Geotechnical Data Report

The Rex Development
Marysville, Washington

for
Williams Investments LLC

September 11, 2021

GeoEngineers
Earth Science + Technology

Geotechnical Data Report

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Marysville, Washington

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GeoEngineers

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Geotechnical Data Report

The Rex Development
Marysville, Washington

File No. 22450-004-00

September 11, 2023

Prepared for:

Williams Investments LLC
2515 Colby Avenue
Everett, Washington 98201

Attention: Ryan Kilby

Prepared by:

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AJH:JRG:leh

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1.0 INTRODUCTION AND SCOPE

GeoEngineers, Inc. (GeoEngineers) is pleased to submit our Geotechnical Data Report for "The Rex Development" industrial area that includes two parcels, one in Maysville and one in Arlington, Washington. The site includes parcel number 31052800400100 (16204 51st Avenue NE, Marysville) and parcel number 31052800100700 (16430 51st Avenue NE, Arlington). The project is in preliminary planning for new industrial buildings with associated parking and improvements. A vicinity map showing the project location is provided as Figure 1. The existing site conditions and approximate location of the completed explorations are shown in the Site and Exploration Plan, Figure 2.

The purpose of this data report is to present the available geotechnical site information as part of the planning and design development. Geotechnical design recommendations will be provided as the project concept is further developed.

Our complete scope of services is described in our proposal for the project dated March 17, 2021 which was authorized by Ryan Kilby with Williams Investments LLC on the same date. We completed review of available geologic and geotechnical information related to the site, observing test pits and installing shallow piezometers, and subcontracting cone penetrometer tests (CPTs).

2.0 SITE CONDITIONS

2.1. Geology

Our review of the U.S. Geological Survey map, *Geologic Map of the Arlington West 7.5-Minute Quadrangle Snohomish County, Washington* by James P. Minard indicates that surficial soils at the site consist primarily of recessional outwash deposits of the Marysville Sand Member.

The Marysville Sand Member typically consists of stratified outwash sand with occasional gravel, and isolated areas of silt and clay. The sediments were deposited by meltwater from the stagnating and receding Vashon glacier and are typically medium dense/stiff. We observed recessional outwash deposits in each of the explorations completed on the property.

2.2. Surface Conditions

The development area at the site consists of relatively flat agricultural fields. The elevation changes gradually from approximately 115 feet (NAVD 88) at the north to 105 feet at the south, based on reviewing available Light Detection and Ranging (LiDAR) information. Wetlands have been identified in the northwest portion of the site. Various farm roads traverse the site. The site is irregularly shaped consisting of multiple parcels bounded by 51st Avenue NE to the east, proposed 156th Street NE to the south, proposed 43rd Avenue to the west and proposed 168th Avenue to the north. Adjacent site uses include residential, retail, rural residential, agricultural, and light industrial. The site is outlined in the attached Figure 2. Existing utilities are typically in adjacent rights-of-way, except for the Olympic pipeline easement which traverses the site at an angle in the southeast/northwest direction.

2.3. Subsurface Exploration

Subsurface soil and groundwater conditions were evaluated by reviewing available information including borings from a previous GeoEngineers study in the area, excavating five test pits, and advancing CPTs. The test pits were completed using an excavator provided by the owner on June 11, 2021. The test pits were completed to depths ranging from 2 to 5 feet below the existing ground surface (bgs), where they were terminated because of caving in saturated sand. Stainless steel drive-point piezometers were installed at the test pit locations to monitor seasonal groundwater levels. Groundwater pressure transducers were installed in the piezometers and will be monitored quarterly through the wet season. Details of the field exploration program, the test pit logs, and laboratory testing are presented in Appendix A. GeoEngineers subcontracted the completion of five CPTs which were completed to depths of 40.4 to 40.9 feet bgs. The CPT logs are presented in Appendix B. The approximate locations of the test pits and CPTs are shown in Figure 2.

2.4. Previous Studies

We reviewed GeoEngineers' geotechnical report "156th Street NE, 160th Street NE and 51st Avenue NE Improvements, Marysville, Washington" dated September 110, 2018. The report includes several borings and a monitoring well within or immediately adjacent to the project footprint. The relevant boring logs are also shown in Figure 2 and the logs and laboratory data are included in Appendix C.

2.5. Subsurface Conditions

2.5.1. Soil Conditions

Subsurface soil conditions generally consisted of a reworked agricultural layer at the surface of overlying outwash sand with isolated silt, consistent with the mapped geology.

Reworked Agricultural Horizon (Topsoil): The reworked agricultural surface layer (topsoil) typically consisted of loose brown silty sand with occasional gravel, roots, and rootlets. The agricultural layer extended from the surface to approximately 1 to 1½ feet bgs in the test pits. The CPTs encountered similar surficial conditions indicating loose/soft soil conditions in the upper 2 feet.

Outwash: Outwash deposits were observed below the topsoil. The outwash deposits typically consist of fine to medium sand with variable amounts of silt, gravel, and cobbles. The fines content of the outwash deposits typically ranged from 1 to 12 percent with occasional sandy silt interbeds observed in some of the explorations. TP-1 encountered a thicker silt layer between 2 and 4 feet bgs. CPTs recorded increasing resistance below the topsoil and encountered medium dense sand to the full depth explored with increased resistance from approximately 35 to 40 feet in CPT-1, CPT-2, and CPT-5. CPT-2 and CPT-4 encountered a 1-foot-thick layer of stiff silt at 31 and 19 feet, respectively.

2.5.2. Groundwater

Groundwater seepage was encountered in all explorations at depths ranging from 2 to 5 feet bgs during test pit excavation and interpreted to range between 1.2 and 1.9 feet in the CPT explorations. Groundwater was typically encountered within the outwash sand material. Based on observations of iron staining in the soil samples, and our understanding of groundwater fluctuation in the project vicinity, we expect that groundwater could rise to near the ground surface during wetter portions of the year. Our explorations were not left open long enough to allow groundwater to stabilize. Rapid groundwater seepage and caving was observed in the outwash deposits during the short time period the test pits were left open.

To determine seasonal groundwater fluctuations and water levels, we installed stainless steel drive-point piezometers and pressure transducers. We will continue to monitor the piezometers quarterly. The data from the recent groundwater monitoring event are presented in Figure 3. The groundwater is influenced by season, precipitation, and other factors.

3.0 LIMITATIONS

We have prepared this geotechnical data report for use by Williams Investments LLC, and other members of the design team for use in planning and permitting for the proposed The Rex Development project. This report is not intended for design purposes; design recommendations will be provided under separate cover.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted geotechnical practices in this area at the time the report was prepared. No warranty or other conditions express or implied should be understood.

Any electronic form, facsimile, or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

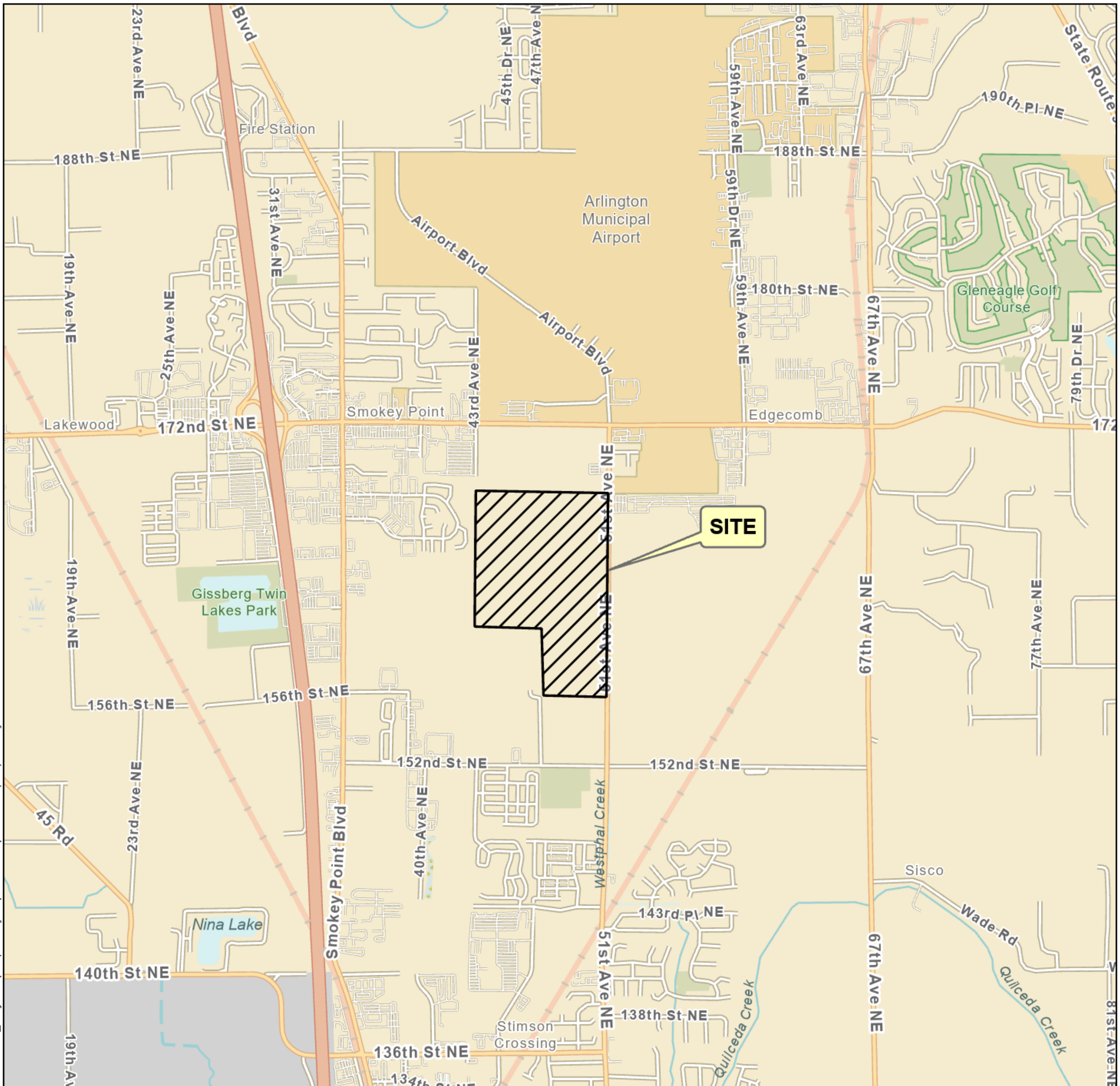
See Appendix D for additional information regarding the limitations.

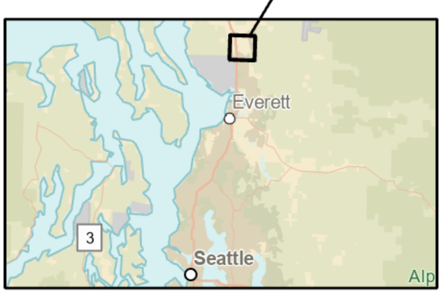
4.0 REFERENCES

GeoEngineers, 2018. "Geotechnical Engineering Services, 156th Street NE, 160th Street NE and 51st Avenue NE Improvements, Marysville, Washington", dated September 110, 2018.

Minard, James P. 1985. "Geologic Map of the Arlington West 7.5 Minute Quadrangle, Snohomish County, Washington" Department of the Interior, U.S. Geological Survey. Miscellaneous Field Studies Map MF-1740.

FIGURES





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Feet

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: ESRI

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

The Rex Development
Marysville, Washington

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Figure 1

\\geoengineers.com\WAN\Projects\22\22450004\GIS\2245000400_Project\2245000400_Project.aprx\VicinityMap Date Exported: 08/27/21 by alarson

Legend

- TP-1 — Test Pit by GeoEngineers, Inc., 2021
- CPT-1 — Cone Penetrometer Test by GeoEngineers, Inc., 2021
- B-3 — Boring by GeoEngineers, Inc., 2021
- Site Boundary

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: Background Aerial from Microsoft Bin.g

Projection: Washington State Plane, North Zone, NAD83, US Foot

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Feet

Site Plan

The Rex Development
Marysville, Washington

GEOENGINEERS

Figure 2

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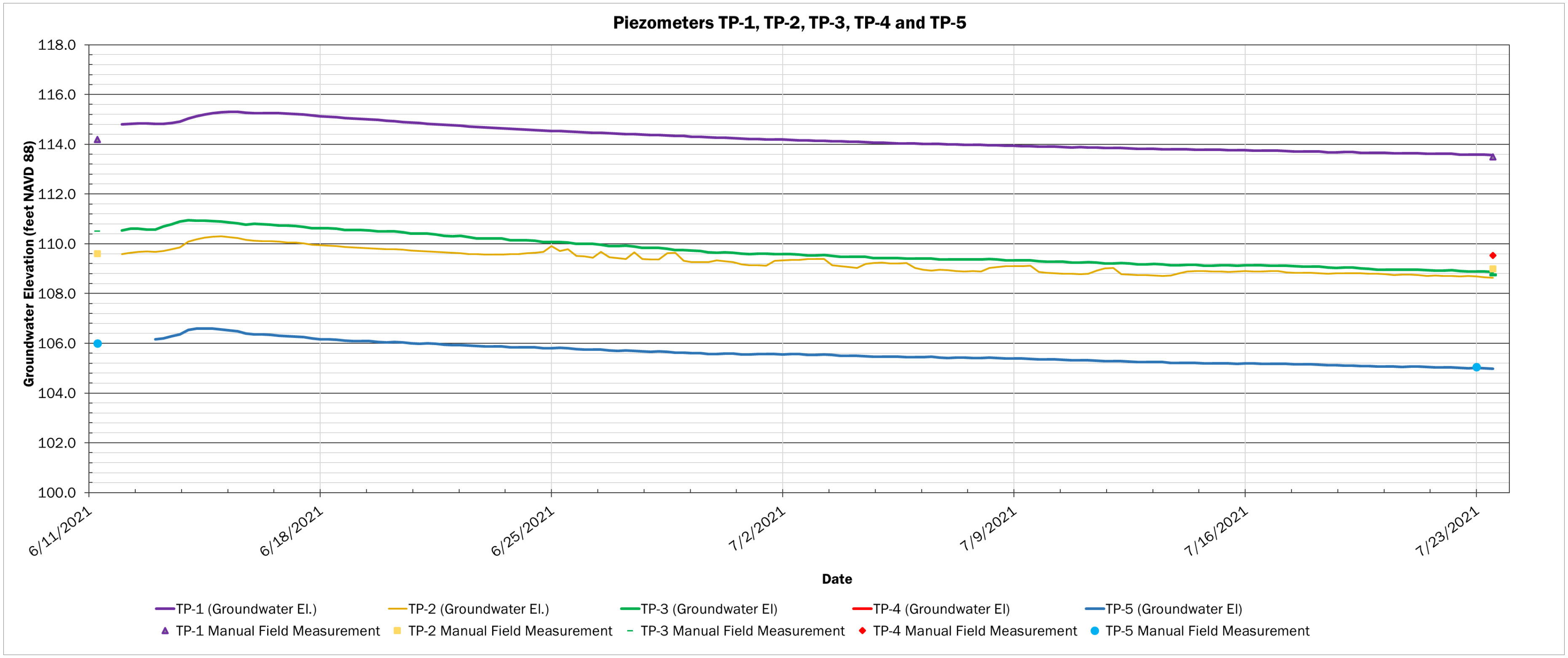
22450-004-00 Date Exported: 08/26/2021



Notes:

1. The locations of all features shown are approximate.
2. TP-4 damaged during initial installation; Replacement installed with transducer on July 23, 2021.
3. 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.

Groundwater Monitoring Data
Piezometers TP-1 through TP-5

The Rex Development
Marysville, Washington

GEOENGINEERS

Figure 3

APPENDICES

APPENDIX A
Field Explorations and Laboratory Testing

APPENDIX A
FIELD EXPLORATIONS AND LABORATORY TESTING

Field Explorations

Subsurface conditions were evaluated by completing five test pits (TP-1 through TP-5) on June 11, 2021 and subcontracting cone penetrometer tests (CPTs). The test pit excavations were completed to depths ranging from approximately 2 to 5 feet below the existing ground surface (bgs) by using a mini excavator provided by the owner. The CPT drill rig was subcontracted to GeoEngineers. The locations of the explorations are shown in the Site and Exploration Plan, Figure 2. The locations of the explorations were determined by iPad global positioning system (GPS) and were monitored by a geologist from our firm. The locations should be considered accurate to the degree implied by the method used. Ground surface elevations were estimated based on publicly available Light Detection and Ranging (LiDAR) topography information.

