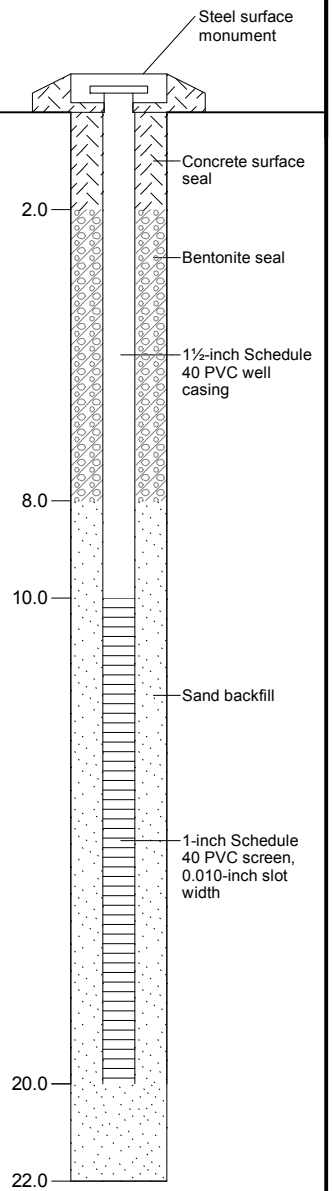
Drilled Start 12/17/2014	End 12/17/2014	Total Depth (ft) 36.5	Logged By APL / Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger

Hammer Data: Rope & Cathead, 140 (lbs) / 30 (in) Drop		Drilling Equipment: Deep Rock XL Trailer Rig	DOE Well I.D.: VIJ 5K3 A 2 (in) well was installed on 12/17/2014 to a depth of 22 (ft).
Surface Elevation (ft): 106.31 Vertical Datum: NAVD88		Top of Casing Elevation (ft):	Groundwater: Date Measured 12/17/2014; Depth to Water (ft) 3.8; Elevation (ft) 102.5
Easting (X): 1313609.001 Northing (Y): 215862.8174		Horizontal Datum: LiDAR	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
105	0						SM	Brown silty fine to coarse sand with gravel (dense, wet) (fill)		
		6	35	1 SA					11	22
					▼		SM	Brown silty fine to medium sand with occasional gravel (loose, moist to wet) (recessional outwash)		
100	5	2	5	2				(Groundwater encountered at approximately 5 feet during drilling)		
							SM	Brown to gray silty fine to medium sand (medium dense, wet)		
		3	18	3						
95	10	18	14	4				Becomes grayish brown		
	15	18	22	5 %F					13	16
90							SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, wet)		
	20	18	23	6						
85	25									