Disturbed soil samples were generally obtained from the sides of the test pits and the bucket of the excavator. The samples were placed in plastic bags to maintain the moisture content and transported back to our laboratory for analysis and testing. The test pits were backfilled with the excavated material upon completion and tamped with the excavator bucket.

The soil test pits were continuously monitored by a geologist from our firm who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions, and prepared a detailed log of each exploration. Soils were visually classified in general accordance with ASTM International (ASTM) D-2488-90, which is described in Figure A-1. An explanation of our exploration log symbols is also shown in Figure A-1.

The logs of the test pits completed for the geotechnical evaluation are presented in the attached figures. The exploration logs are based on our interpretation of the field and laboratory data and indicate the various types of soils encountered. They also indicate the depths at which these soils or their characteristics change, although the change might be gradual. If the change occurred between samples in the borings the depth was inferred.

The CPT exploration methodology and logs are presented in Appendix B. Some additional borings completed near the site are presented in Appendix C.

Laboratory Testing

Soil samples obtained from the explorations were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate index properties of the soil samples. Representative samples were selected for laboratory testing consisting of the determination of the moisture and fines contents. The tests were performed in general accordance with test methods of ASTM or other applicable procedures.

Moisture Content Testing

Moisture content tests were completed in general accordance with ASTM D 2216 for representative samples obtained from the explorations. The results of these tests are presented on the exploration logs at the depths at which the samples were obtained.

Percent Passing U.S. No. 200 Sieve

Selected samples were "washed" through the U.S. No. 200 mesh sieve to determine the relative percentage of coarse- and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve. These tests were conducted to verify field descriptions and to determine the fines content for analysis purposes. The tests were conducted in general accordance with ASTM D 1140, and the results are shown on the exploration logs in Appendix A at the representative sample depths.

Sieve Analyses

Sieve analyses were performed on selected samples in general accordance with ASTM D 422 to determine the sample grain-size distribution. The wet sieve analysis method was used to determine the percentage of soil greater than the U.S. No. 200 mesh sieve. The results of the sieve analyses were plotted, classified in general accordance with the Unified Soil Classification System (USCS), and are presented in Figure A-7.

Atterberg Limits

Atterberg limits were performed on selected samples in general accordance with ASTM D 4318 to determine the plasticity index and liquid limit of clay. The results of the Atterberg limit analyses were plotted and classified in general accordance with USCS and are presented in Figure A-8.

SOIL CLASSIFICATION CHART

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

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

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.

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

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

ADDITIONAL MATERIAL SYMBOLS

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

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

Laboratory / Field Tests

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

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

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

Key to Exploration Logs

GeoEngineers

Figure A-1

Date Excavated	6/11/2021	Total Depth (ft)	5	Logged By JES	Checked By AJH	Excavator Taylor Excavating	Equipment	See "Remarks" section for groundwater observed See "Remarks" section for caving observed

Surface Elevation (ft) Vertical Datum	118 NAVD88	Easting (X) Northing (Y)	1314305 421399	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0–1		1 / MC		SM	Dark brown fine to medium silty sand with occasional gravel and rootlets (loose, moist) (topsoil)	30		
117	1–2		2 / %F		SP	Gray fine to medium sand with occasional gravel (medium dense, moist) (outwash)	10	7	
116	2–4		3 / AL		MH	Yellow elastic silt with occasional gravel (soft, moist)	49		LL=58; PI=25
115	3								
114	4–5		4 / %F		SP	Gray fine to medium sand with occasional gravel (medium dense, wet)	33	2	Slight caving observed at 4 feet
113	5								Slow groundwater seepage observed at 5 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit TP-1

GEOENGINEERS

Project: The Rex Development
Project Location: Marysville, Washington
Project Number: 22450-004-00

Figure A-2
Sheet 1 of 1

Date Excavated	6/11/2021	Total Depth (ft)	5	Logged By JES Checked By AJH	Excavator Taylor Excavating Equipment
See "Remarks" section for groundwater observed See "Remarks" section for caving observed					

Surface Elevation (ft) Vertical Datum	113 NAVD88	Easting (X) Northing (Y)	1314172 419785	Coordinate System Horizontal Datum	WA State Plane North NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample / Sample Name Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
113	0		SM	Dark brown fine to medium sand with occasional gravel and rootlets (loose, moist) (topsoil)			
112	1	1	SP-SM	Light brown fine to medium sand with silt and occasional gravel (medium dense, moist) (outwash)			
111	2	2 %F	SM	Gray silty fine to medium sand with occasional gravel (medium dense, moist)	27	22	
110	3						
109	4		SP	Gray fine to medium sand with gravel (medium dense, wet)			Severe caving observed from 4 to 5 feet
	4.5	3 SA			8	1	
108	5						Rapid groundwater seepage observed at 5 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit TP-2

GEOENGINEERS

Project: The Rex Development
Project Location: Marysville, Washington
Project Number: 22450-004-00

Figure A-3
Sheet 1 of 1

Date Excavated	6/11/2021	Total Depth (ft)	2.5	Logged By	JES	Excavator	Taylor Excavating	See "Remarks" section for groundwater observed
				Checked By	AJH	Equipment		See "Remarks" section for caving observed

Surface Elevation (ft)	112	Easting (X)	1315128	Coordinate System	WA State Plane North
Vertical Datum	NAVD88	Northing (Y)	419885	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SM	Brown fine to medium silty sand with occasional gravel (loose, moist) (topsoil)			
111	1		1 MC				18		
					SP	Light brown/gray fine to medium sand with occasional gravel (medium dense, wet) (outwash)			
110	2		2 %F				28	4	Slight caving observed from 2 to 2.4 feet Slow groundwater seepage observed at 2.4 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit TP-3

GeoEngineers

Project: The Rex Development
Project Location: Marysville, Washington
Project Number: 22450-004-00

Date Excavated	6/11/2021	Total Depth (ft)	2	Logged By	JES	Excavator	Taylor Excavating	See "Remarks" section for groundwater observed
				Checked By	AJH	Equipment		Caving not observed

Surface Elevation (ft)	112	Easting (X)	1315954	Coordinate System	WA State Plane North
Vertical Datum	NAVD88	Northing (Y)	418933	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SM	Dark brown fine to medium silty sand with occasional gravel and rootlets (loose, moist) (topsoil)			
			1 / %F				26	22	
111	1								
			2 / %F		SP	Brown-gray fine to medium sand with occasional gravel (medium dense, wet) (outwash)	23	7	
110	2								Slow groundwater seepage observed at 2 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit TP-4

GEOENGINEERS

Project: The Rex Development
Project Location: Marysville, Washington
Project Number: 22450-004-00

Figure A-5
Sheet 1 of 1

Date Excavated	6/11/2021	Total Depth (ft)	5	Logged By	JES	Excavator	Taylor Excavating	See "Remarks" section for groundwater observed	
				Checked By	AJH	Equipment		See "Remarks" section for caving observed	

Surface Elevation (ft)	110	Easting (X)	1315523	Coordinate System	WA State Plane North
Vertical Datum	NAVD88	Northing (Y)	417824	Horizontal Datum	NAD83 (feet)

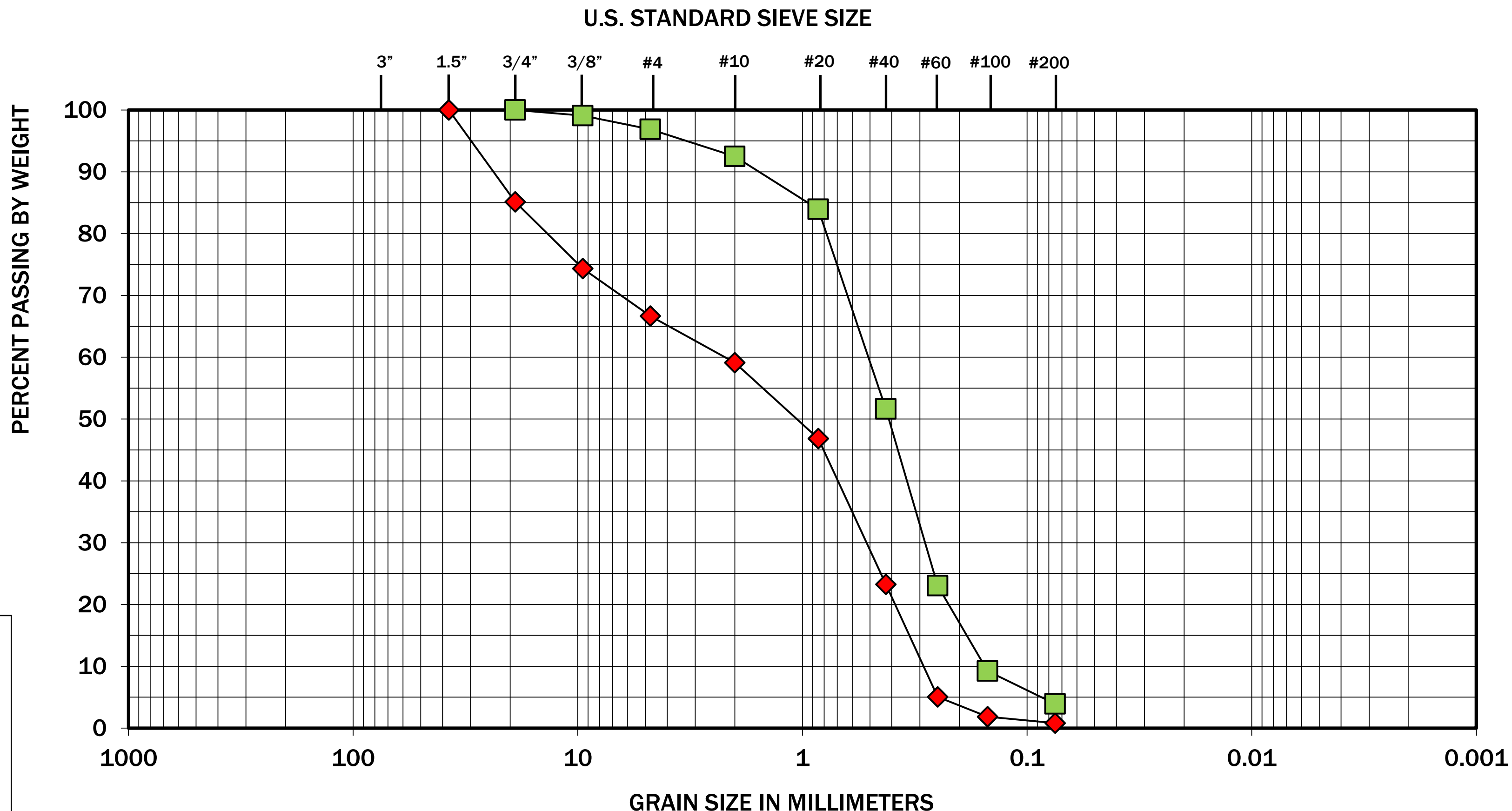
Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0				SOD	2 inches of sod			
			1 / MC		SM	Red-brown fine to medium silty sand with occasional gravel (loose, moist) (topsoil)	28		
109	1				SP	Light brown fine to medium sand with gravel			
			2 / SA				12	4	
108	2								
107	3								
106	4								
			3 / %F				15	1	Slight caving observed from 4½ to 5 feet
105	5					Becomes wet and gray with increased gravel content			Moderate groundwater seepage observed at 5 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Test Pit TP-5

GeoEngineers

Project: The Rex Development
Project Location: Marysville, Washington
Project Number: 22450-004-00



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	TP-2	5	8.0	Poorly graded sand with gravel (SP)
■	TP-5	2	12	Poorly graded sand (SP)

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The grain size analysis results were obtained in general accordance with ASTM D 6913. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

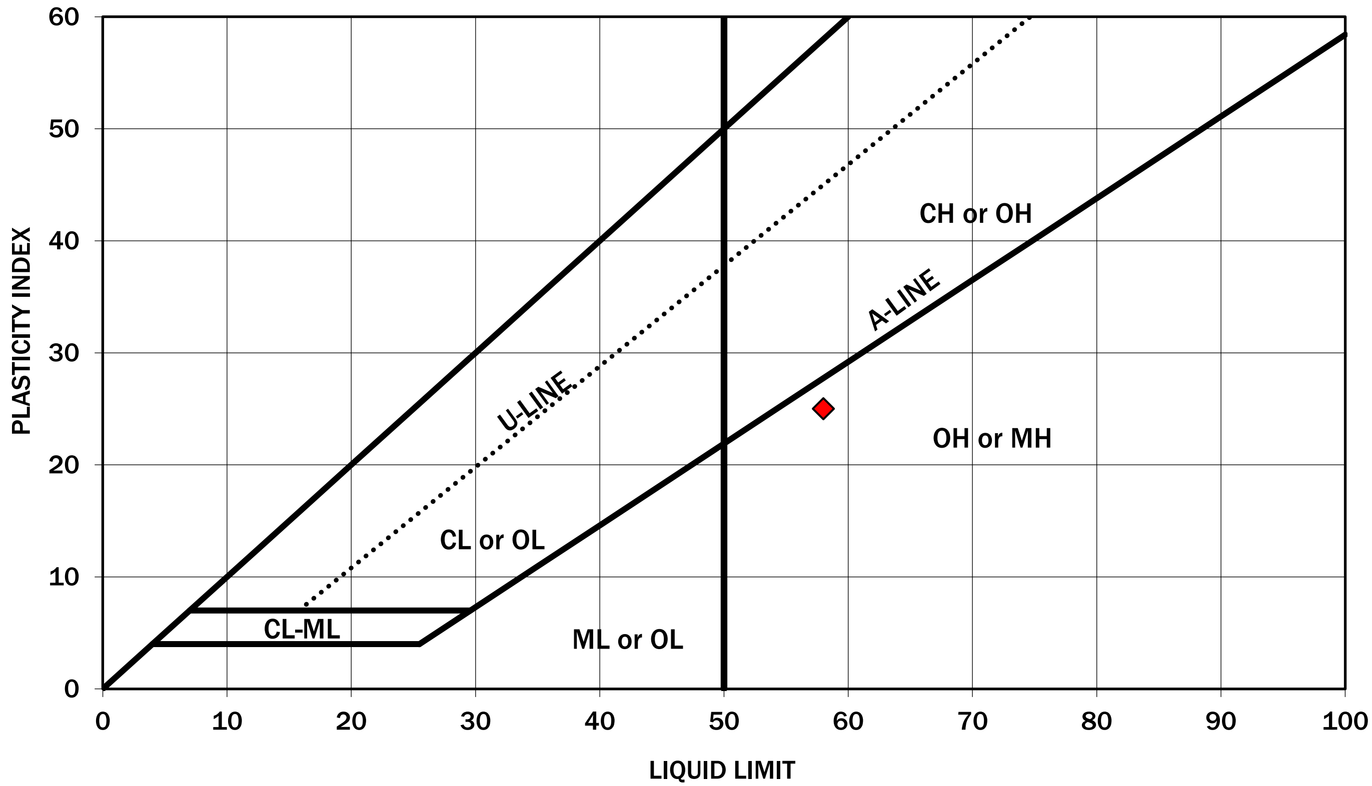
GEOENGINEERS

Sieve Analysis Results

The Rex Development
Marysville, Washington

Figure A-7

PLASTICITY CHART



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	TP-1	3	49	58	25	Silt (MH)

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Atterberg Limits Test Results

The Rex Development
Marysville, Washington

GeoEngineers

Figure A-8

APPENDIX B
Cone Penetrometer Report

PRESENTATION OF SITE INVESTIGATION RESULTS

Rex Development

Prepared for:

GeoEngineers, Inc.

ConeTec Job No: 21-59-22493

Project Start Date: 11-JUN-2021
Project End Date: 11-JUN-2021
Report Date: 18-JUN-2021

Prepared by:

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Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for GeoEngineers, Inc. at 16408 51st Ave NE, Arlington, WA 98223. The program consisted of cone penetration tests.

Project Information

Project	
Client	GeoEngineers, Inc.
Project	Rex Development
ConeTec project number	21-59-22493

An aerial overview from Google Earth including the CPTu test locations is presented below.

Rig Description	Deployment System	Test Type
C05-023_20Ton Track Rig	Integrated Push Cylinders	CPTu

Coordinates		
Test Type	Collection Method	EPSG Number
CPTu	Consumer grade GPS	4326

Cone Penetrometers Used for this Project						
Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (bar)
730: T1500F15U35	730	15.0	225	1500	15	35
Cone 730 was used for all CPTu soundings						

Cone Penetration Test (CPTu)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test.
Tip and sleeve data offset	0.1 meter This has been accounted for in the CPT data files.
Additional plots	• Advanced plots with Ic, Su, phi and N(60)/N1(60) • Soil Behaviour Type (SBT) scatter plots

Calculated Geotechnical Parameter Tables	
Additional information	The Normalized Soil Behaviour Type Chart based on Q_{tn} (SBT Q_{tn}) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPTu parameters have been generated and are provided in Excel format files in the release folder. The CPTu parameter calculations are based on values of corrected tip resistance (q_t) sleeve friction (f_s) and pore pressure (u_2). Effective stresses are calculated based on unit weights that have been assigned to the individual soil behaviour type zones and the assumed equilibrium pore pressure profile.

Limitations

This report has been prepared for the exclusive use of GeoEngineers, Inc. (Client) for the project titled "Rex Development". The report's contents may not be relied upon by any other party without the express written permission of ConeTec Inc. (ConeTec). ConeTec has provided site investigation services, prepared the factual data reporting and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

Cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd., a subsidiary of ConeTec.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and two geophone sensors for recording seismic signals. All signals are amplified and measured with minimum sixteen-bit resolution down hole within the cone body, and the signals are sent to the surface using a high bandwidth, error corrected digital interface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table presented in the first appendix. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 millimeters diameter over a length of 32 millimeters with tapered leading and trailing edges) located at a distance of 585 millimeters above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is six millimeters thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meets or exceeds those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

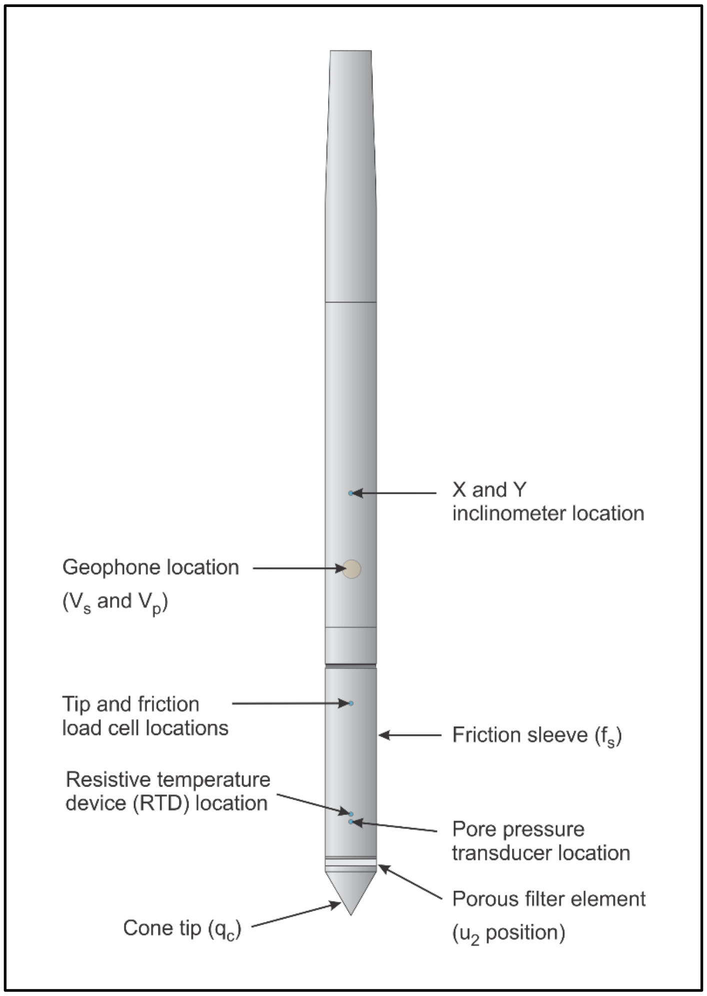


Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal interface box and power supply. The signal interface combines depth increment signals, seismic trigger signals and the downhole digital data. This combined data is then sent to the Windows based computer for collection and presentation. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording interval is 2.5 centimeters; custom recording intervals are possible.

The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPTu operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of two centimeters per second, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches (38.1 millimeters) are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil under vacuum pressure prior to use
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson et al. (1986) and Robertson (1990, 2009). It should be noted that it is not always possible to accurately identify a soil behavior type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al. (1986):

$$q_t = q_c + (1-a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (R_f) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of files with calculated geotechnical parameters were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the methods used is also included in the data release folder.

For additional information on CPTu interpretations and calculated geotechnical parameters, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

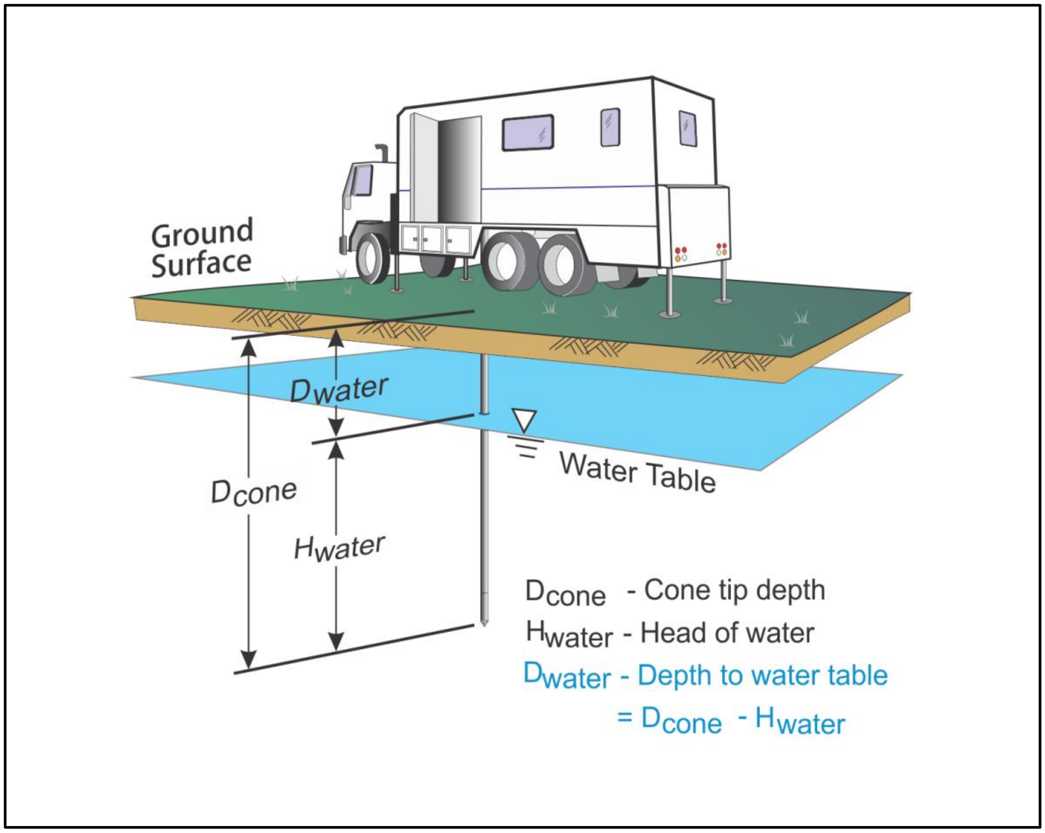


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

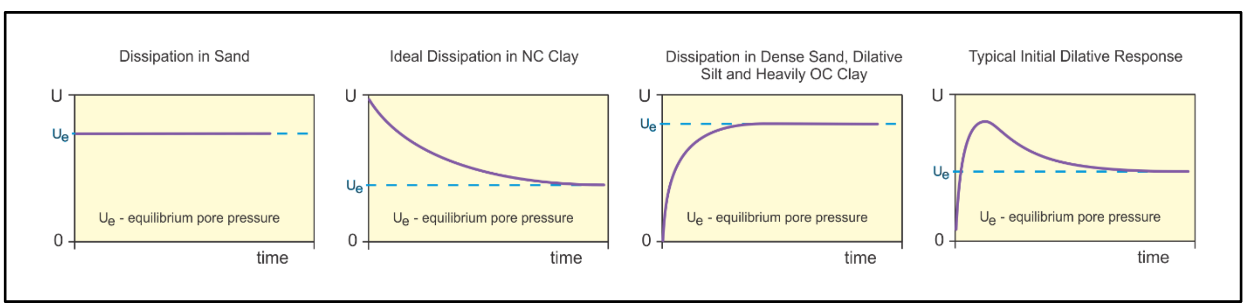


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve in Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T* is the dimensionless time factor (Table Time Factor)
a is the radius of the cone
I_r is the rigidity index
t is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby (1991))

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby (1991)), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

ASTM D5778-12, 2012, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM International, West Conshohocken, PA. DOI: 10.1520/D5778-12.

Burns, S.E. and Mayne, P.W., 1998, "Monotonic and dilatory pore pressure decay during piezocone tests", Canadian Geotechnical Journal 26 (4): 1063-1073. DOI: 1063-1073/T98-062.

Burns, S.E. and Mayne, P.W., 2002, "Analytical cavity expansion-critical state model cone dissipation in fine-grained soils", Soils & Foundations, Vol. 42(2): 131-137.

Jones, G.A. and Van Zyl, D.J.A., 1981, "The piezometer probe: a useful investigation tool", Proceedings, 10th International Conference on Soil Mechanics and Foundation Engineering, Vol. 3, Stockholm: 489-495.

Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, "Cone Penetration Testing in Geotechnical Practice", Blackie Academic and Professional.

Mayne, P.W., 2013, "Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests", Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420. DOI: 10.1061/9780784412770.027.

Mayne, P.W. and Peuchen, J., 2012, "Unit weight trends with cone resistance in soft to firm clays", Geotechnical and Geophysical Site Characterization *4,* Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Mayne, P.W., 2014, "Interpretation of geotechnical parameters from seismic piezocone tests", CPT'14 Keynote Address, Las Vegas, NV, May 2014.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27: 151-158. DOI: 10.1139/T90-014.

Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, "Estimating coefficient of consolidation from piezocone tests", Canadian Geotechnical Journal, 29(4): 539-550. DOI: 10.1139/T92-061.

Robertson, P.K., 2009, "Interpretation of cone penetration tests – a unified approach", Canadian Geotechnical Journal, Volume 46: 1337-1355. DOI: 10.1139/T09-065.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, "An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils", Canadian Geotechnical Journal, 36(2): 369-381. DOI: 10.1139/T98-105.

Teh, C.I., and Houlsby, G.T., 1991, "An analytical study of the cone penetration test in clay", Geotechnique, 41(1): 17-34. DOI: 10.1680/geot.1991.41.1.17.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Advanced Cone Penetration Test Plots with Ic, Su(Nkt), Phi and N(60)Ic/N1(60)Ic
- Soil Behavior Type (SBT) Scatter Plots
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Cone Penetration Test Summary and Standard Cone Penetration Test Plots

Job No:	21-59-22493
Client:	GeoEngineers, Inc.
Project:	Rex Development
Start Date:	11-Jun-2021
End Date:	11-Jun-2021

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed [1] Phreatic Surface (ft)	Final Depth (ft)	Latitude [3] (deg)	Longitude [3] (deg)	Refer to Notation Number
CPT-01	21-59-22493_CP01	11-Jun-2021	730: T1500F15U35	1.2	40.9	48.13860	-122.16576	2
CPT-02	21-59-22493_CP02	11-Jun-2021	730: T1500F15U35	1.2	40.6	48.13976	-122.16327	
CPT-03	21-59-22493_CP03	11-Jun-2021	730: T1500F15U35	1.6	40.4	48.14251	-122.16966	
CPT-04	21-59-22493_CP04	11-Jun-2021	730: T1500F15U35	1.9	40.9	48.14339	-122.16422	
CPT-05	21-59-22493_CP05	11-Jun-2021	730: T1500F15U35	1.9	40.8	48.14768	-122.16821	2
Totals	5 soundings				203.7			

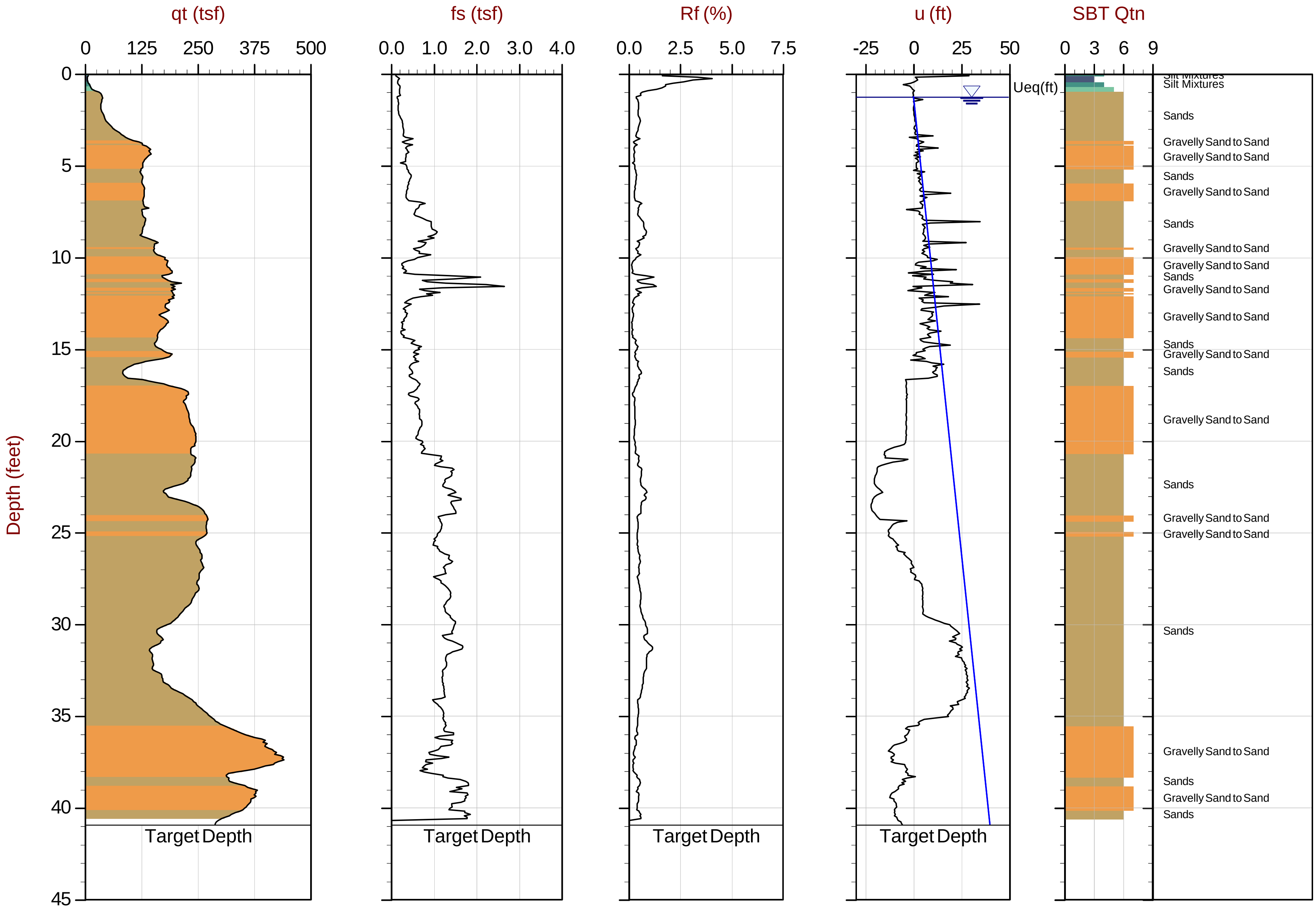
1. Phreatic surface based on pore pressure dissipation test unless otherwise noted. Hydrostatic profile applied to interpretation tables
2. Phreatic surface based on adjacent sounding pore pressure dissipation test. Hydrostatic profile applied to interpretation tables
3. Coordinates were collected using a handheld GPS - WGS 84 Lat/Long

CONETEC

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 14:07
Site: Rex Development

Sounding: CPT-01
Cone: 730:T1500F15U35



Max Depth: 12.475 m / 40.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.13860 Long: -122.16576