WELL LOG



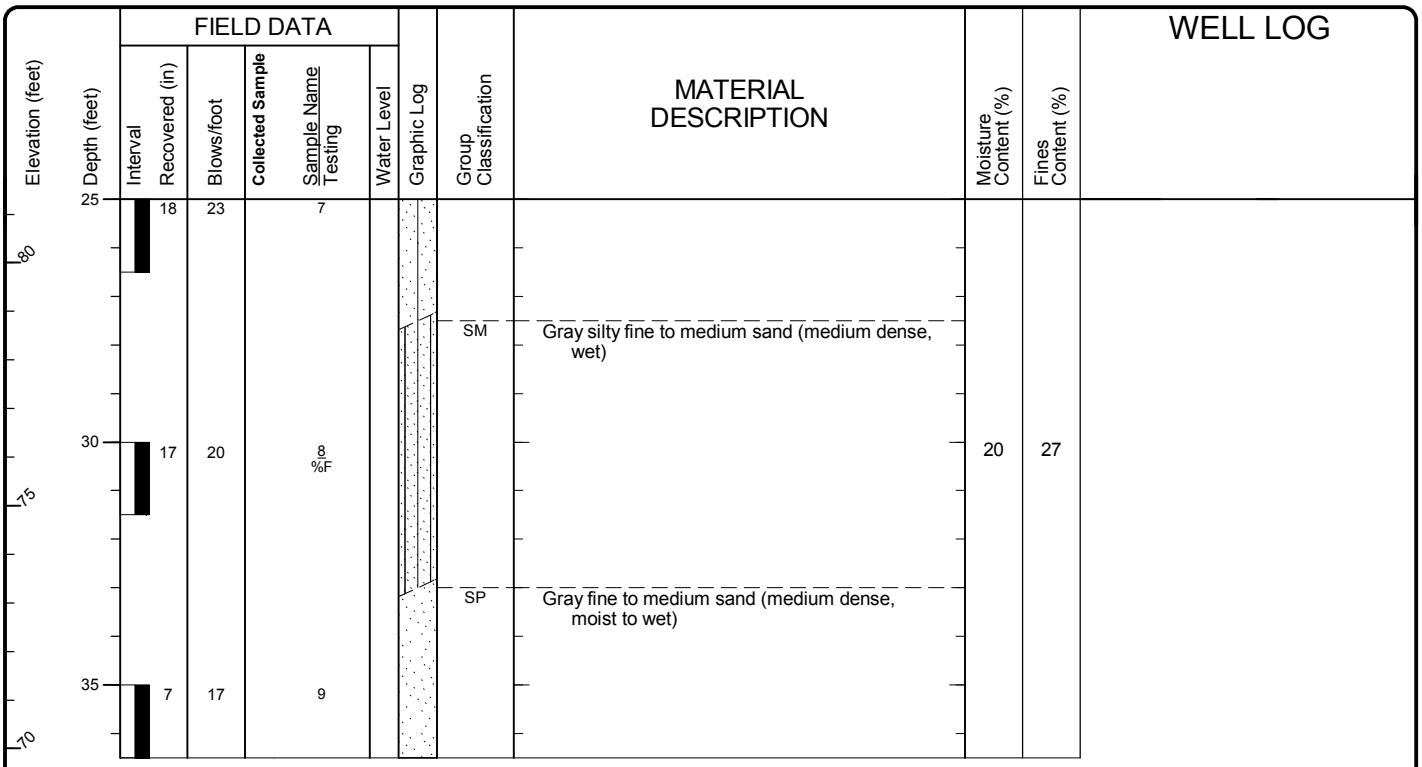
Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-1

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-2
Sheet 1 of 2



Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-1 (continued)

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

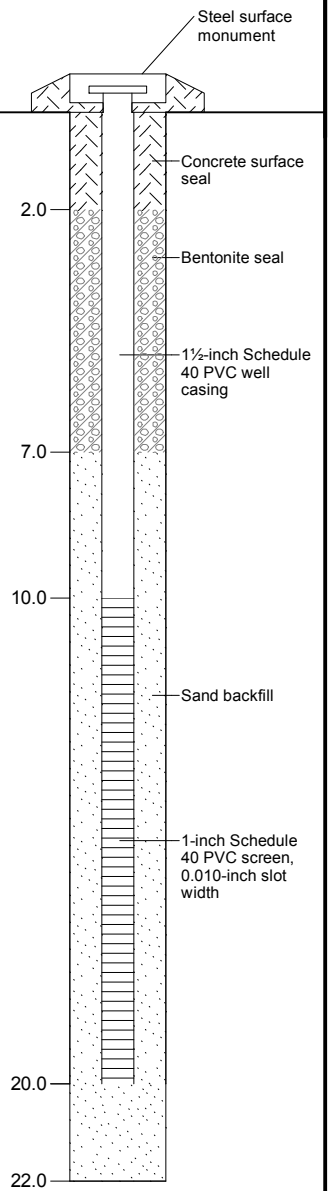
Figure A-2
Sheet 2 of 2

Drilled Start 12/17/2014	End 12/17/2014	Total Depth (ft) 36.5	Logged By APL / Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Hammer Data: Rope & Cathead, 140 (lbs) / 30 (in) Drop			Drilling Equipment: Deep Rock XL Trailer Rig		DOE Well I.D.: BIJ 584 A 2 (in) well was installed on 12/17/2014 to a depth of 22 (ft).
Surface Elevation (ft): 100.75 Vertical Datum: NAVD88			Top of Casing Elevation (ft):		Groundwater: Date Measured 12/17/2014; Depth to Water (ft) 7.4; Elevation (ft) 93.4
Easting (X): 1313467.444 Northing (Y): 216099.6631			Horizontal Datum: LiDAR		

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
100	0						GP-GM	Brown fine to coarse gravel with silt and trace organics (loose, moist) (fill)		
		6	6	1						
							SM	Dark brown silty fine to medium sand (loose, moist) (fill)		
95	5	18	14	2 SA			GP-GM	Brown fine to coarse gravel with silt and sand (medium dense, moist) (fill)	8	6
		3	4	3	▼		SM	Brown silty fine to medium sand with occasional gravel (loose, wet) (recessional outwash)		
90	10	18	6	4 %F				(Groundwater encountered at approximately 10 feet during drilling)	26	15
							SM	Brown silty fine to medium sand with occasional gravel (medium dense, wet)		
85	15	18	53*	5				(*High blowcount due to gravel content)		
80	20	18	14	6						
	25						SP-SM	Brown fine to medium sand with silt and occasional gravel (medium dense, wet)		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-2

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-3
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	WELL LOG
75	25	18	20	7							
70	30	18	16	8			CL	Gray clay with sand (very stiff, moist to wet)			
65	35	18	19	9							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-2 (continued)

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-3
Sheet 2 of 2

Drilled Start 12/17/2014 End 12/17/2014	Total Depth (ft) 36.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger	
Surface Elevation (ft) 102.1 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Deep Rock XL Trailer Rig	
Easting (X) 1313487.143 Northing (Y) 215949.8592		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						CR	1 inch crushed rock surfacing			
							SM	Gray silty fine to medium sand with gravel (loose to medium dense, moist) (fill)			
100		18	16	1 SA					10	35	
	5	6	6	2							Groundwater encountered at approximately 5 feet during drilling
95		8	4	3 %F					13	21	
	10	18	7	4			SM/PT	Gray silty fine to medium sand with peat lenses (loose, wet) (fill/wetland deposits)			
90							SP-SM	Brown fine to medium sand with silt and gravel (medium dense, wet) (recessional outwash)			
	15	18	28	5							
85											
	20	18	27	6							
80											
	25										

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-3

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-4
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	25	18	17	7							
75											
	30	18	23	8							
70											
	35	18	14*	9							*Blowcount may not be representative due to heave

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-3 (continued)

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-4
Sheet 2 of 2

Drilled Start 12/17/2014 End 12/17/2014	Total Depth (ft) 16.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 87.06 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Deep Rock XL Trailer Rig
Easting (X) 1313340.088 Northing (Y) 215816.0898		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						GP-GM	Brown fine to coarse gravel with silt, sand and trace organics (medium dense to dense, moist to wet) (fill)			
85		18	30	1 SA					8	16	
							SM	Brown silty fine to medium sand with gravel (medium dense, moist) (fill)			
	5	12	23	2				No recovery			
80		0	16	3			GP-GM	Gray fine to coarse gravel with silt and sand (medium dense, wet) (recessional outwash)			Groundwater encountered at approximately 7.5 feet during drilling
	10	18	24	4 %F					13	9	
75							SP-SM	Brown fine to medium sand with silt and gravel (medium dense to dense, wet)			
	15	18	32	5							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-4

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-5
Sheet 1 of 1

Drilled Start 12/19/2014 End 12/19/2014	Total Depth (ft) 31.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 120.93 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Track Mounted Drill Rig
Easting (X) 1313687.339 Northing (Y) 215790.4353		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
120	0	5	16	1			SP	Brown gray fine to medium sand with silt and trace organics (medium dense, moist)			
115	5	7	16	2 %F			SP-SM	Brownish gray fine to medium sand with silt and gravel (medium dense to dense, moist) (recessional outwash)	3	7	
		13	31	3							
110	10	2	48*	4			GP-GM	Brown fine to coarse gravel with silt and sand (medium dense, wet)			Groundwater encountered at approximately 10 feet during drilling *Blowcount not representative due to gravel content
							SP-SM	Brown fine to medium sand with silt and occasional gravel (medium dense to dense, wet)			
105	15	18	22	5 %F					13	11	
100	20	18	25	6							
	25										

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-5

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Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-6
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
-95	25	18	34	7							
							SM	Brown silty fine to medium sand (dense, wet) (glacial till)			
-90	30	18	38	8							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-5 (continued)