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

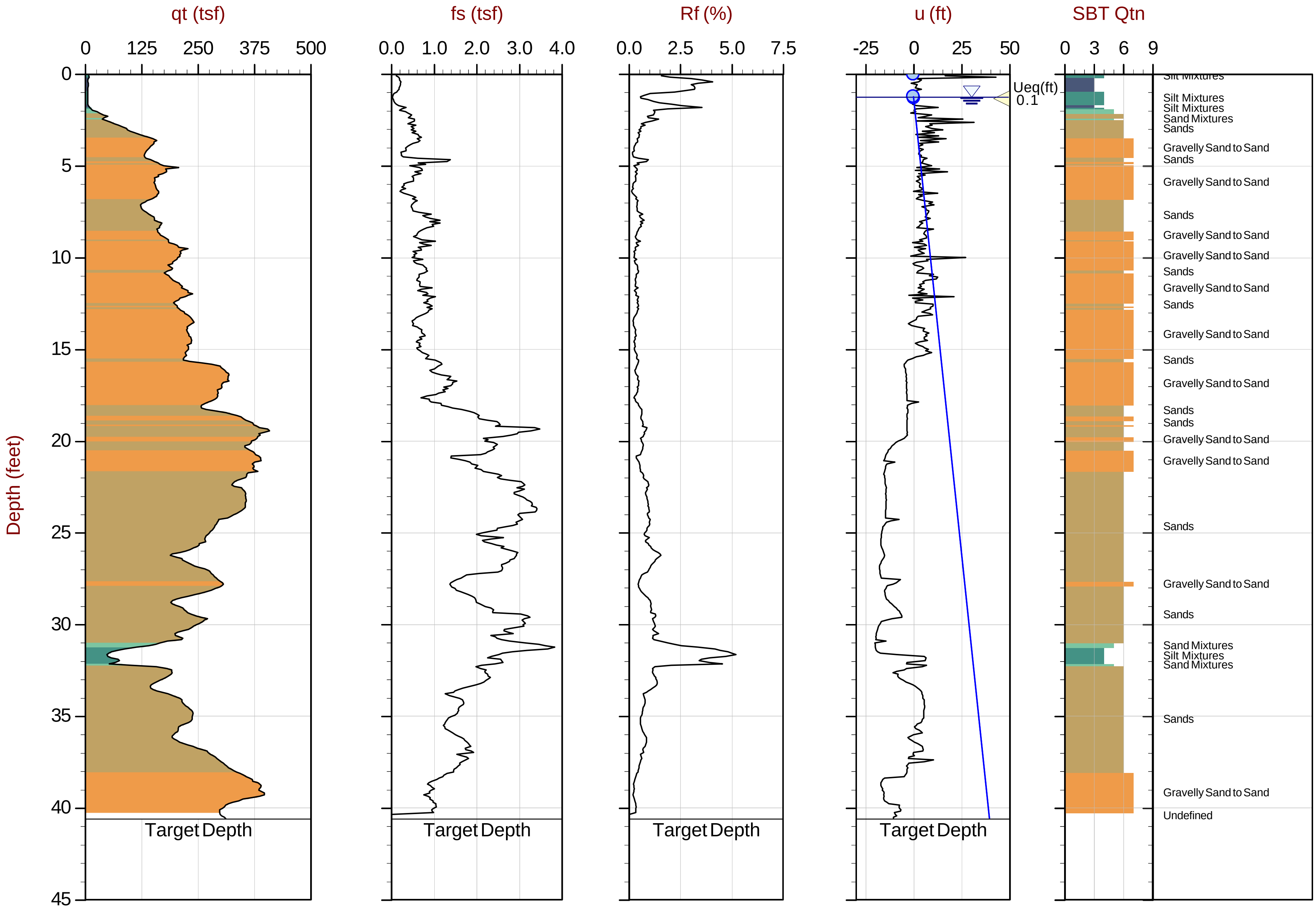
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 12:30
Site: Rex Development

Sounding: CPT-02
Cone: 730:T1500F15U35



Max Depth: 12.375 m / 40.60 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.13976 Long: -122.16327

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

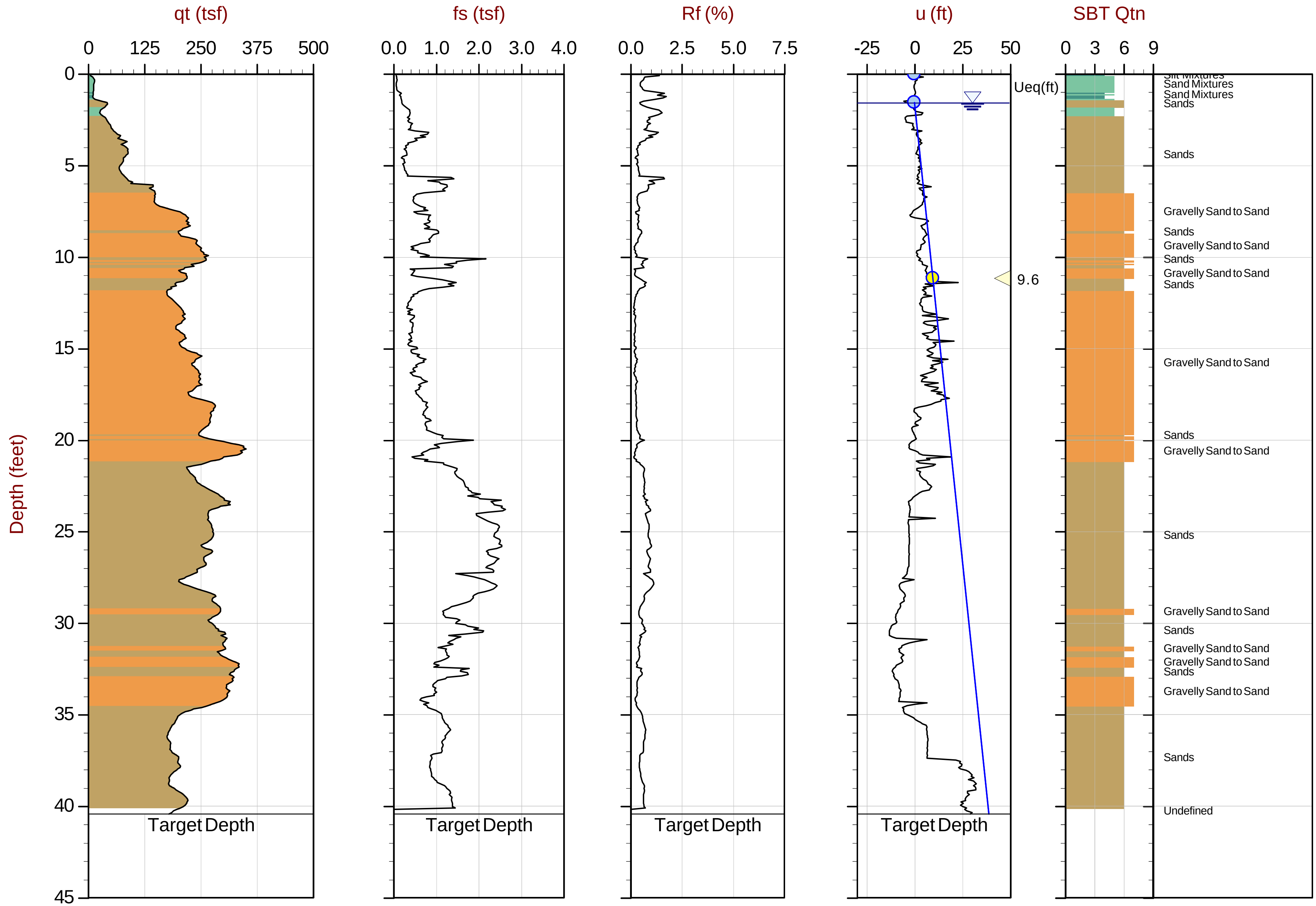
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 09:07
Site: Rex Development

Sounding: CPT-03
Cone: 730:T1500F15U35



Max Depth: 12.325 m / 40.44 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP03.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.14251 Long: -122.16966

Equilibrium Pore Pressure (Ueq) · Assumed Ueq · Dissipation, Ueq achieved · Dissipation, Ueq not achieved · Hydrostatic Line

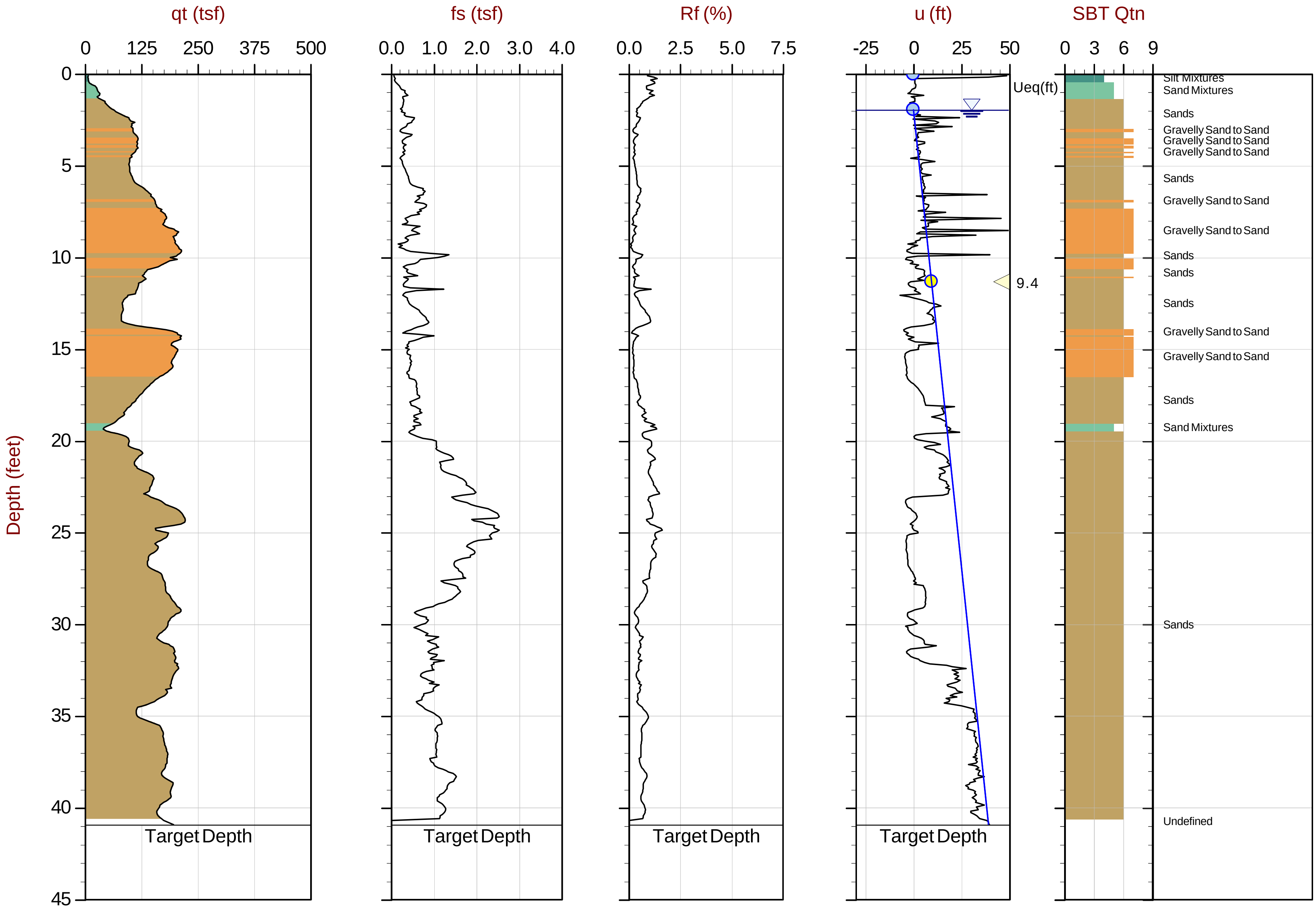
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 08:23
Site: Rex Development

Sounding: CPT-04
Cone: 730:T1500F15U35



Max Depth: 12.475 m / 40.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.14339 Long: -122.16422

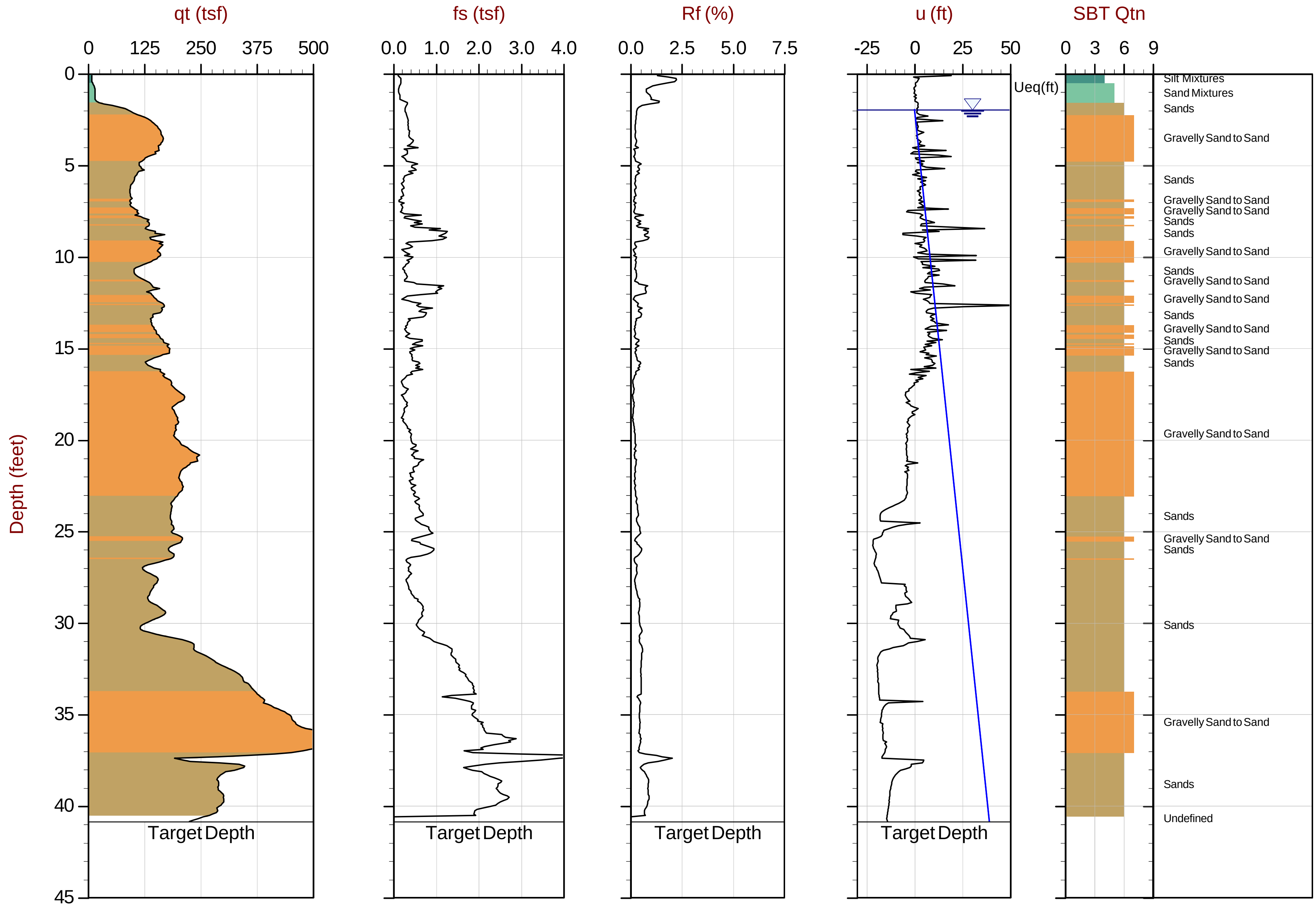
Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 10:17
Site: Rex Development

Sounding: CPT-05
Cone: 730:T1500F15U35



Max Depth: 12.450 m / 40.85 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP05.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.14768 Long: -122.16821

Equilibrium Pore Pressure (Ueq) — Assumed Ueq — Dissipation, Ueq achieved — Dissipation, Ueq not achieved — Hydrostatic Line