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Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-6
Sheet 2 of 2

Drilled Start 12/17/2014 End 12/17/2014	Total Depth (ft) 31.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 124.23 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Track Mounted Drill Rig
Easting (X) 1313725.363 Northing (Y) 216013.5373		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						SM	Brown silty fine to medium sand with trace organics (fine roots) (loose, moist to wet)			
120		15	7	1							
	5	6	7	2							Groundwater encountered at approximately 5 feet during drilling
		2	7	3			ML	Brown sandy silt (medium stiff, wet)			
115							SP-SM	Gray fine to medium sand with silt (medium dense, wet) (recessional outwash)			
	10	18	18	4							
							SM	Brown silty fine sand with occasional gravel (medium dense, wet)			
110	15	18	29	5 %F					18	39	
							SP-SM	Gray fine to medium sand with silt (medium dense, wet)			
105	20	18	24	6							
100	25										

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-6

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-7
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	25	18	23	7							
-95							SM	Gray silty fine to medium sand with gravel (very dense, moist to wet) (glacial till)			
	30	16	98/10"	8							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-6 (continued)

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Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-7
Sheet 2 of 2

Drilled Start 12/19/2014 End 12/19/2014	Total Depth (ft) 21.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 109.8 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Track Mounted Drill Rig
Easting (X) 1313639.237 Northing (Y) 216170.6708		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						SM	Brown silty fine to medium sand with gravel and trace organics (medium dense, moist to wet) (fill)			
		8	15	1							
105	5	13	29	2			SM	Brown silty fine to medium sand with gravel (medium dense, wet) (recessional outwash)			Groundwater encountered at approximately 6 feet during drilling
		18	16	3			SM	Brown to gray silty fine to medium sand (medium dense, wet)			
100	10	14	12	4 %F					24	24	
							SP-SM	Gray fine to medium sand with silt (medium dense, wet)			
95	15	18	16	5			SM	Gray silty fine sand (medium dense, wet)			
							SM	Gray silty fine to medium sand (medium dense, wet) (glacial till)			
90	20	8	26	6							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-7

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-8
Sheet 1 of 1

Drilled Start 12/19/2014 End 12/19/2014	Total Depth (ft) 16.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 100.77 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Track Mounted Drill Rig
Easting (X) 1313569.145 Northing (Y) 216247.6339		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
100	0	15	5	1			SM	Brown with oxidation staining silty fine to medium sand with occasional gravel (loose, wet) (fill)			
95	5	15	17	2			SM	Brown silty fine to medium sand (medium dense, wet) (recessional outwash)			Groundwater encountered at approximately 5 feet during drilling
		12	30	3			SM	Brown with oxidation staining silty fine to medium sand with occasional gravel and silt lenses (medium dense, wet)			
90	10	13	24	4			SM	Brown to gray silty fine to medium sand (medium dense, wet)			
85	15	12	23	5 %F					15	16	

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-8

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-9
Sheet 1 of 1

ATTACHMENT B
Previous Explorations

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
8/31/2015	8/31/2015	50.33	KMS / NT	Geologic Drill Inc.	Hollow-stem Auger

Hammer Data	Auto 140 (lbs) / 30 (in) Drop	Drilling Equipment	D50 Track Rig
Surface Elevation (ft) Vertical Datum	92 NAVD88	Top of Casing Elevation (ft)	
Latitude Longitude	47.58538° -122.15791°	Horizontal Datum	Geographic WGS84

DOE Well I.D.: BIJ 533
A 2 (in) well was installed on 8/31/2015 to a depth of 50 (ft).