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

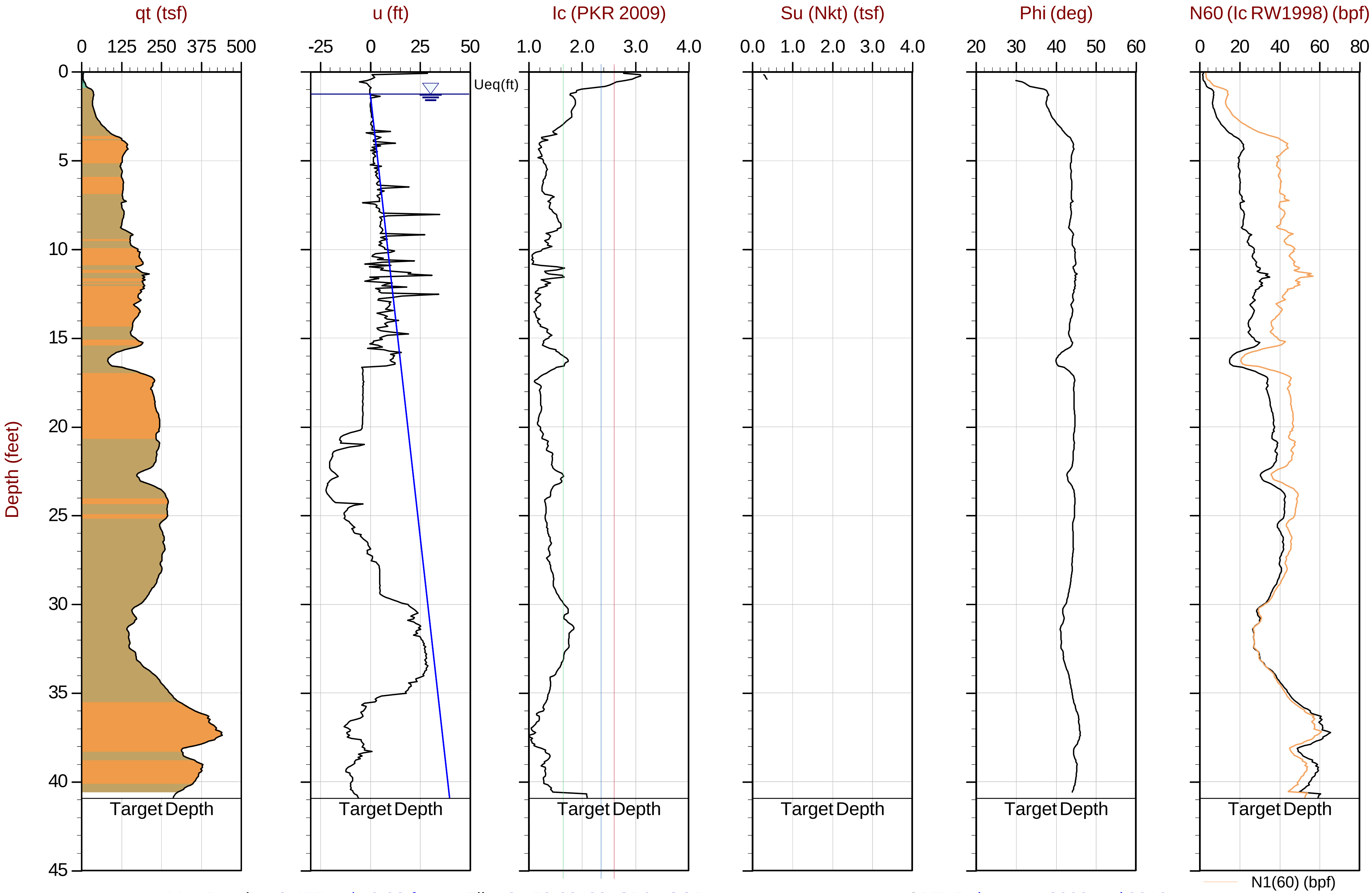
Advanced Cone Penetration Test Plots with Ic, Su, Phi and N(60)/N1(60)

ConeTec

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 14:07
Site: Rex Development

Sounding: CPT-01
Cone: 730:T1500F15U35



Max Depth: 12.475 m / 40.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP01.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.13860 Long: -122.16576

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

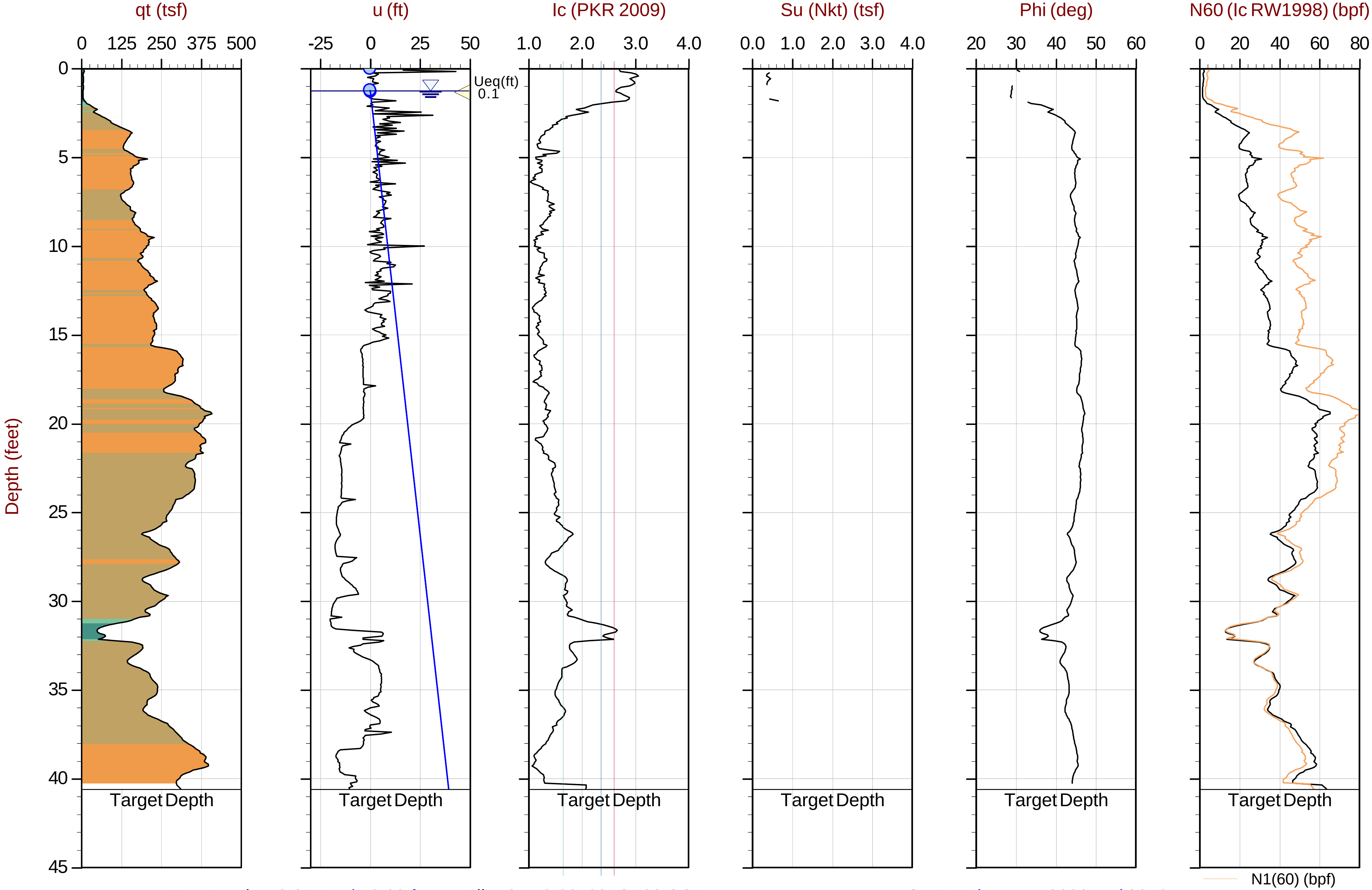
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 12:30
Site: Rex Development

Sounding: CPT-02
Cone: 730:T1500F15U35



Max Depth: 12.375 m / 40.60 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

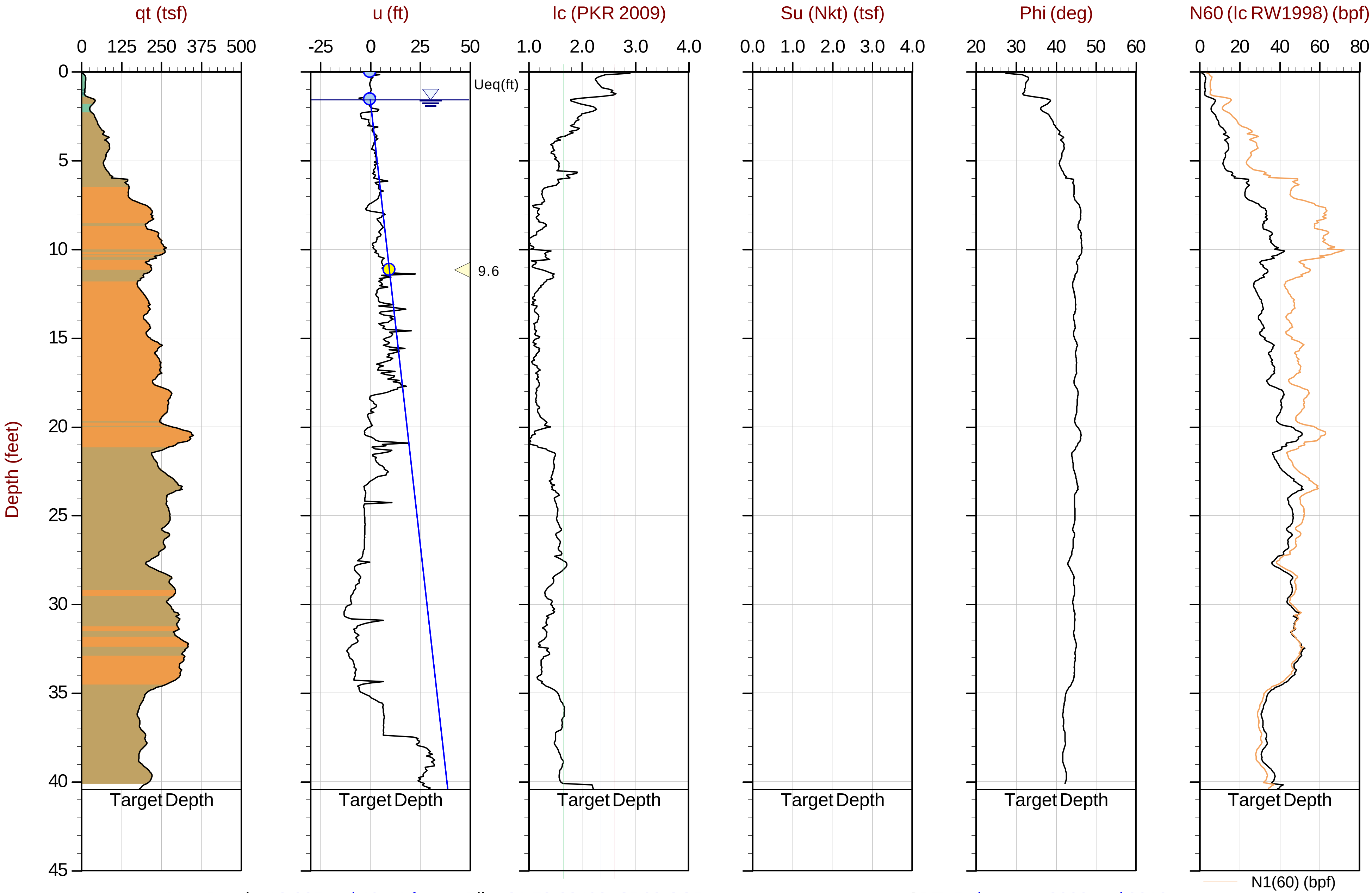
File: 21-59-22493_CP02.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.13976 Long: -122.16327

Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec
GeoEngineers
Job No: 21-59-22493
Date: 2021-06-11 09:07
Site: Rex Development
Sounding: CPT-03
Cone: 730:T1500F15U35



Max Depth: 12.325 m / 40.44 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP03.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.14251 Long: -122.16966

Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

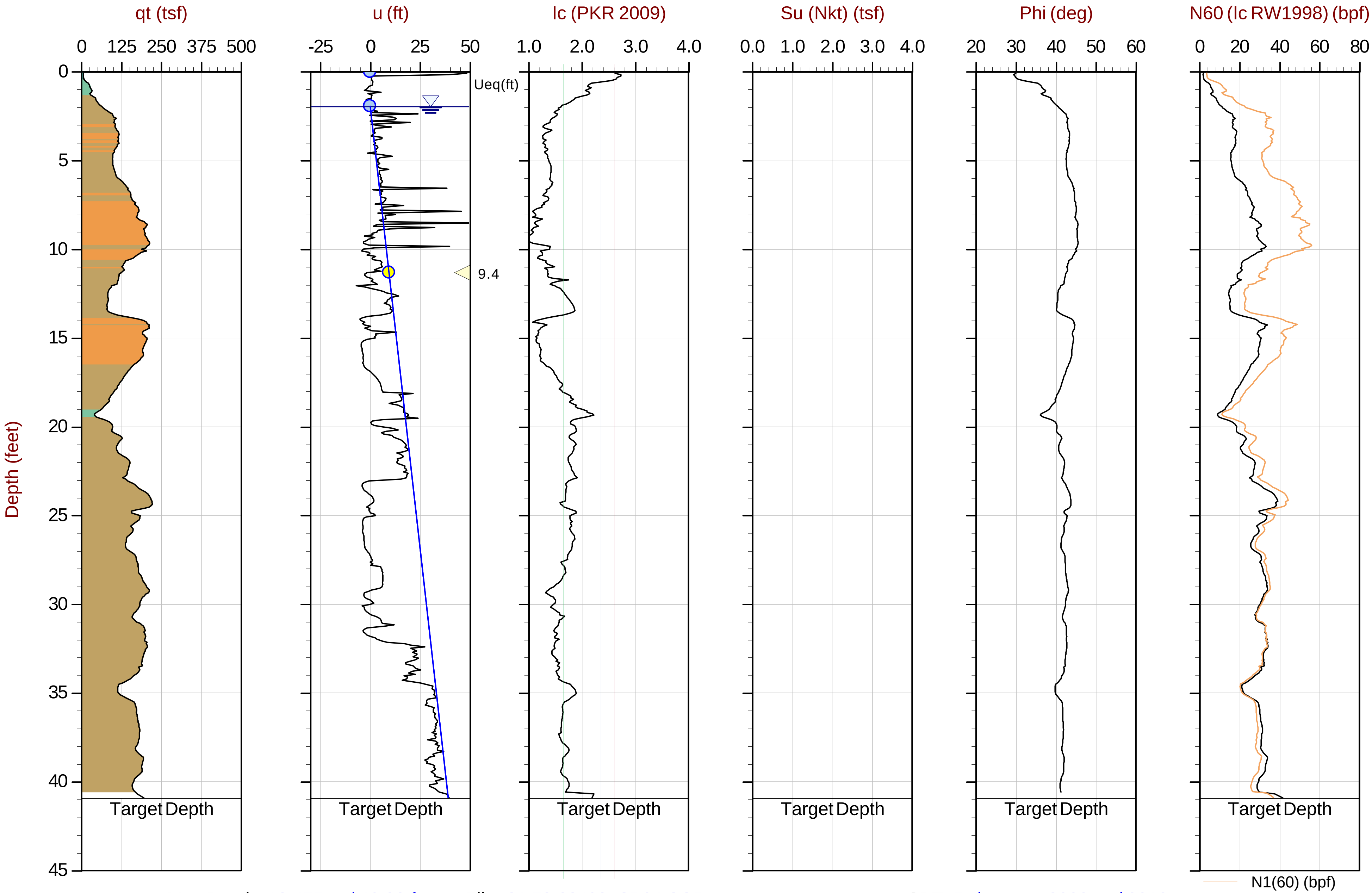
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 08:23
Site: Rex Development

Sounding: CPT-04
Cone: 730:T1500F15U35



Max Depth: 12.475 m / 40.93 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP04.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.14339 Long: -122.16422

Equilibrium Pore Pressure (Ueq) | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Hydrostatic Line