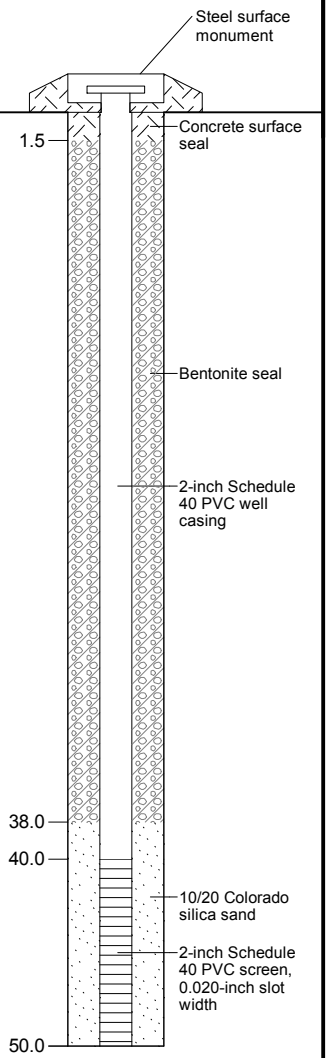
Groundwater	Depth to Water (ft)	Elevation (ft)
Date Measured		
9/16/2015	0.0	92.0

Notes: Field screening was completed to a depth of 15 feet; no sheen was observed.

Depth (feet)	Elevation (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
0	90						SM	Dark brown silty fine sand with organic matter (loose, wet)		
5	85	16	8	1			SW-SM	Gray fine to coarse sand with silt and gravel (loose to medium dense, wet) (recessional outwash?)		
10	80	9	27	2						
15	75	0	65	3*			SM	Gray silty fine to medium sand with occasional gravel (very dense, moist to wet) (weathered glacial till?) (Dry density = 118 pcf)	8	
20	70	18	57	4 MD						
25	65	18	24	5 SA					12	31
30	60	18	24	6						
35	55	5	50/5"	7			SM	Gray silty fine to medium sand with occasional gravel (very dense, moist) (glacial till?) (Rough drilling at 34 feet)		
40	50	11.5	50/5.5"	8						
45	45	5	50/5"	9 MD				(Dry density = 115 pcf)	9	
50			50/4"	10						

*California sample taken

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well J1 (TL 8/9)

GeoEngineers

Project:	PSE - Energize Eastside Design Phase
Project Location:	Bellevue, Washington
Project Number:	0186-871-05

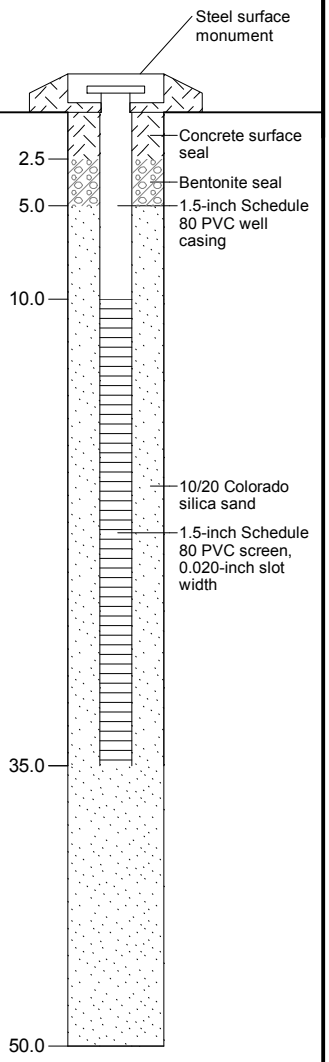
Figure A-23
Sheet 1 of 1

Drilled Start 11/20/2015	End 11/20/2015	Total Depth (ft) 51.5	Logged By NLP / Checked By NT	Driller Geologic Drill Inc.	Drilling Method Hollow-stem Auger

Hammer Data: Auto, 140 (lbs) / 30 (in) Drop	Drilling Equipment: D50 Track Rig	DOE Well I.D.: BIK 311 A 1.5 (in) well was installed on 11/20/2015 to a depth of 35 (ft).	
Surface Elevation (ft) Vertical Datum: Undetermined	Top of Casing Elevation (ft)	Groundwater: Date Measured 11/20/2015; Depth to Water (ft) 6.0; Elevation (ft)	
Latitude / Longitude	Horizontal Datum: Geographic		

Notes: Field screening was completed to a depth of 15 feet; no sheen was observed.

Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
0						SM	Brown silty sand and gravel (loose, moist to wet) (fill)		
5	12	2	1	▼		PT	Brown peat (soft, moist to wet)		
						SP-SM	Gray fine to medium sand with silt and gravel (medium dense, wet)		
10	0	34	2						
15	0	37	3						
	12	31	4				With lenses of fine to coarse sand with gravel		
20	12	25	5						
25	18	17	6						
30	18	7	7			SM/SP-SM	Gray-brown interbedded silty fine sand and fine to medium sand with silt (loose to medium dense, wet) (4 feet of heaving sand at 30 feet)		
35		12	8			SM	Gray silty fine sand (medium dense, wet)		
40	18	13	9			ML/SM	Gray interbedded silt with sand and silty fine sand (medium dense, wet)		
45		38	10				Grades to dense		
						SP-SM	Gray fine to coarse sand with silt (dense, wet)		
50		33	11			SM	Gray silty fine to medium sand with lenses of fine to medium sand		



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well G2-1

GeoEngineers

Project: PSE - Energize Eastside Design Phase
Project Location: Bellevue, Washington
Project Number: 0186-871-05

Figure A-18
Sheet 1 of 1

LOG OF TEST PIT NO. 1

Location: See Drawing 1 Elevation: Approx. 77

Surface Conditions: Grass, brush, and blackberries

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.7) **ORGANIC SILT** (Fill); dark brown, trace fine sand, scattered pieces of wood; wet, soft	
2				(1.7 - 3.8) **SAND & GRAVEL** (Fill); gray-brown, fine to coarse, trace silt; wet, medium dense	moderate caving of test pit walls
3					
4				(3.8 - 5.0) **PEAT**; amorphous; wet, soft to medium stiff	
5					
6				(5.0 - 6.2) **SILT**; brown, little fine to coarse sand, scattered gravel; wet, loose	
7				(6.2 - 7.6) **SILT & SAND**; gray-brown, fine to coarse, trace gravel; wet, medium dense	
8				Bottom of test pit at depth 7.6' Groundwater seepage observed below approx. 2.2' Completed 4/3/84	

DFR4

LOG OF TEST PIT NO. 2

Location: See Drawing 1

Elevation: Approx. 108

Surface Conditions: Scattered small trees, brush

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 0.4) **DUFF**	
2				(0.4 - 4.4) **SAND**; gray-brown, fine to medium, trace coarse, trace gravel, trace silt, numerous roots to approx. depth 2'; slightly moist, medium dense	
3		1			
4					
5				(4.4 - 8.3) **SAND**; gray, fine to coarse, little gravel, trace silt; slightly moist, dense	
6		2			
7				wet below depth 6.6'	
8					
9				(8.3 - 9.5) **SILT**; mottled gray and brown, trace to little fine sand; wet, dense	
10				(9.5 - 10.4) **SAND**; brown, fine to medium, trace silt, thin interbeds of brown silt; wet, medium dense	
				Bottom of test pit at depth 10.4'	
				Groundwater seepage observed below approx. 6.6'	
				Completed 4/3/84	

PROPOSED POLE YARD
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Project No
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Drawing No
3

LOG OF TEST PIT NO. 3

Location: See Drawing 1

Elevation: Approx. 110

Surface Conditions: Scattered small trees, brush

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 0.4) **DUFF**	
2				(0.4 - 3.6) **SAND**; brown, fine to medium, trace coarse, trace gravel, trace silt (10%), occasional cobble, numerous roots to approx. 3' depth; slightly moist, medium dense	
3					
4		1		(3.6 - 10.4) **SAND**; gray, fine to coarse, little gravel, trace silt; slightly moist, dense	
5					
6					
7				very dense	
8					
9					
10					
				Bottom of test pit at depth 10.4'	
				Groundwater seepage observed below approx. 8.6'	
				Completed 4/3/84	

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Drawing No.
4

LOG OF TEST PIT NO. 4

Location: See Drawing 1

Elevation: Approx. 107

Surface Conditions: Scattered small trees, brush

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 0.4) **DUFF**	
2				(0.4 - 3.5) **SAND**; brown, fine to medium, trace coarse, trace silt (10%), trace gravel, numerous roots to approx. depth 2'; slightly moist, loose	
3					
4				(3.5 - 8.1) **SAND**; gray, fine to coarse, little gravel, trace silt, occasional cobble; slightly moist, medium dense to dense	
5					
6					
7					
8					
9				(8.1 - 11.8) **SANDY SILT**; mottled gray & brown, fine to medium sand, thin interbeds of fine to medium sand with trace to little silt, thin interbeds of clayey silt with little fine sand; wet, medium dense	
10					
11					
12				Bottom of test pit at depth 11.8'	
				Groundwater seepage observed below approx. 11.4'	
				Completed 4/3/84	