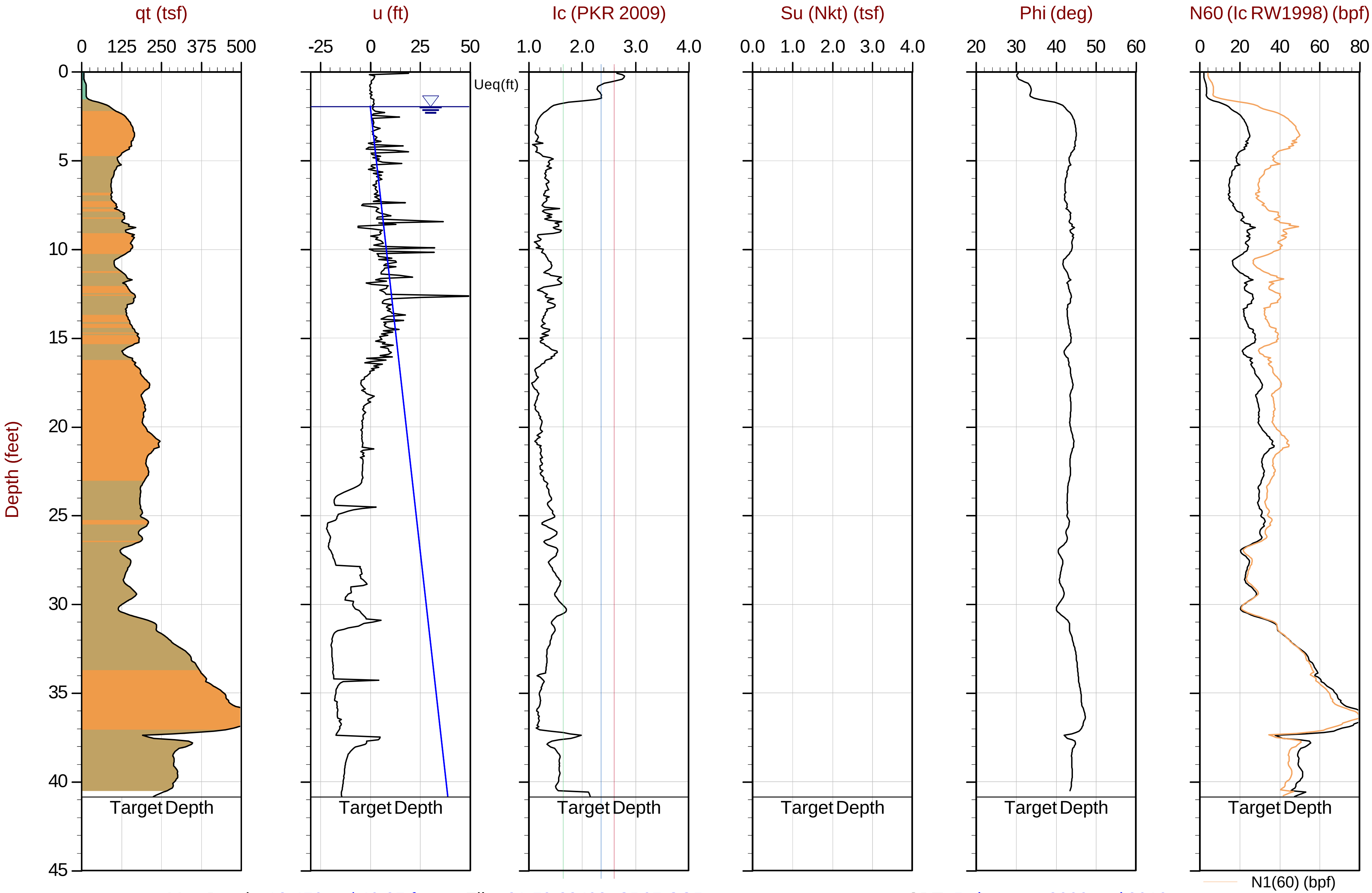
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 10:17
Site: Rex Development

Sounding: CPT-05
Cone: 730:T1500F15U35



Max Depth: 12.450 m / 40.85 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 21-59-22493_CP05.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt: 15.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 48.14768 Long: -122.16821

Equilibrium Pore Pressure (Ueq) Assumed Ueq Dissipation, Ueq achieved Dissipation, Ueq not achieved Hydrostatic Line

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Soil Behavior Type (SBT) Scatter Plots

ConeTec

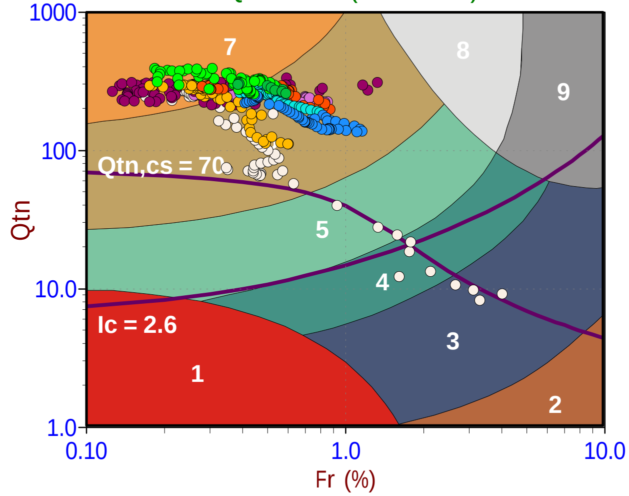
CONETEC

GeoEngineers

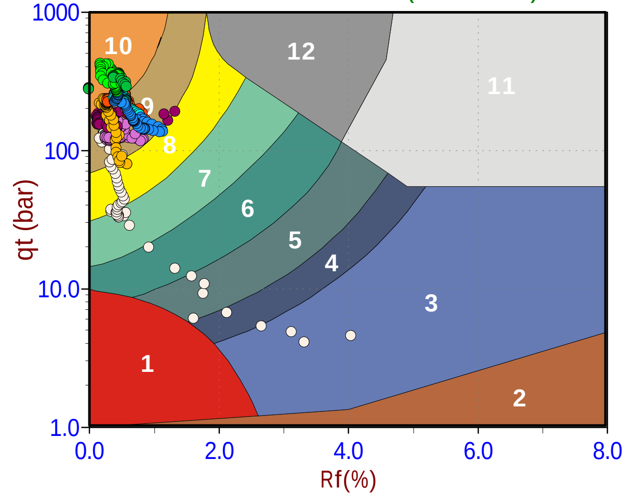
Job No: 21-59-22493
Date: 2021-06-11 14:07
Site: Rex Development

Sounding: CPT-01
Cone: 730:T1500F15U35

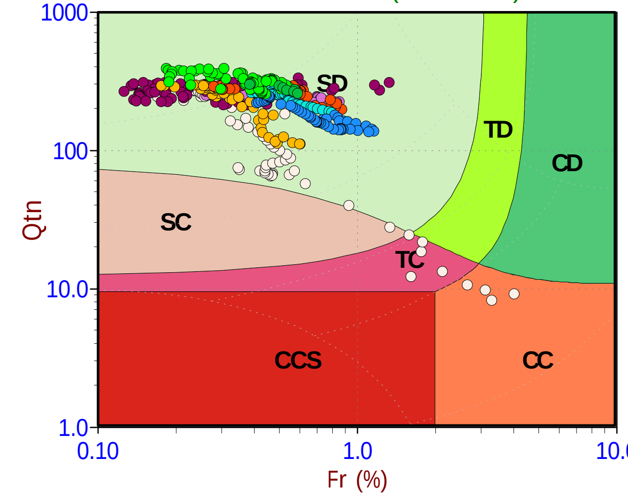
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

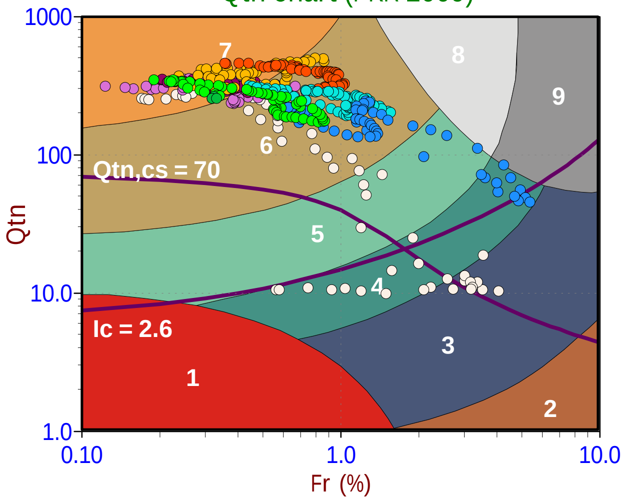
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend

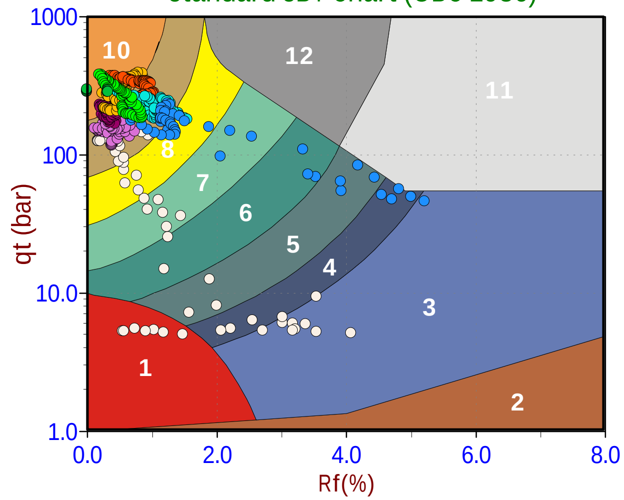
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

GeoEngineers	Job No: 21-59-22493	Sounding: CPT-02
	Date: 2021-06-11 12:30	Cone: 730:T1500F15U35
	Site: Rex Development	

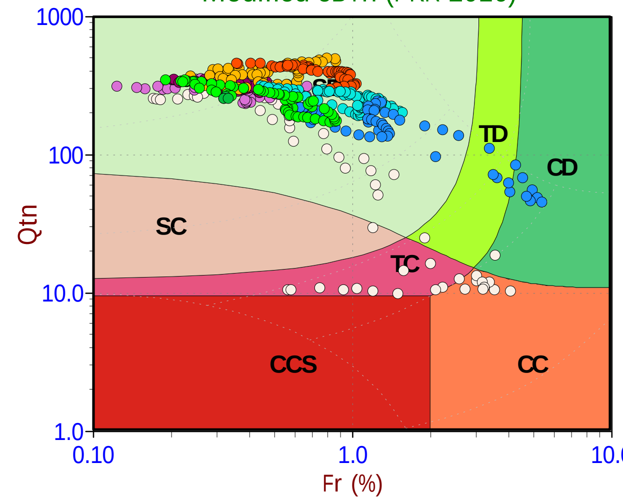
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend

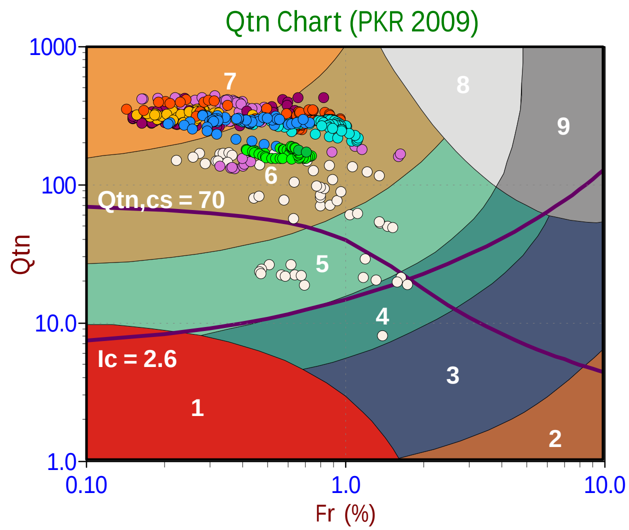
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

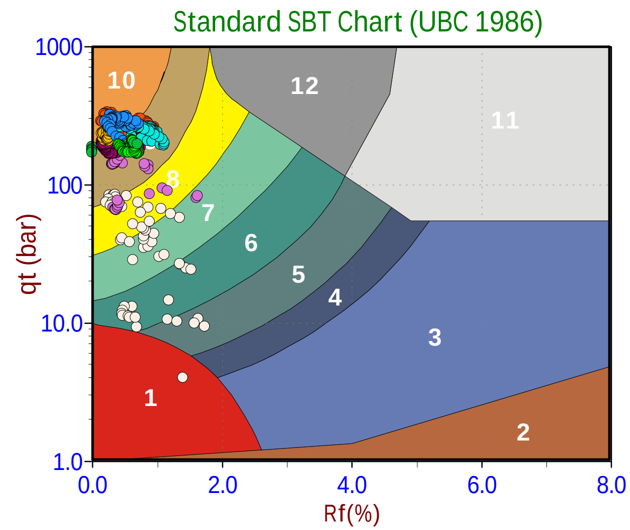
CONETEC

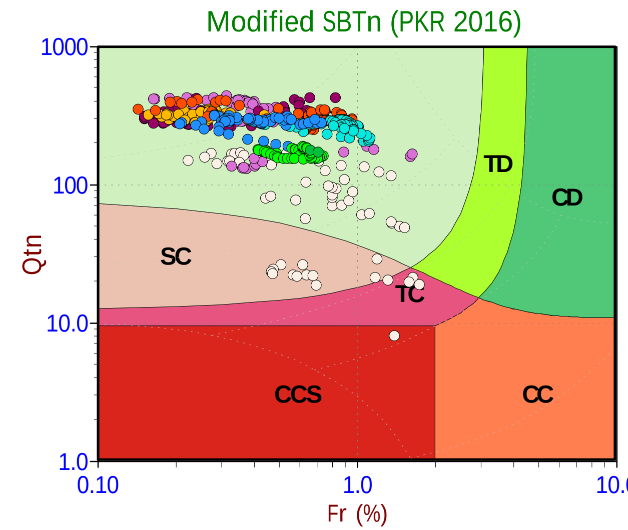
GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 09:07
Site: Rex Development

Sounding: CPT-03
Cone: 730:T1500F15U35







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

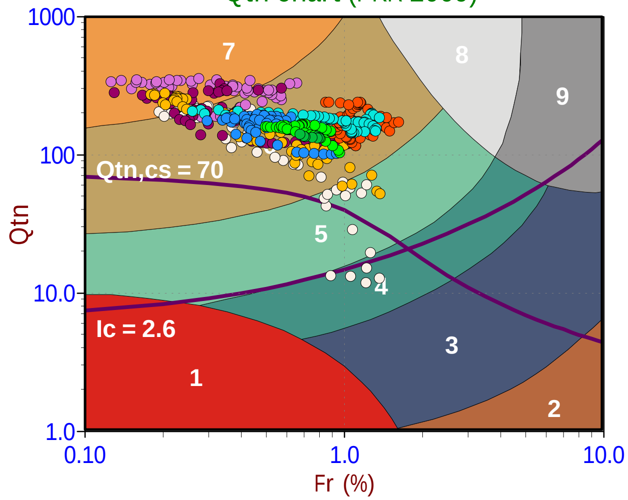
CONETEC

GeoEngineers

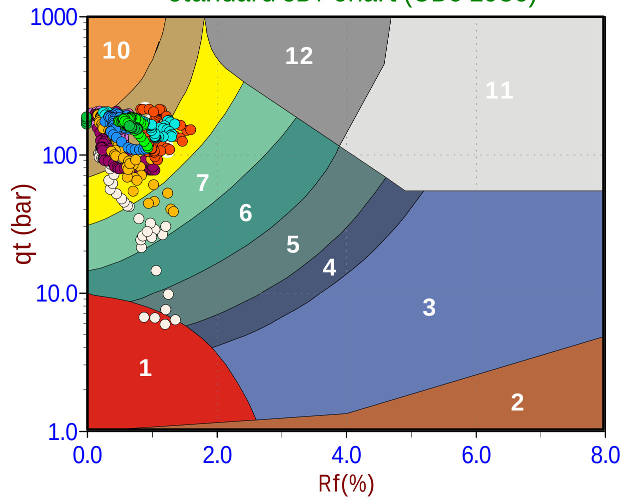
Job No: 21-59-22493
Date: 2021-06-11 08:23
Site: Rex Development

Sounding: CPT-04
Cone: 730:T1500F15U35

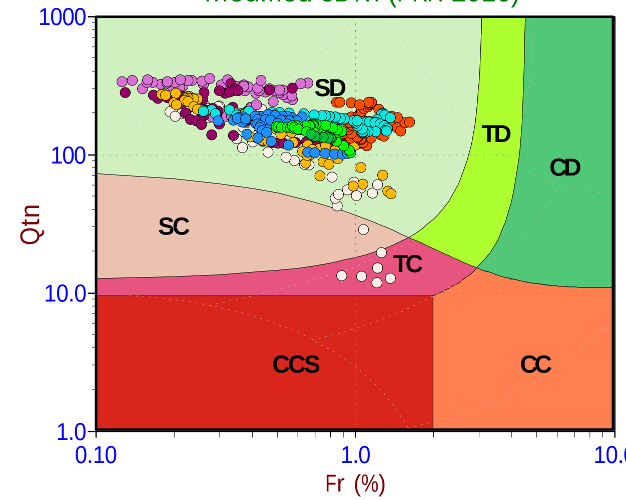
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend