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Drawing No
5

LOG OF TEST PIT NO. 5

Location: See Drawing 1

Elevation: Approx. 104

Surface Conditions: Fill surface, scattered grass

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.2) **SILT & SAND** (Fill); dark brown, fine to coarse sand, scattered gravel, encountered aluminum debris; moist, loose	
2				(1.2 - 3.4) **SILTY SAND** (Fill); brown, fine to medium, trace coarse sand, scattered gravel, scattered pieces of concrete and asphalt rubble up to 1-1/2' across; slightly moist, loose	
3					
4				(3.4 - 5.4) **SAND**; brown, fine to medium, trace coarse sand, trace gravel, trace to little silt; slightly moist, medium dense	
5					
6				(5.4 - 10.6) **SILTY SAND**; gray-brown, fine, scattered gravel, thin interbeds of silt & fine to medium sand; moist, medium dense	
7				wet below approx. 7.1'	
8					
9					
10					
				Bottom of test pit at depth 10.6'	
				Groundwater seepage observed below approx. 7.1'	
				Completed 4/3/84	

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Drawing No
6

LOG OF TEST PIT NO. 6

Location: See Drawing 1 Elevation: Approx. 107

Surface Conditions: Scattered clumps of grass

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.7) **SAND** (Fill); gray, fine to coarse, trace to little gravel, little silt, scattered pieces of concrete & asphalt rubble, wood, and tree branches; moist, loose	
2					
3				(1.7 - 4.6) **CLAYEY SILT** (Fill); dark gray, fine to medium sand, scattered tree branches, occasional piece of asphalt rubble; moist, very loose wet below approx. 3.1'	
4					
5					
6				(4.6 - 7.3) **SAND** (Fill); gray, fine to coarse, some clayey silt, numerous tree branches, and pieces of asphalt; wet, very loose	
7					
				Bottom of test pit at depth 7.3' Test pit terminated due to soil running into pit as excavated below approx. 3' Groundwater seepage observed below approx. 3.1' Completed 4/3/84	

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Drawing No
7

LOG OF TEST PIT NO. 7

Location: See Drawing 1 Elevation: Approx. 108

Surface Conditions: Grass, fill mounds, scattered concrete rubble

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.9) **SILTY SAND** (Fill); gray-brown, fine to medium; slightly moist, loose	
2				(1.9 - 4.1) **SILTY SAND** (Fill); dark gray-brown, fine to medium, scattered tree branches, pieces of pipe & asphalt rubble; moist, loose asphalt rubble layer from 2.4' to 3.1'	
3					
4					
5				(4.1 - 6.6) **SILTY SAND** (Fill); gray, fine to medium, trace coarse, little gravel, occasional cobble; slightly moist, dense wet below approx. 4.4'	massive caving of test pit walls below approx. 5.5'
6					
7				(6.6 - 9.6) **SAND** (Fill); brown, fine to coarse, little silt, trace gravel, occasional cobble and boulder, scattered metal debris, wire, asphalt rubble, tree branches, and wood pieces; wet, medium dense	
8					
9					
				Bottom of test pit at depth 9.6' Groundwater seepage observed below approx. 4.4' Completed 4/3/84	

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Drawing No
8

HAND DUG HOLE HH-1

Depth (feet)	Description
0.0 - 2.8	PEAT; amorphous; wet
2.8 - 3.1	SAND & GRAVEL; gray-brown, fine to coarse, trace silt; wet
	Bottom of hole at depth 3.1' Water standing in hole at depth 1.2' Completed 4/3/84

HAND DUG HOLE HH-2

Depth (feet)	Description
0.0 - 1.3	PEAT; amorphous; wet
1.3 - 2.0	SAND & GRAVEL; gray-brown, fine to coarse, trace silt; wet
	Bottom of hole at depth 2.0' Completed 4/3/84

LOG OF HAND DUG HOLES

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Drawing No.
9

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