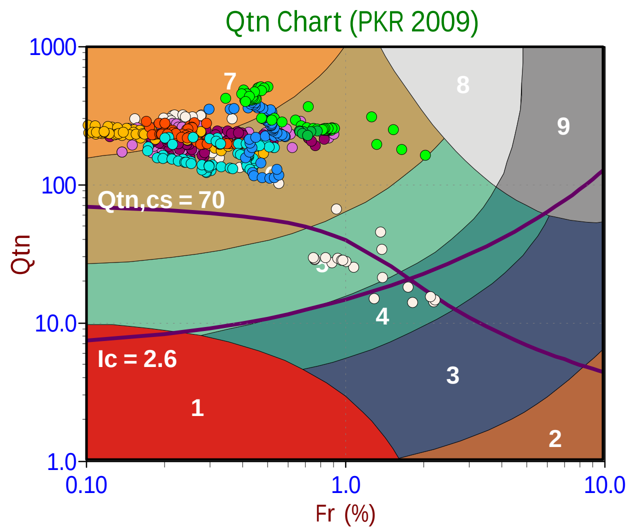
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

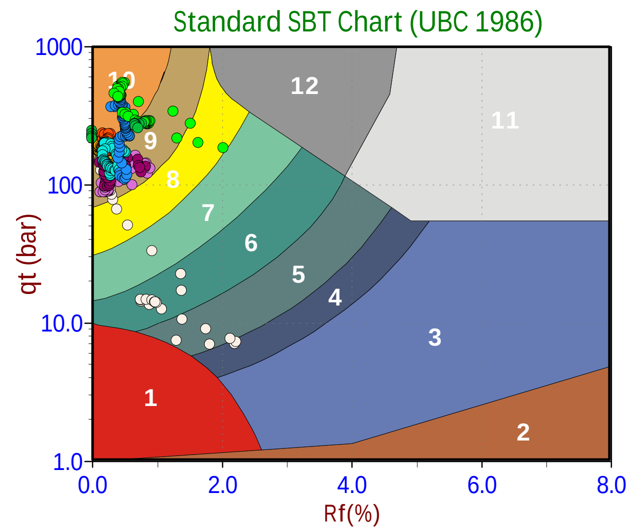
CONETEC

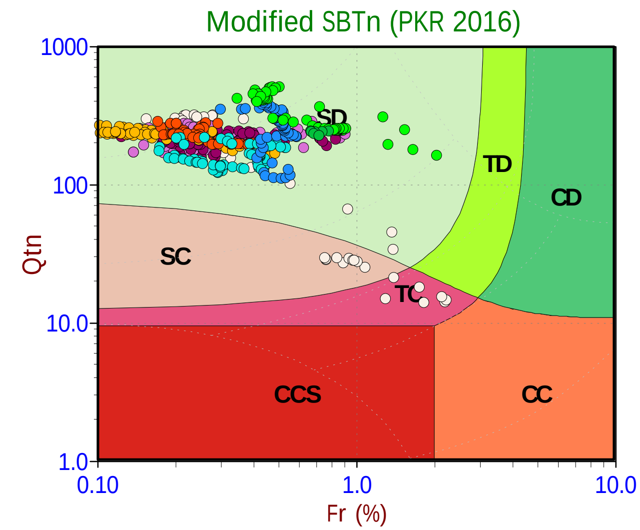
GeoEngineers

Job No: 21-59-22493
Date: 2021-06-11 10:17
Site: Rex Development

Sounding: CPT-05
Cone: 730:T1500F15U35







Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots

Job No: 21-59-22493
Client: GeoEngineers, Inc.
Project: Rex Development
Start Date: 11-Jun-2021
End Date: 11-Jun-2021

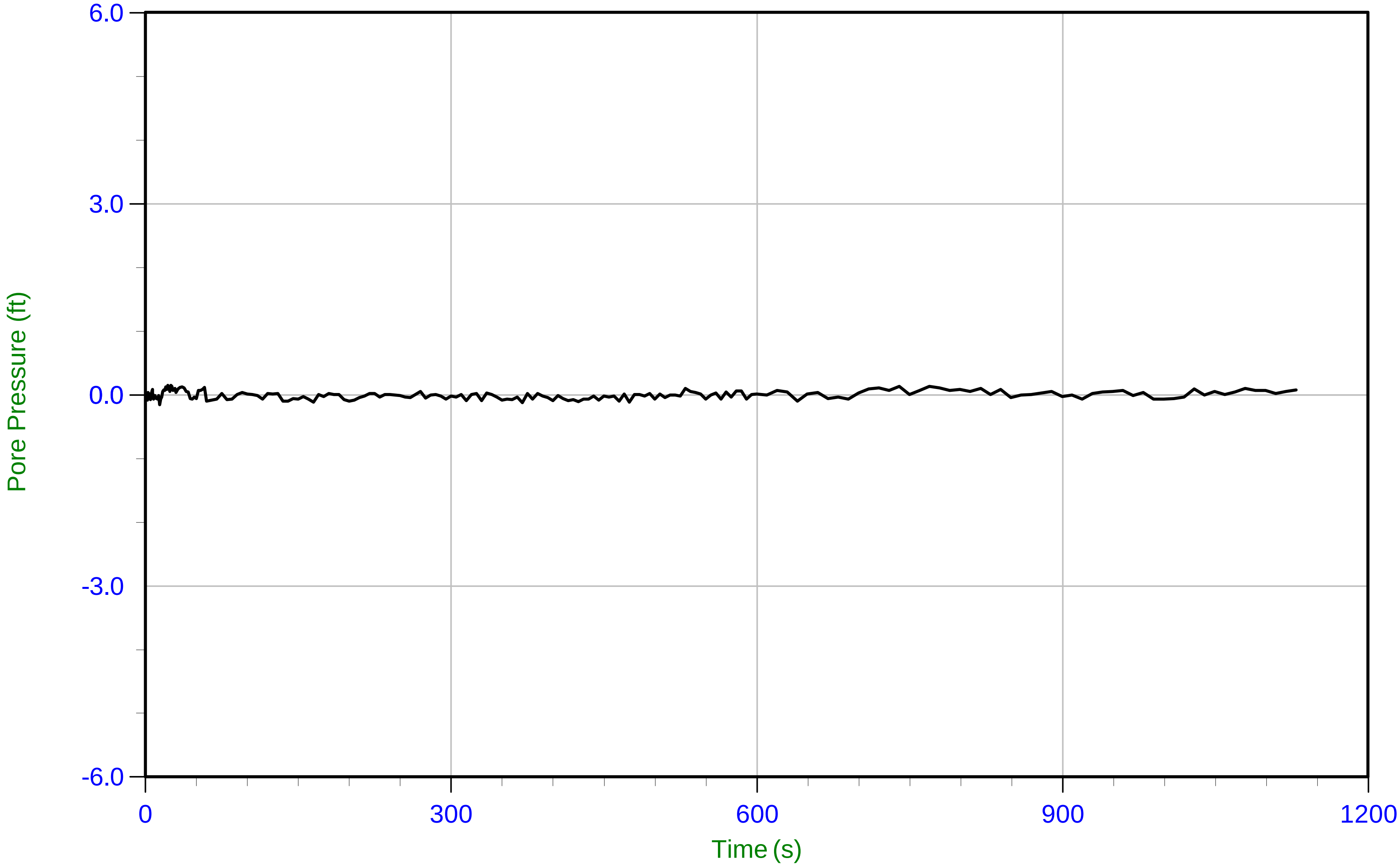
CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
CPT-02	21-59-22493_CP02	15.0	1129.9	1.3	0.1	1.2
CPT-03	21-59-22493_CP03	15.0	390.0	11.2	9.6	1.6
CPT-04	21-59-22493_CP04	15.0	250.0	11.3	9.4	2.0
Total Duration			29.5 min			

GeoEngineers

Job No: 21-59-22493
Date: 06/11/2021 12:30
Site: Rex Development

Sounding: CPT-02
Cone: 730:T1500F15U35 Area=15 cm²



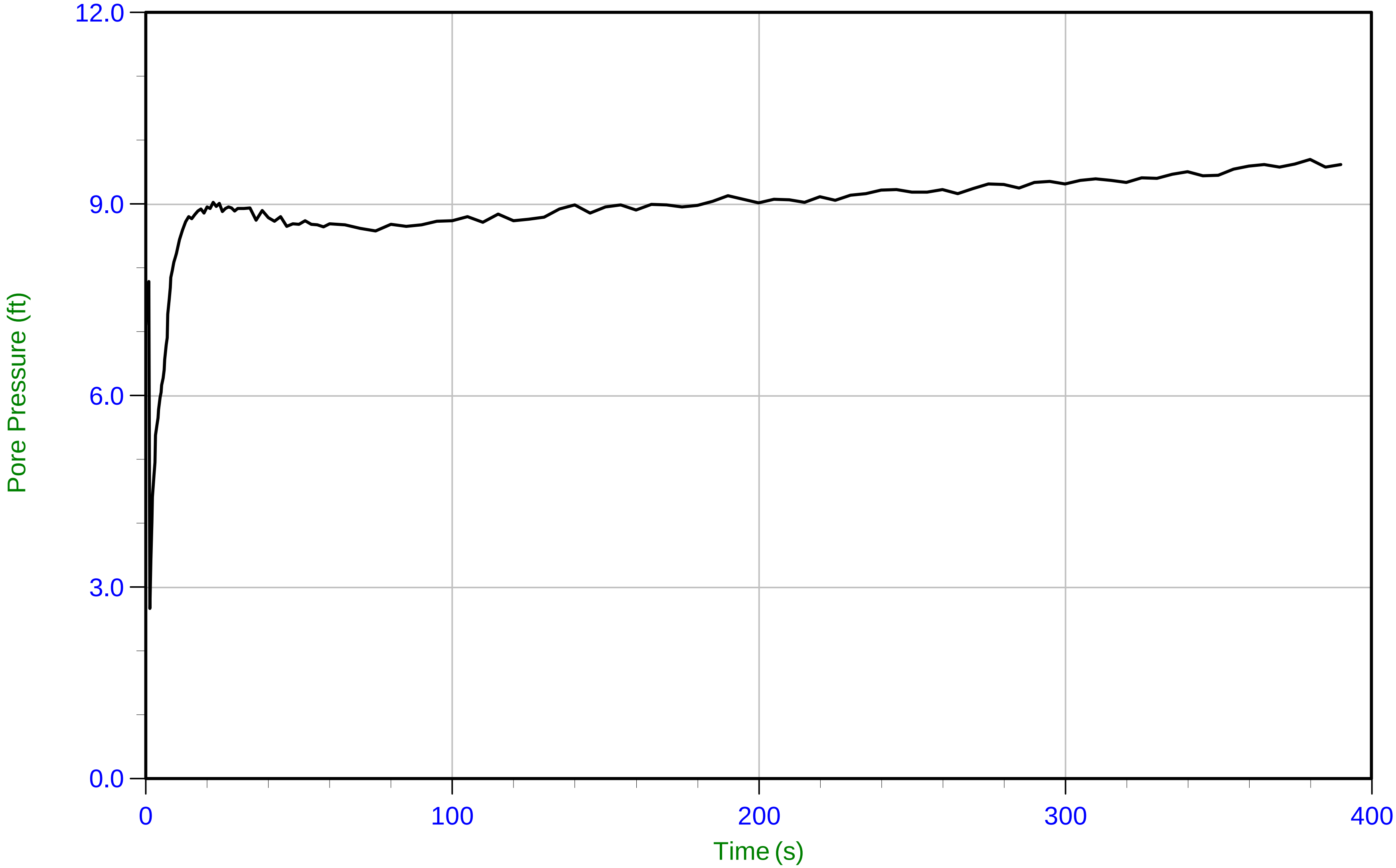
Trace Summary:

Filename: 21-59-22493_CP02.ppd2
Depth: 0.400 m / 1.312 ft
Duration: 1129.9 s

u Min: -0.2 ft
u Max: 0.1 ft
u Final: 0.1 ft

WT: 0.378 m / 1.241 ft
Ueq: 0.1 ft

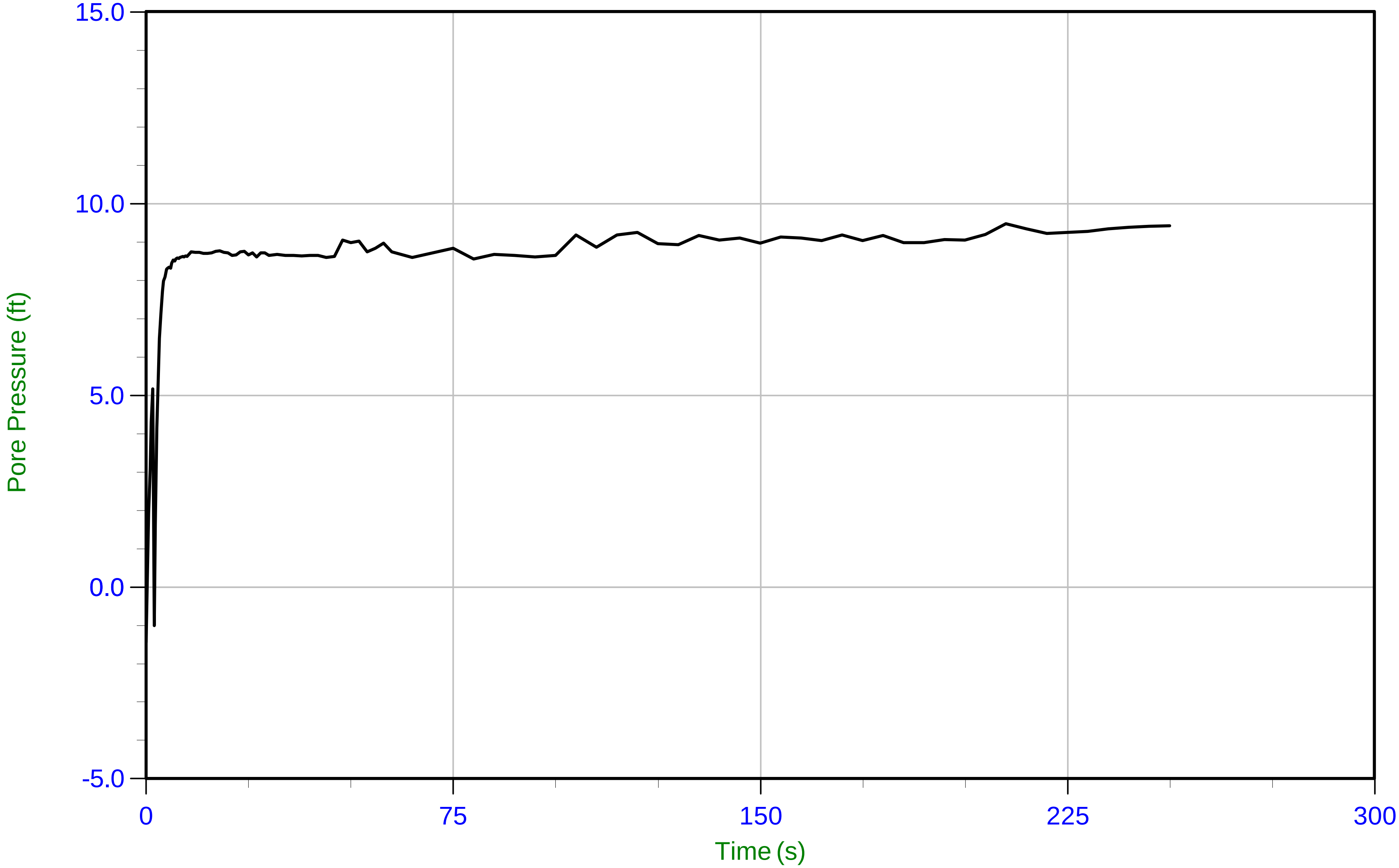
GeoEngineers	Job No: 21-59-22493 Date: 06/11/2021 09:07 Site: Rex Development	Sounding: CPT-03 Cone: 730:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 21-59-22493_CP03.ppd2	u Min: 2.7 ft	WT: 0.477 m / 1.564 ft
Depth: 3.400 m / 11.155 ft	u Max: 9.7 ft	Ueq: 9.6 ft
Duration: 390.0 s	u Final: 9.6 ft	

CONETEC	*GeoEngineers*	Job No: 21-59-22493 Date: 06/11/2021 08:23 Site: Rex Development	Sounding: CPT-04 Cone: 730:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 21-59-22493_CP04.ppd2	u Min: -1.5 ft	WT: 0.594 m / 1.949 ft
Depth: 3.450 m / 11.319 ft	u Max: 9.5 ft	Ueq: 9.4 ft
Duration: 250.0 s	u Final: 9.4 ft	

APPENDIX C
Logs from Previous Studies

APPENDIX C
PREVIOUS STUDIES

GeoEngineers reviewed logs of previous explorations completed in the general vicinity of the currently planned project. The locations of previous explorations are shown on the Site Plan, Figure 2. The logs of the previous explorations are presented in this appendix and include the following:

- The logs of four borings (B-2 through B-5) completed in 2018 by GeoEngineers, Inc. in the report entitled "Geotechnical Engineering Services, 156th Street NE, 160th Street NE and 51st Avenue NE Improvements, Marysville, Washington." Dated September 110, 2018.

Drilled	Start 4/12/2018	End 4/12/2018	Total Depth (ft)	21.5	Logged By CWM Checked By CWM	Driller	Advanced Drilling Technologies, Inc.	Drilling Method	Hollow-stem Auger

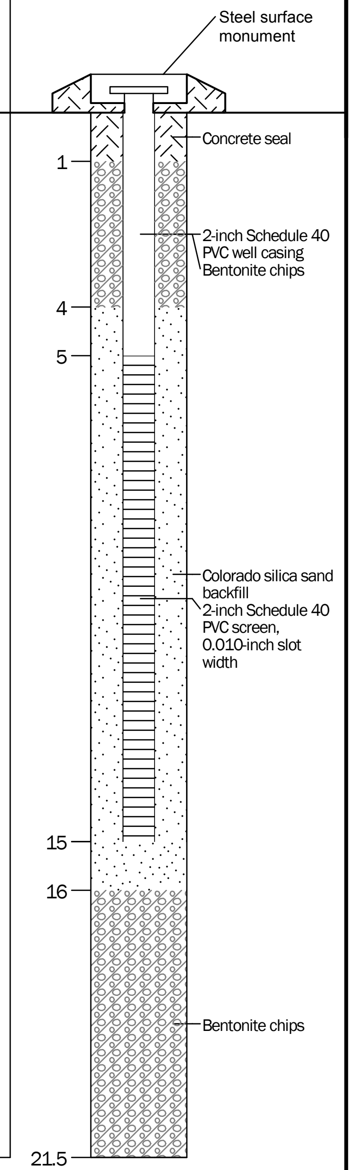
Hammer Data	Autohammer	Drilling Equipment	Diedrich D-50 drill rig	DOE Well I.D.: BKP-229 A 2 (in) well was installed on 4/12/2018 to a depth of 21.5 (ft).	
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)			
Easting (X) Northing (Y)		Horizontal Datum			

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
4/26/2018	1.80	

Notes:

Elevation (feet)	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								SOD	2 inches of sod		
							▼ (1.80)		SM	Brown silty fine to medium sand with organic matter (very loose, wet) (fill)		
		X	6	1		1 %F					36	31
	5	X	6	1		2 SA			SP	Gray fine to coarse sand with occasional gravel (very loose, wet)	30	3
	10	X	5	1		3						
	15	X	10	2		4				(Driller added water)		
	20	X	18	1		5						

WELL LOG



Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on . Vertical approximated based on .

Log of Boring with Monitoring Well B-2

GEOENGINEERS

Project: City of Marysville - 156th, 160th and 51st
Project Location: Marysville, Washington
Project Number: 0925-017-00

Figure A-3
Sheet 1 of 1

Drilled	Start 4/12/2018	End 4/12/2018	Total Depth (ft)	16.5	Logged By CWM / Checked By CWM	Driller	Advanced Drilling Technologies, Inc.	Drilling Method	Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Autohammer	Drilling Equipment	Diedrich D-50 drill rig
Easting (X) / Northing (Y)		System Datum		See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							SOD	2 inches of sod			
								SM	Brown silty fine to medium sand with gravel and trace organic matter (loose, moist) (fill)			
		X	3	4		1 / MC				26		Groundwater observed at approximately 3 feet below ground surface during drilling
	5	X	14	11		2		SP-SM	Gray fine to coarse sand with silt (medium dense, moist to wet) (recessional outwash)			
								SM	Gray silty fine to coarse sand with organic matter (medium dense, wet)			
	10	X	12	16		3						
								SP-SM	Gray fine to coarse sand with silt (medium dense, wet)			
	15	X	15	12		4						Driller added water

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on . Vertical approximated based on .

Log of Boring B-3

GeoEngineers

Project: City of Marysville - 156th, 160th and 51st
Project Location: Marysville, Washington
Project Number: 0925-017-00

Drilled	Start 4/12/2018	End 4/12/2018	Total Depth (ft) 16.5	Logged By CWM / Checked By CWM	Driller: Advanced Drilling Technologies, Inc.	Drilling Method: Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Autohammer	Drilling Equipment: Diedrich D-50 drill rig
Easting (X) / Northing (Y):	System / Datum:	See "Remarks" section for groundwater observed

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							SOD	2 inches of sod			
								SM	Brown silty fine to medium sand with occasional gravel and organic matter (medium dense, wet) (fill)			
			18	10		1A %F				43	30	Groundwater observed at approximately 2½ feet below ground surface during drilling
						1B		SP-SM	Gray fine to medium sand with silt (medium dense, wet)			
	5		18	9		2 %F			Becomes fine to coarse with gravel, becomes loose	19	5	
	10		18	8		3			Becomes without gravel			Driller added water
									Gray fine to medium sand with silt (medium dense, wet) (recessional outwash)			
	15		15	16		4						Driller added water

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on . Vertical approximated based on .

Date:7/24/18 Path:P:\0\0925017\GINT\092501700.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_GEOTECH_STANDARD_%F_NO_GW

Log of Boring B-4

GeoEngineers

Project: City of Marysville - 156th, 160th and 51st
Project Location: Marysville, Washington
Project Number: 0925-017-00

Figure A-5
Sheet 1 of 1

Drilled	Start 4/13/2018	End 4/13/2018	Total Depth (ft)	21.5	Logged By CWM	Checked By CWM	Driller	Advanced Drilling Technologies, Inc.	Drilling Method	Hollow-stem Auger

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Autohammer	Drilling Equipment	Diedrich D-50 drill rig
Easting (X) Northing (Y)		System Datum		See "Remarks" section for groundwater observed	
Notes:					

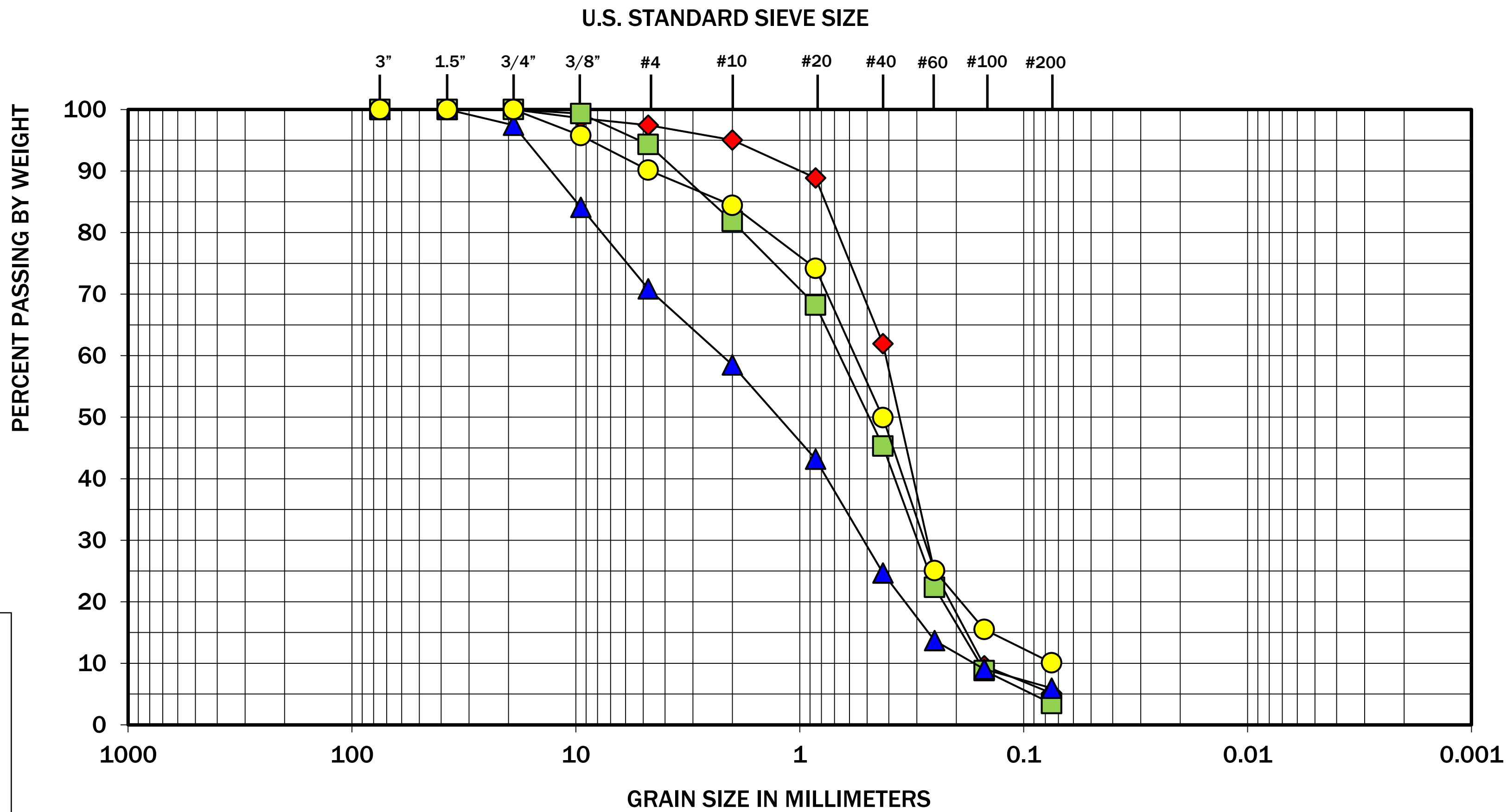
Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							AC	8½ inches of asphalt concrete			
								SP-SM	Brown/black fine to coarse sand with silt and gravel (medium dense, moist) (fill)			
			12	10		1 SA				9	6	
	5		12	12		2		SP-SM	Gray fine to medium sand with silt (medium dense, wet) (recessional outwash)			Groundwater observed at approximately 4½ feet below ground surface during drilling
	10		18	13		3			Becomes fine to coarse			Driller added water
	15		18	18		4			Becomes fine to medium			Driller added water
	20		18	21		5						Driller added water

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on . Vertical approximated based on .

Log of Boring B-5

GeoEngineers

Project: City of Marysville - 156th, 160th and 51st
Project Location: Marysville, Washington
Project Number: 0925-017-00



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	B-1	5	25	Fine to medium sand with silt (SP-SM)
■	B-2	5	30	Fine to coarse sand with occasional gravel (SP)
▲	B-5	2.5	9	Fine to coarse sand with silt and gravel (SP-SM)
●	B-6	5	19	Fine to medium sand with silt and occasional gravel (SP-SM)

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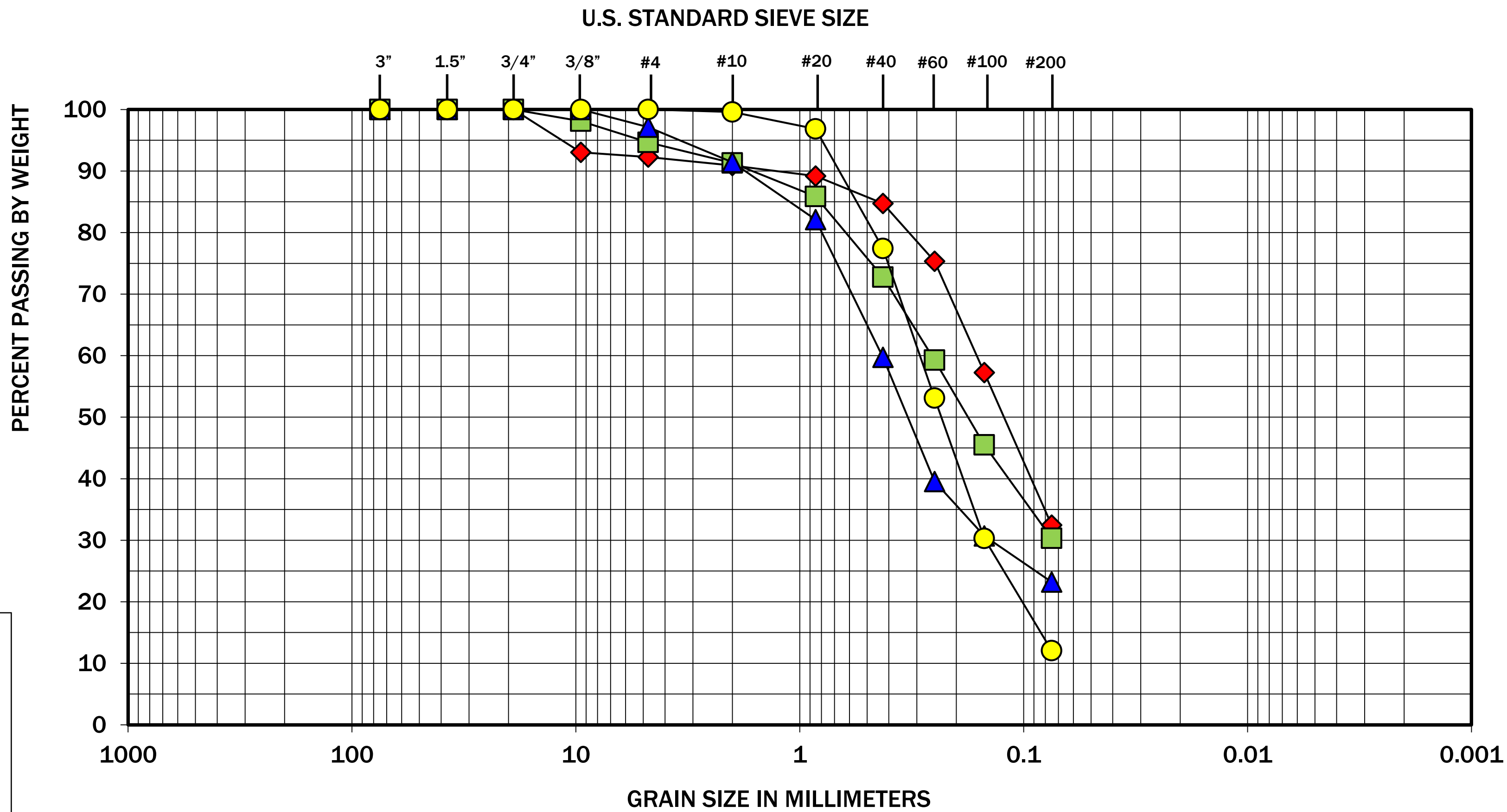
The grain size analysis results were obtained in general accordance with ASTM D 6913.

GeoEngineers

Sieve Analysis Results

156th St NE, 160th St NE, and 51st Ave NE Improvements
Marysville, Washington

Figure B-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	B-1	2.5	30	Silty fine sand with occasional gravel (SM)
■	B-4	2.5	43	Silty fine to medium sand with occasional gravel (SM)
▲	B-7	2.5	21	Silty Fine to medium sand (SM)
●	B-10	2.5	25	Silty fine to medium sand (SM)

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The grain size analysis results were obtained in general accordance with ASTM D 6913.

Sieve Analysis Results

156th St NE, 160th St NE, and 51st Ave NE Improvements
Marysville, Washington

GeoEngineers

Figure B-2

APPENDIX D
Report Limitations and Guidelines for Use

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REPORT LIMITATIONS AND GUIDELINES FOR USE

This appendix provides information to help you manage your risks with respect to the use of this geotechnical data report. This report does not include design recommendations.

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